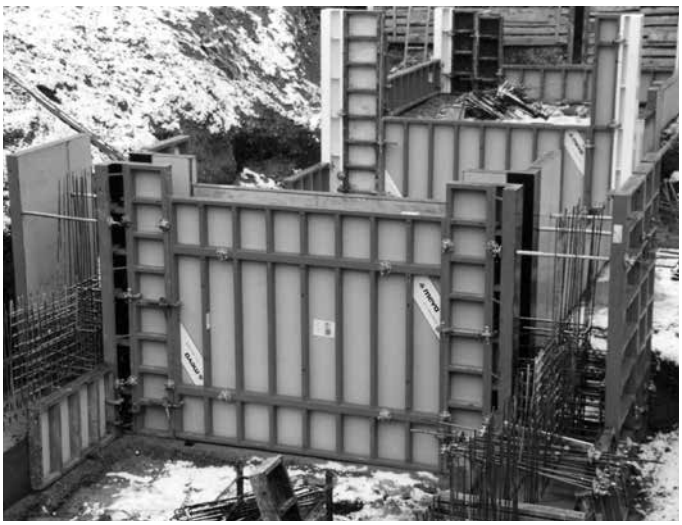
meva

StarTec / AluStar

Technical Instruction Manual



Product features

The StarTec wall formwork is a frame formwork system made of steel while the AluStar wall formwork is a crane-independent frame formwork system made of aluminium. Both systems can be freely combined without the need for adapters.

AluStar and StarTec are ideally suited for alternate building projects in the housing and commercial construction and ideal systems for medium-sized companies.

The annealed plastic coating ensures an improved rust and corrosion protection which prolongs the material's lifespan and reduces cleaning. The steel frames are also primed and cavity-sealed.

The MEVA multi-function profile with welded nuts and DW-threads facilitates the connection of all accessories, e.g.
- push-pull props and alignment rails with flange screws
- walkway brackets with integrated safety pins
- DW tie rods of any length when bridging problem areas

The StarTec and AluStar panels are equipped with a 17 mm thick alkus all-plastic facing. StarTec panels that are 135 and 240 cm wide have a 20 mm alkus facing. For details on alkus refer to p. ST/AS-7.

StarTec panels handle a fresh concrete pressure of up to 70 kN/m² or 55 kN/m² while AluStar panels are designed to handle a fresh concrete pressure of up to 60 kN/m². For further details see p. ST/AS-11.

Safety equipment
The Securit safety equipment developed for the StarTec system protects workers from falling down while at the same time enhancing work safety and efficiency. For details see the ST Securit Technical Instruction Manual.

Abbreviations, measurements, figures and tables
The abbreviation ST is used for StarTec and the abbreviation AS for AluStar.

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. 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).

Any further abbreviations are explained where they are used the first time.

Measurements: This manual uses the metric system and thus m (for metre), cm (for centrimetre) and mm (for millimetre). Dimensions without a measure are in cm.

The page numbers in this manual start with the product abbreviation AS/ST. 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 this or in another manual.

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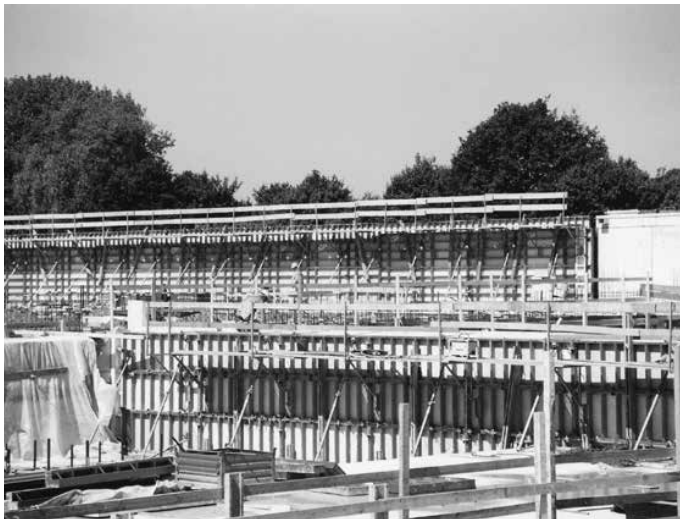

Please observe

This Technical Instruction Manual contains 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 this manual, 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 this manual 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 this manual. 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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Fig. 4.6
Transport hole for attaching the crane slings 40. It allows a fast loading and unloading of panel stacks as well as moving them at ground or slab level (see p. ST/AS-74).

Fig. 4.7
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 135 and 240 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 descriptions and reference numbers refer to the Product List.

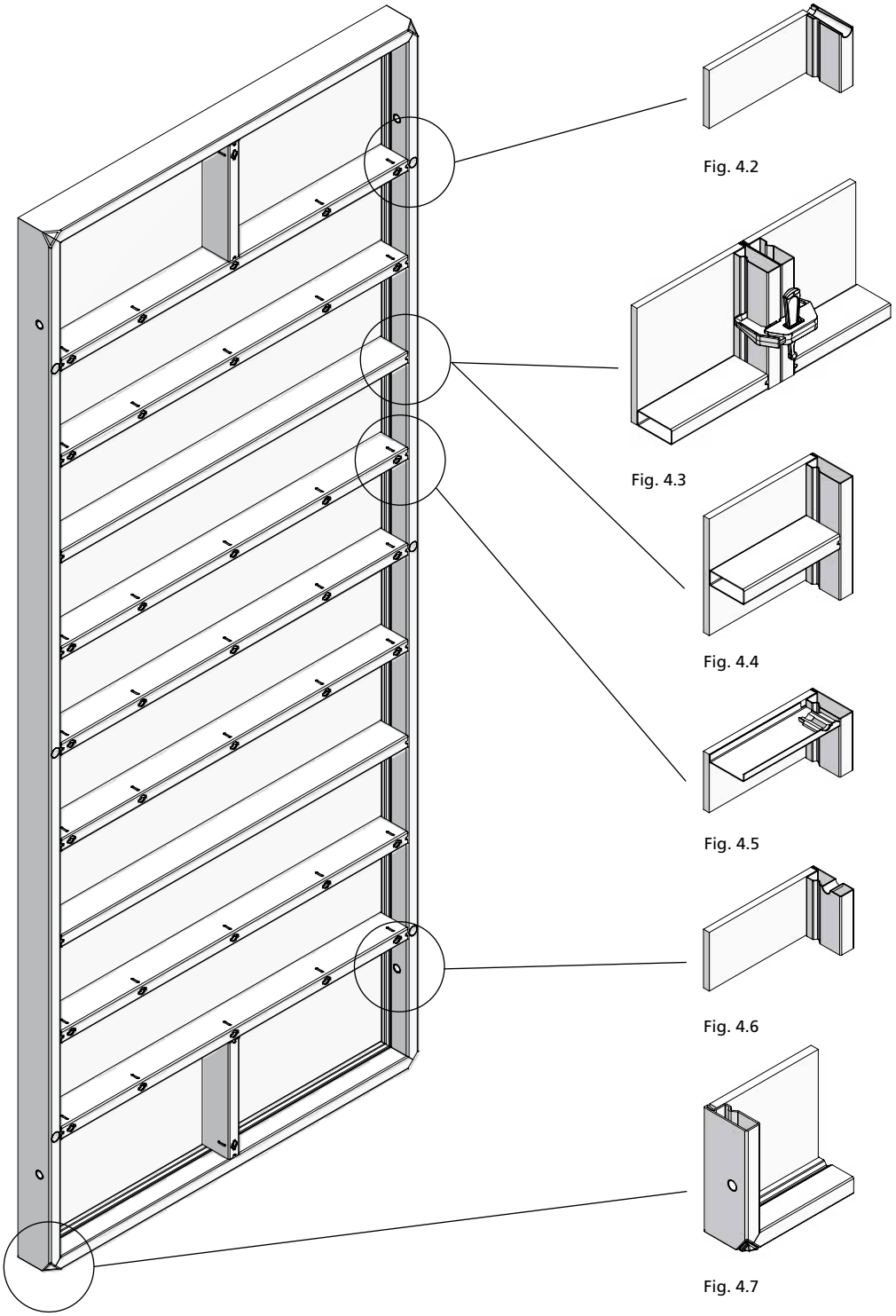

Fig. 4.1 StarTec 330/135

Fig. 4.2

Fig. 4.3

Fig. 4.4

Fig. 4.5

Fig. 4.6

Fig. 4.7

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Large-size StarTec panel 270/240

The large-size panel 270/240 (Fig. 5.1) is ideally suited for vertical and horizontal use. Since the tie holes are located inside, the 6.48 m² facing requires only 4 ties (Fig. 5.1).

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. ST/ AS-39).

When extending panels horizontally, a uniform joint pattern with vertical panel joints is achieved if all horizontally used and extended panels have the same standard height.

The panels can be freely combined vertically and horizontally (Fig. 5.2).

Panels with a width of 135 and 240 cm are equipped with 4 bump notches that are diagonally welded in. An exact panel positioning in all directions is feasible without a hammer (ST/AS-4.7).

The large panels can be transported without problems since, due to their width of 240 cm, they fit on any truck. Please observe the transport guidelines on page ST/AS-76.

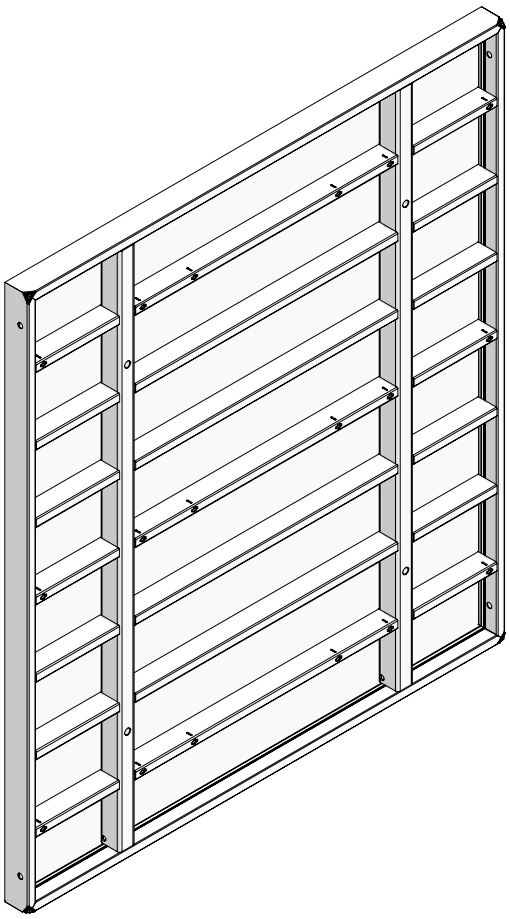

Fig. 5.1

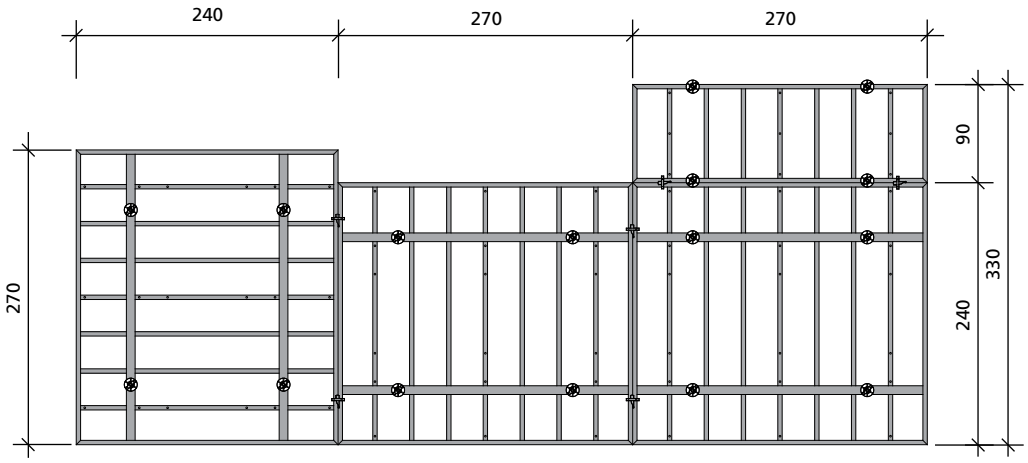

Fig. 5.2

Description	Ref. No.
ST panel AL 20 270/240	21-200-03

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The AluStar panel

Fig. 6.2
Tie hole with conical anchor sleeve
(see p. ST/AS-9)

Fig. 6.3
The panels are connected with the AS assembly lock (see p. AS/ ST-8).

Fig. 6.4
Cross stiffener made of closed aluminium profile

Fig. 6.5
Welded DW 15 nut for fast and solid attachment of accessories at the multi-function profile (see p. ST/AS-13)

Fig. 6.6
The aluminium frames are mitre-welded and consist of a two-chamber profile equipped with a groove and an edge protection.

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

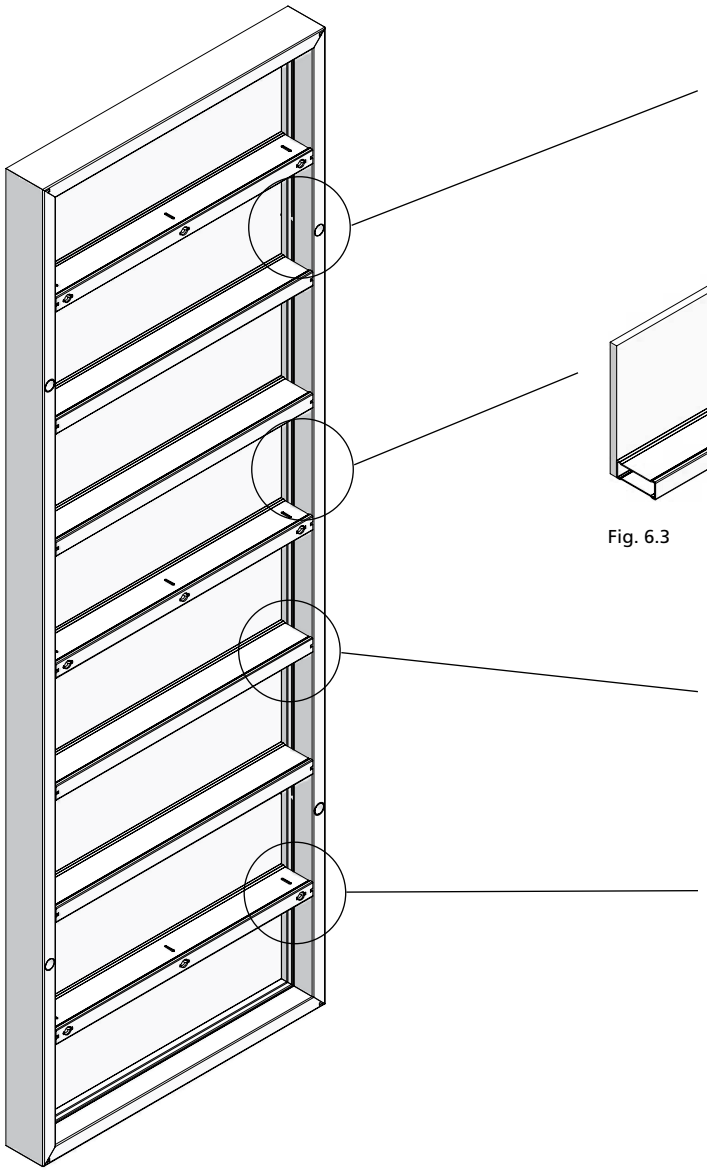

Fig. 6.1 AluStar 270/90

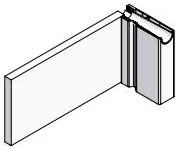

Fig. 6.2

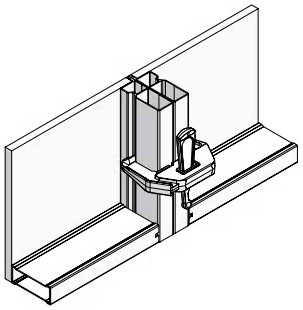

Fig. 6.3

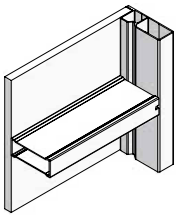

Fig. 6.4

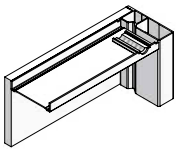

Fig. 6.5

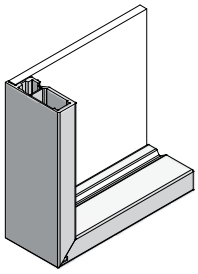

Fig. 6.6

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alkus plastic sheet

The polypropylene and aluminium composite forming face (Fig. 7.3) 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.

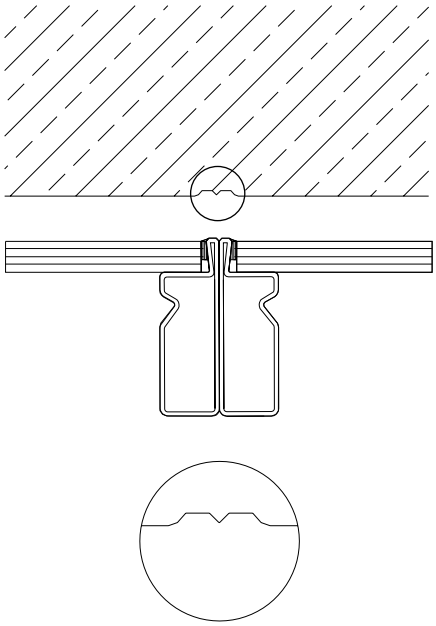

Fig. 7.1 Frame profile with plywood face: Negative imprint in the concrete when using panels with a conventional plywood face

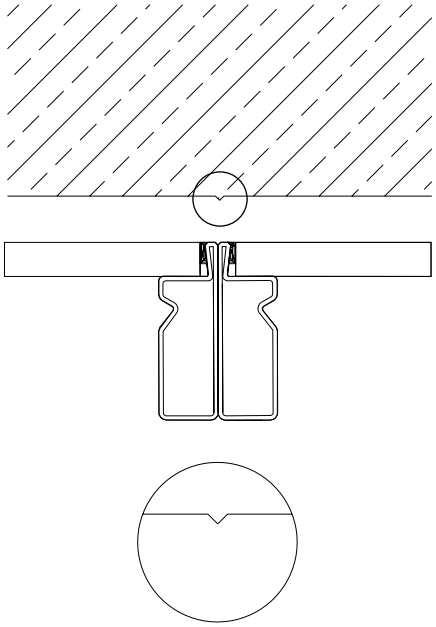

Fig. 7.2 Frame profile with alkus plastic sheet: Smooth and even concrete surface as there is no projecting profile of the panel frame

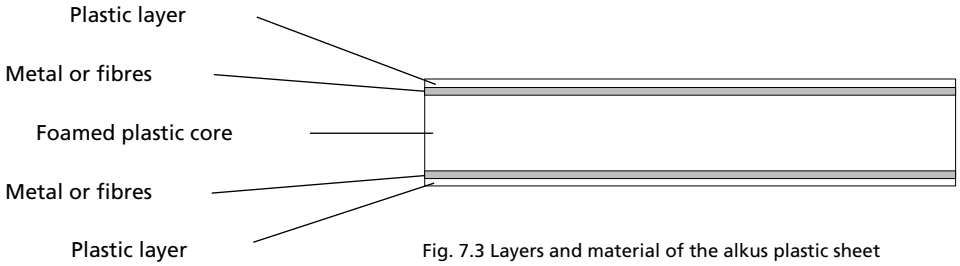

Fig. 7.3 Layers and material of the alkus plastic sheet

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Panel connection

The fast and efficient connection of the panels is accomplished with the AS assembly lock (Fig. 8.1) 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. Since the lock weighs only 2 kg, it can easily be attached with only one hand.

Its 5-point contact (Fig. 8.2 and 8.3) 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.

Panels up to a height of 270 cm are usually connected with 2 assembly locks and those with a height of 330 cm with 3 assembly locks.

Walls to be poured with a top architectural concrete surface require 1 additional assembly lock per joint if panels are 270 cm high (or higher).

Two assembly locks are required for horizontal panel connection.

For the quantity of assembly locks required for outside corners and columns see p. ST/AS-22 through 24 und and pages ST/AS-58 through 59 respectively.

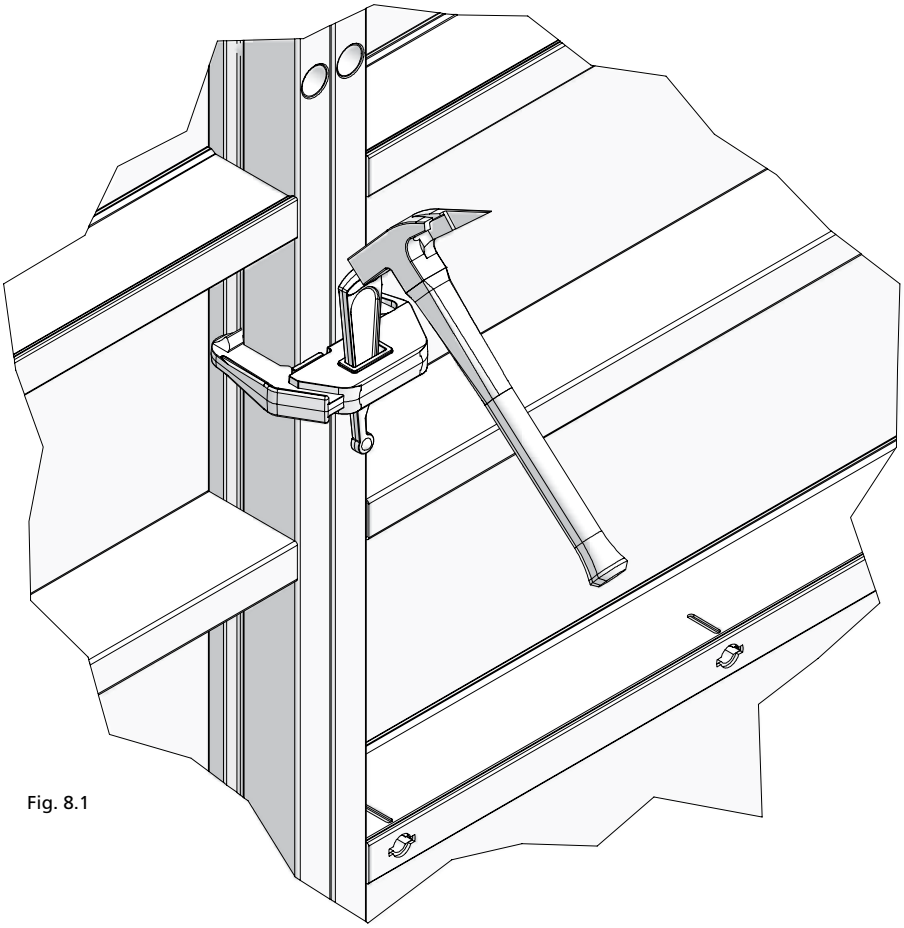

Fig. 8.1

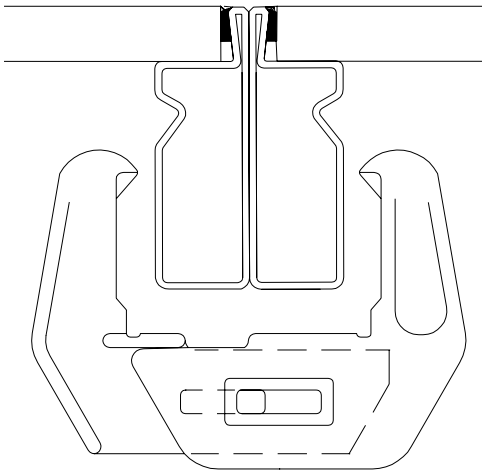

Fig. 8.2

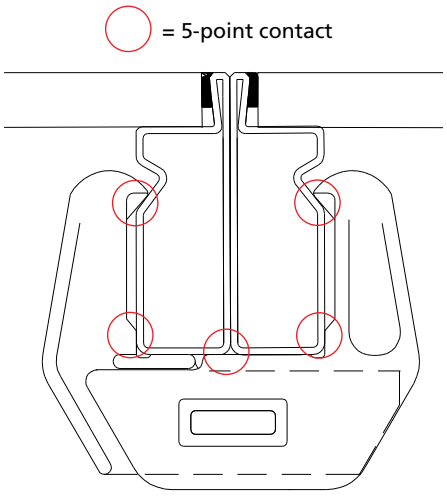

Fig. 8.3

Description	Ref. No.
AS assembly lock	**29-205-00**

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Tie holes

The conical anchor sleeves for the insertion of the tie rods DW15/90 (Fig. 9.1 and 9.2).

The ST/AS formwork can be inclined up to 4 cm per metre. Inclined formwork requires articulated flange nuts and must be secured against uplift.

The articulated flange nut 15/120 must be used for the AluStar formwork. Its revolving plate and nut prevent the panel from being damaged. Use a spanner SW 27 (Fig. 9.3) or a hammer (Fig. 9.4) to handle the articulated flange nut 15/120 without damaging it.

When assembling 2 panels with different widths, the ties should always be placed through the panel with the larger width (Fig. 9.5).

Always use all tie holes, i.e. all usable tie holes must be used for tieing and non usable tie holes closed with plug D20.

When using Uni-tie claws, the ties can be placed at the outside edge of the panels, e.g. when forming stop ends, or directly above the panels when forming foundations (Fig. 9.6).

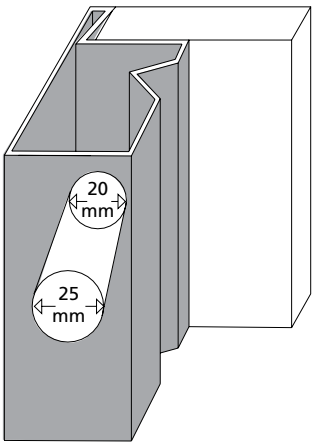

Fig. 9.1 StarTec

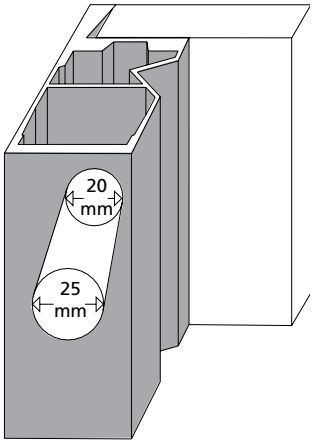

Fig. 9.2 AluStar

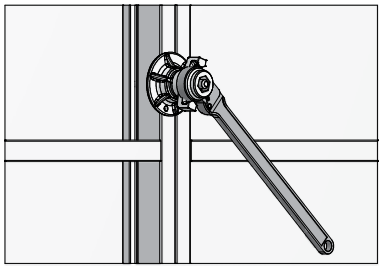

Fig. 9.3

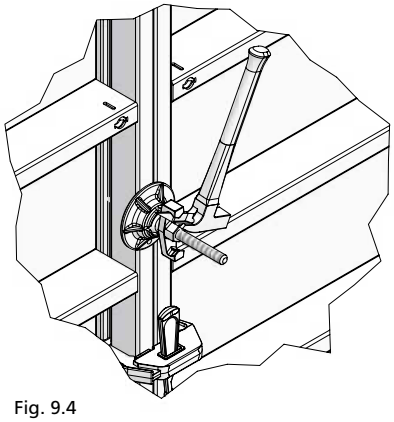

Fig. 9.4

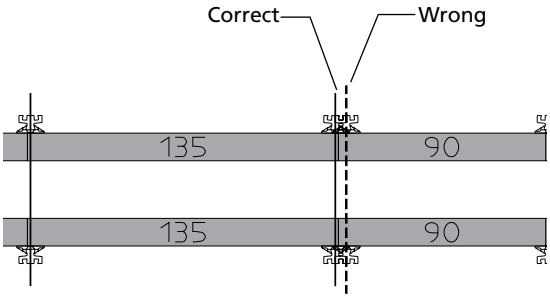

Fig. 9.5

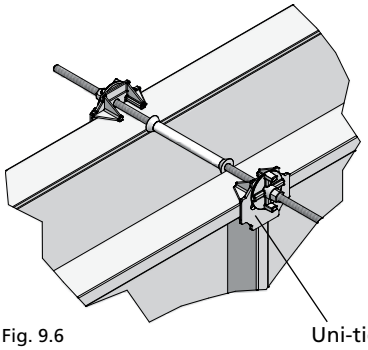

Fig. 9.6

Description	Ref. No.
Tie rod DW 15/90	**29-900-80**
Flange nut100	**29-900-20**
Articulated flange nut 120	**29-900-10**
Plug D20	**29-902-63**
Uni-tie claw	**29-901-41**
Spanner SW 27	**29-800-10**

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Rate of placing

Recommendation for concrete placement

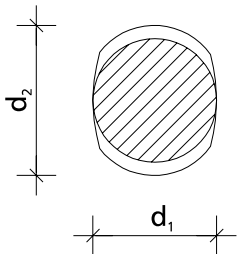
- For AluStar walls higher than 2.40 m observe the values in table ST/AS-11.1. For StarTec walls higher than 2.70 m observe the values in tables ST/AS-11.2 and ST/AS-11.3.
- Concrete should be placed in layers, the thickness of which can vary from 0.50 to 1.00 m (DIN 4235).
- Concrete must not be placed from great 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.

- For the specific values of tie rod DW 15 see table 10.1.

Specific Value of Tie Rod DW 15

Tie rod DW	15
d_1 in mm	15
d_2 in mm	17
Nominal cross section in mm²	177
Adm. working load in kN according to DIN 18216	90
Tie rod elongation in mm/m when using the admissible working load	2.5

Table. 10.1



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Flatness of surface

Walls up to 240 cm (AluStar) and up to 270 cm (StarTec)
Concrete can be poured without consideraton of the pouring rate.

Walls higher than 240 cm (AluStar) or 270 cm (StarTec):
For an exact determination of the maximum pouring rate according to German standard DIN 18218:2010 go to www.meva-international and use the fresh concrete pressure calculator in the WEB SERVICES section. Or observe the pouring rates shown in Tables 11.1 through 11.3. In order to use the values in these tables, you need to know the end of setting t_E of the concrete. You can determine the end of setting with the knead-bag test or by using the MEVA SolidCheck device which measure the concrete's end of setting in real time. Or simply ask your concrete supplier.

Tables 11.1 through 11.3 show the recommended pouring rates in line with the fresh concrete pressure when using DW 15 ties with articulated flange nuts 15/120.

Maximum rate of placing v_b (depending on the consistency and end of setting of concrete t_E)* in m/h					
AluStar (60 kN/m²)		t_E = 5 h	t_E = 7 h	t_E = 10 h	t_E = 15 h
Consistency range	F3	3.00	2.43	1.81	1.14
	F4	2.53	1.76	1.08	0.47
	F5	1.17	0.83	0.58	0.39
	F6	0.92	0.66	0.46	0.31
	SVB	1.06	0.76	0.53	0.35

Table 11.2 AluStar

Maximum rate of placing v_b (depending on the consistency and end of setting of concrete t_E)* in m/h					
StarTec (70 kN/m²)**		t_E = 5 h	t_E = 7 h	t_E = 10 h	t_E = 15 h
Consistency range	F3	3.71	3.05	2.32	1.51
	F4	3.12	2.22	1.42	0.72
	F5	1.50	1.07	0.75	0.50
	F6	1.18	0.85	0.59	0.39
	SVB	1.36	0.97	0.68	0.45

Table 11.3 StarTec ** Not height-extended / all panel widths
Height-extended / panel widths up to 90 cm

Maximum rate of placing v_b (depending on the consistency and end of setting of concrete t_E)* in m/h					
StarTec (55 kN/m²)***		t_E = 5 h	t_E = 7 h	t_E = 10 h	t_E = 15 h
Consistency range	F3	2.64	2.12	1.55	0.93
	F4	2.24	1.53	0.90	0.35
	F5	1.00	0.71	0.50	0.33
	F6	0.79	0.56	0.39	0.26
	SVB	0.91	0.65	0.45	0.30

Tab. 11.3 StarTec *** Height-extended / panels that are 135 cm wide or wider

* According to DIN 18218:2010-01 (Fresh concrete pressure on plumb-vertical formwork)

t_E = End of setting of concrete
v_b = Maximum rate of pouringt

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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 12.1). 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 6 is 60 kN/m² for AluStar and 70 kN/m² or 55 kN/m² for StarTec (see p ST/AS-11).

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 12.1

* Interim values can be found in fig. 12.2. 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.

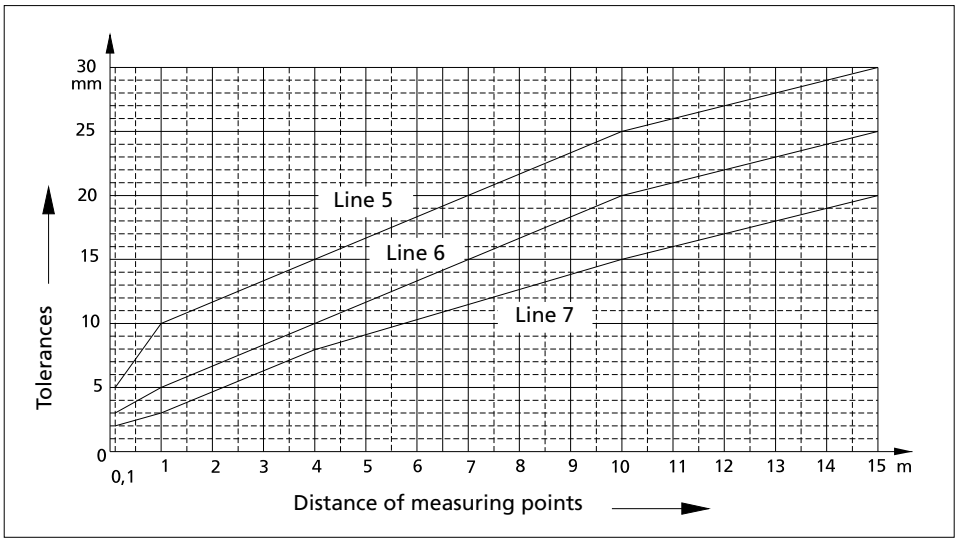

Fig. 12.2

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Attachment of accessories

All panels are provided with multi-function profiles. Dywidag threaded nuts are welded inside the profile (Fig. 13.1, 13.5, 13.6). The difference between multi-function profiles and cross stiffeners is that accessories can be attached to the the multi-function profiles.

Walkway brackets are provided with self-locking pins (Fig. 13.2). They are attached to the multi-function profile and can be secured with a flange screw 18.

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 13.3.

Alignment rails are attached to the multi-fucntion profiles with flange scews to stabilize the panels when crane-lifting panel gangs, in compensation areas or in order to bridge problem areas.

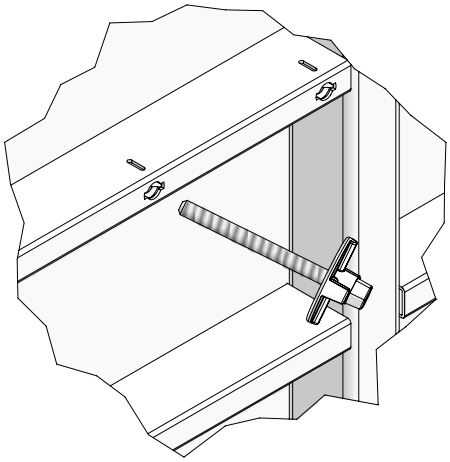

Fig. 13.1

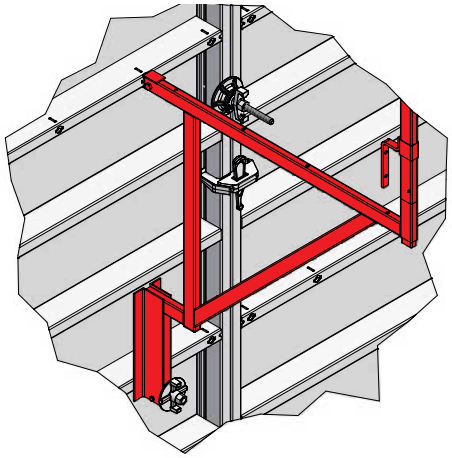

Fig. 13.2

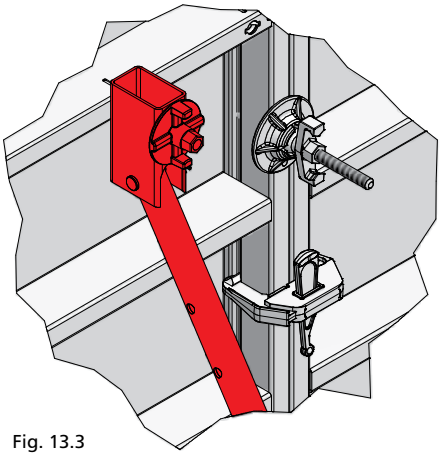

Fig. 13.3

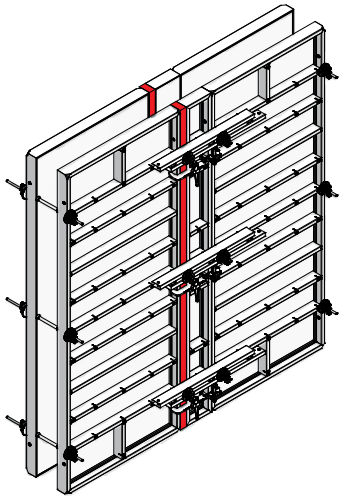

Fig. 13.4

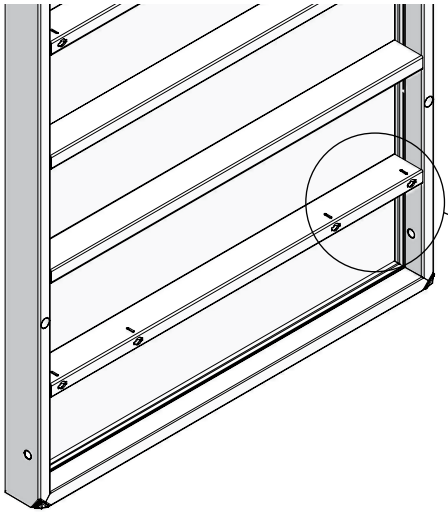

Fig. 13.5

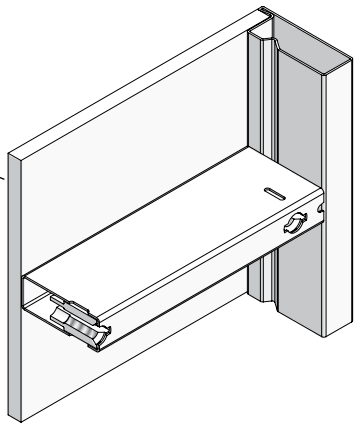

Fig. 13.6

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Wall braces

Wall braces are attached to the multi-function profiles with formwork-prop connectors and flange screws 18 (Fig. 14.1).

If braces 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 14.2). For further applications please contact our technical department.

Please note

- The height of the formwork should match the length of the push-pull props. The angle between ground and push-pull prop should not exceed 60°. See also Table 14.3.
- 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. Also, observe any regulations that apply when working with high walls.

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 connector	**29-109-25**
Flange screw 18	**29-401-10**

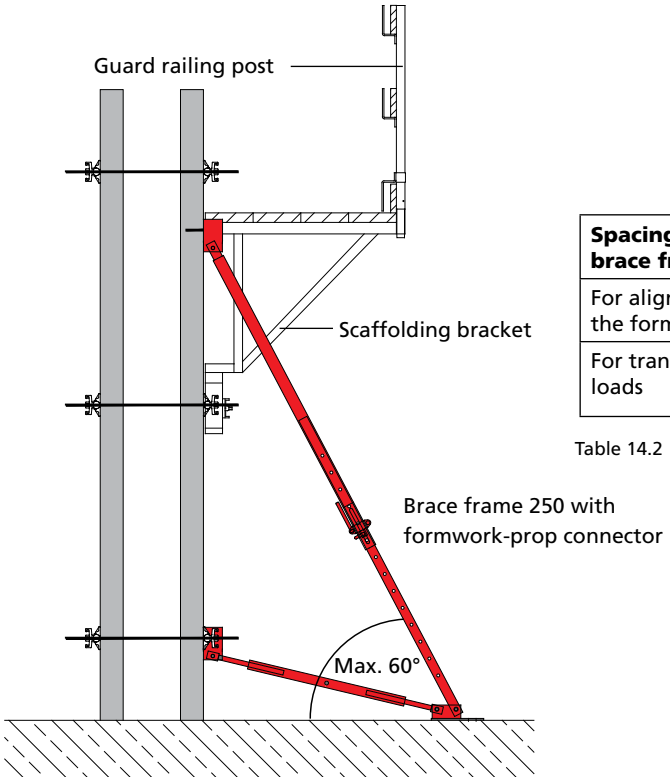
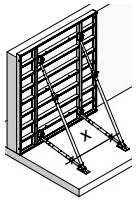


Fig. 14.1



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 14.2

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	8.3	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 14.3

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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 and R 460 (Fig. 15.1).

For wall formwork higher than 6 m we recommend assembling and attaching a brace frame consisting of the push-pull props R 630 and R 250 or R 460 or Triplex R props. The Triplex props are used to align and brace high formwork. See also Table 14.3 on p. ST/AS-14.

Please observe and follow the the Triplex manual.

In both cases the formwork connection (formwork prop connectors or combi-lock with coupling) and the double-joint foot plate must be ordered separately.

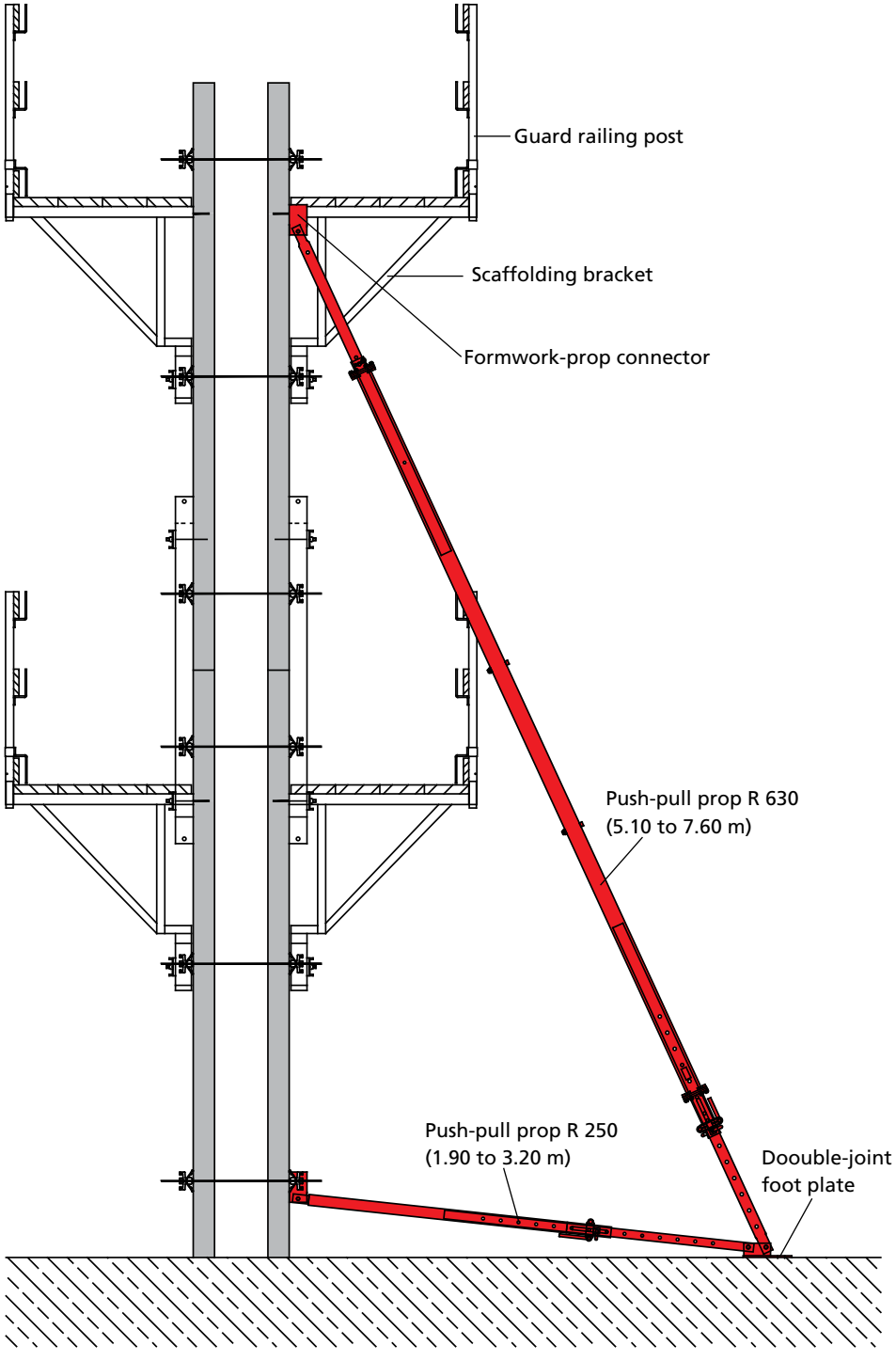

Fig. 15.1

Description	Ref. No.
Push-pull prop	
R 630	**29-109-85**
R 460	**29-109-80**
R 250	**29-109-60**
Formwork prop connector	**29-804-85**
Double-joint foot plate	**29-402-32**
Combi-lock with coupling	**29-402-32**

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Working scaffolds / Folding access platform BKB 125

Folding access platform BKB 125
The ready-made folding access platform BKB 125 unfolds quickly and provides a safe access and 125 cm wide working scaffold (Fig. 16.1 through 16.3).

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 (Fig. 16.1).

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.

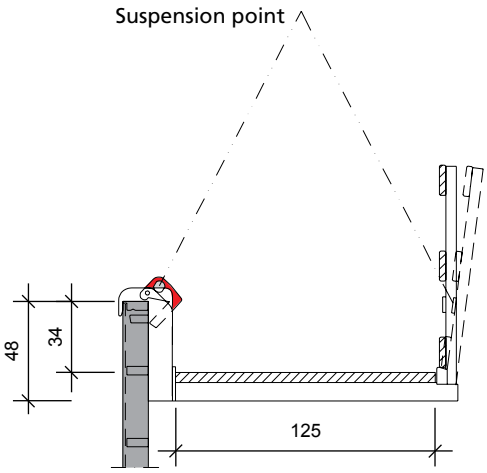


Fig. 16.1

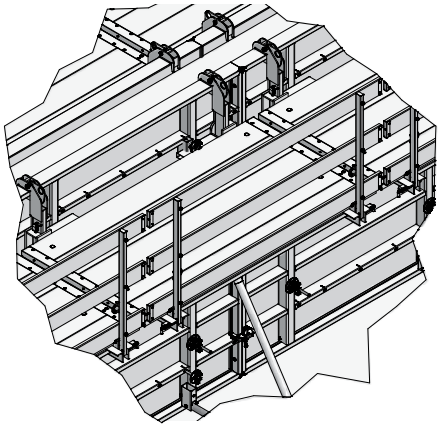
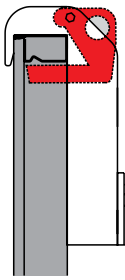


Fig. 16.2



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

Fig. 16.3

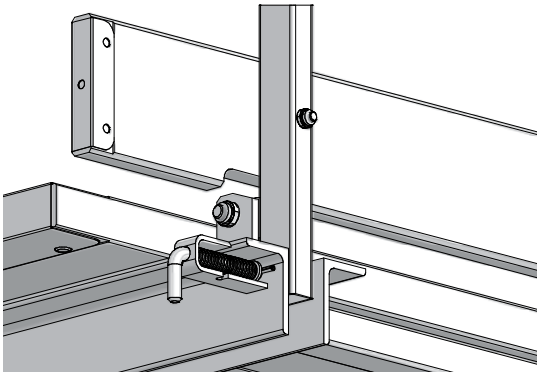


Fig. 16.4

Examples of application for corner configurations and length compensation

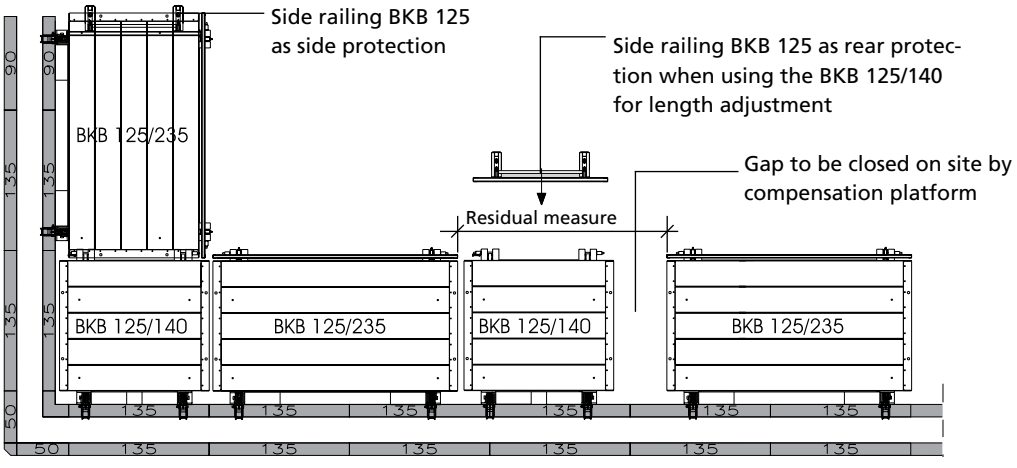


Fig. 16.5

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 scaffolds / Folding access platform BKB 125

When using the folding access platform BKB with 330 cm high StarTec panels, tieing at the top needs to be done above the panels using Uni-tie claws rather than tieing through the top tie holes (Fig. 17.1 and 17.2).

2 Uni-tie claws, 1 tie rod DW 15 and 2 flange nuts 100 are required per tie (Fig. 17.3). We recommend using an anchor sleeve to serve as a spacer and prevent the tie rod from soiling.

Tie holes that are not used must always be closed with plugs D20.

Note
The modular SecuritBasic safety system offers platforms and ladders access that can be used with the StarTec panels and offer safe and efficient work at all heights. For further details see the SecuritBasic Technical Instruction Manual.

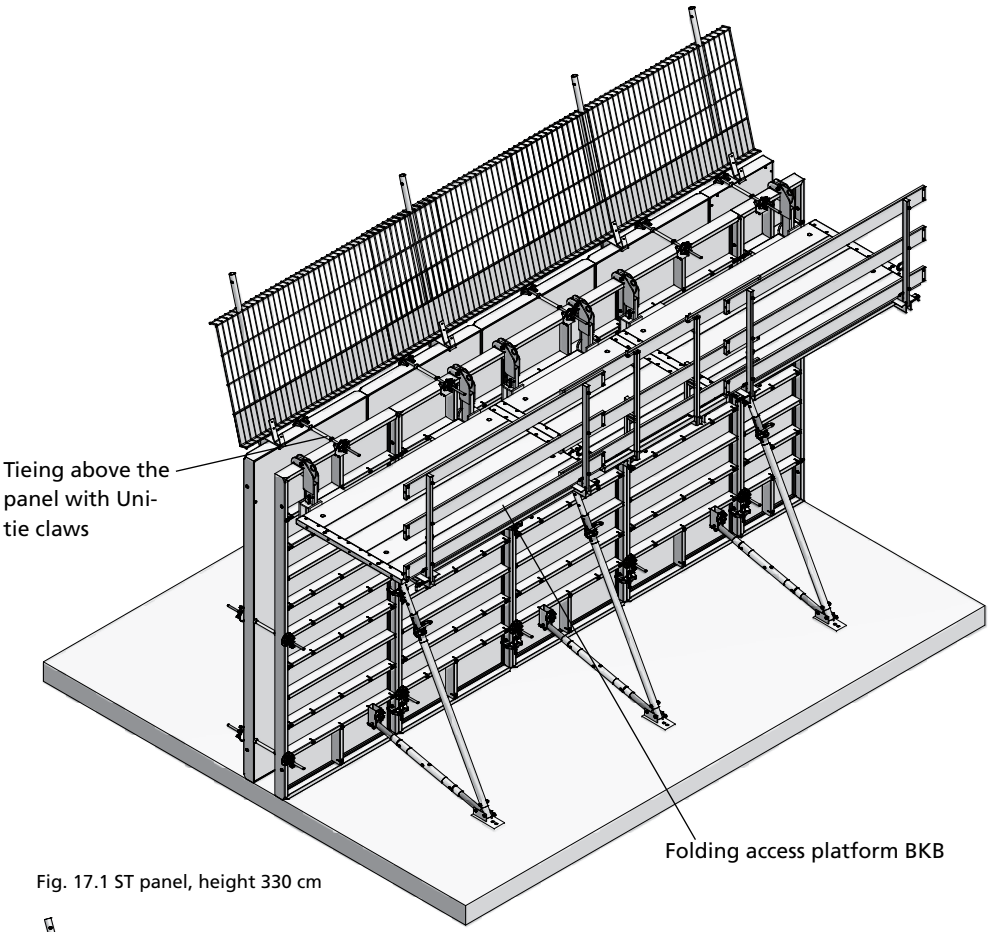

Fig. 17.1 ST panel, height 330 cm

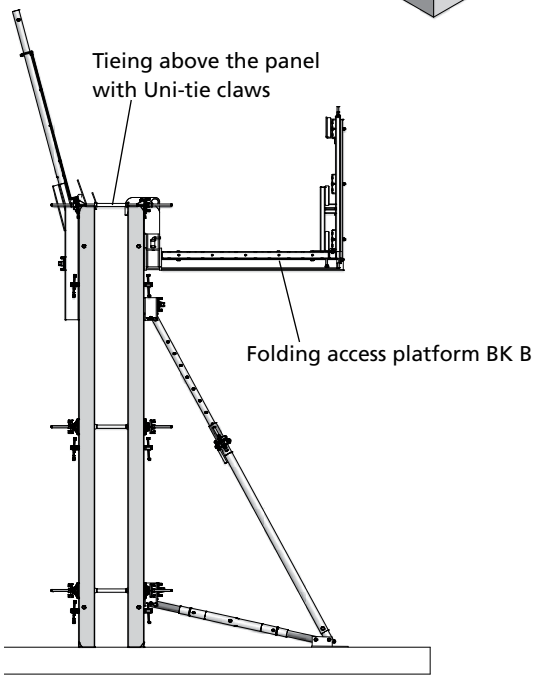

Fig. 17.2

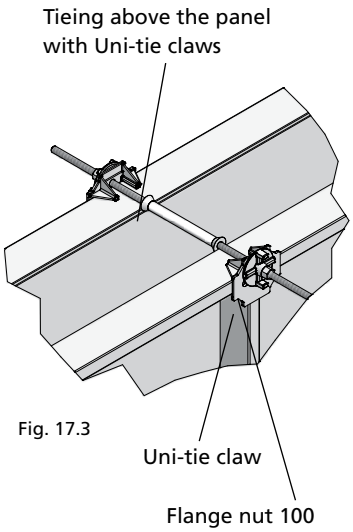

Fig. 17.3

Description	Ref. No.
Tie rod DW 15/90	**29-900-80**
Flange nut 100	**29-900-20**
Uni-tie claw	**29-901-41**
Plug D20	**29-902-63**

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Working scaffolds / Walkway brackets

Scaffolding bracket
The scaffolding bracket 90 or 125 (Fig. 16.2) 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 and the minimum width is 24 cm.

Guard-railing post and side railing
The guard-railing post (Fig. 18.3 through 18.5) is plugged into the scaffolding bracket. If the fall height exceeds 2.00 m, a side railing consisting of handrail, midrail and toe board is required (Fig. 18.1).

Guard-railing post UK 48/120 can be used when using scaffold tubes to install a fall-down protection. This guard-railing post consists of a round tube with dia. 48 mm and a rectangular adapter piece that is plugged into the walkway bracket (Fig. 18.4).

Please note
The minimum cross section of the handrail and midrail (Fig. 18.1) 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

Description	Ref. No.
Walkway bracket	
90	**29-106-00**
125	**29-106-50**
Flange screw 18	**29-401-10**
Guard-railing post	
100	**29-106-75**
140	**29-106-85**
48/120 UK	**29-106-80**
48/134	**29-920-80**
Side railing	
90/100	**29-108-20**
125/100	**29-108-30**
Swivel-joint coupler 48/48	**29-412-52**
Scaffold tube	
48/200	**29-412-23**
48/300	**29-412-26**
48/400	**29-412-27**
48/500	**29-412-25**
48/600	**29-412-28**

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

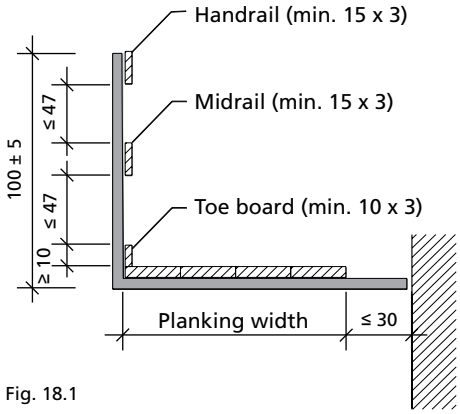

Fig. 18.1

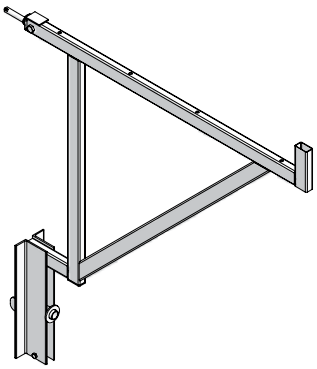

Fig. 18.2 Walkway bracket 90 / 125

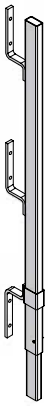

Fig. 18.3 Guard-railing post 100 / 140

Fig. 18.4 Guard-railing post 48/120 UK

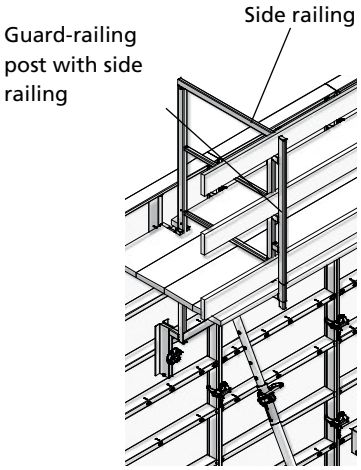

Fig. 18.5 Side railing

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Working scaffolds / Support 800 for guard-railing posts

An additional fall-down protection on the side opposite the working scaffolds, i.e on the other side of the formwork is required for heights of 2.00 m (or more). Note that this regulation is valid for Germany. Make sure to observe the federal, state and local regulations of the country where the formwork is used.

The support 800 for guard-railing posts (Fig. 19.1) is compatible with all MEVA wall formwork systems and designed to mount a fall-down protection on the side opposite the working scaffolds.

The support 800 is suspended over the frame of the formwork and secured with a flange screw 18 to a DW-threaded nut of the panel's multi-function profile (Fig. 19.2).

MEVA guard-railing posts 100, 140 and 48/120 UK as well as guard-railing posts with a square cross section of 40 by 40 mm can be plugged into the support 800 at an angle of 15° to leave sufficient room for the concrete bucket (Fig. 19.2).

Toe boards can also be plugged into the support 800. Boards with a cross section of 150 by 30 mm must be used as handrails and midrails and are attached to the guard-railing post.

One flange screw 18 and one guard-railing post per support 800 must be ordered separately.

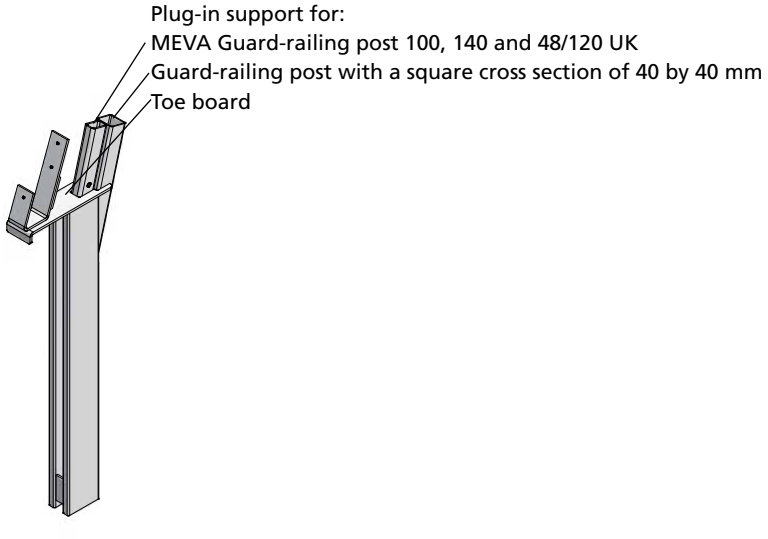

Fig. 19.1

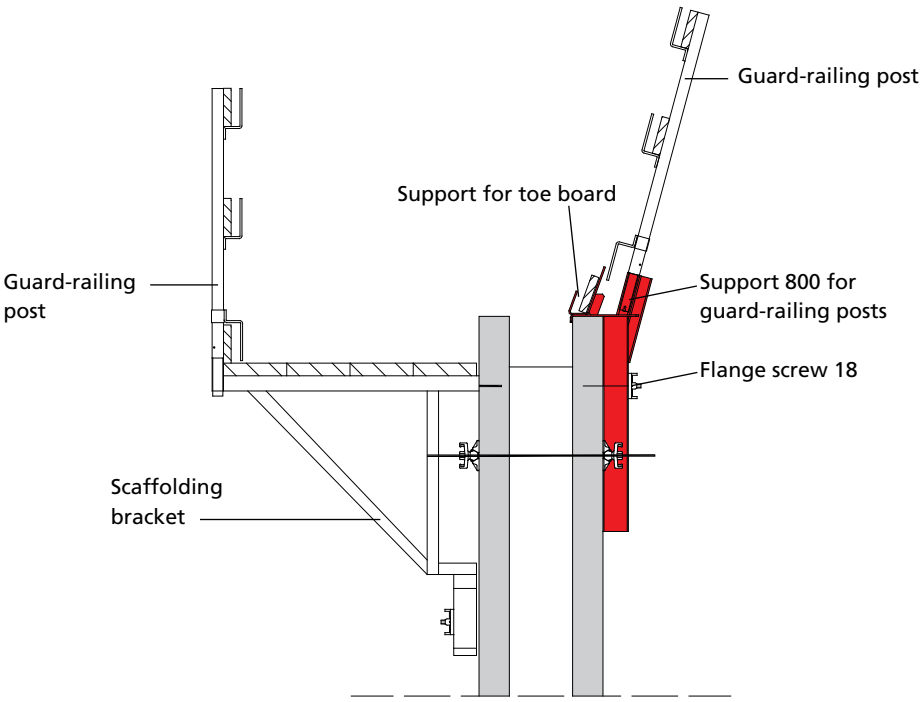

Fig. 19.2

Description	Ref. No.
Support 800 for guard-railing post	**29-108-50**
Flange screw 18	**29-401-10**
Guard-railing post	
100	**29-106-75**
140	**29-106-85**
48/120 UK	**29-106-80**
48/134	**29-920-80**

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Crane hook

The admissible load of an AS crane hook (Fig. 20.1) is 15 kN (1.5 tons).

Handling
The handling is easy:
1. Open the safety lever as far as possible (Fig. 20.2).
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. 20.3).

Attention
When moving gangs, make sure each crane hook is attached at a panel joint (Fig. 20.4). 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.

When to replace the crane hook
If the reference dimension exceeds 41 mm, the crane hook must be replaced immediately. Replace it also if only one side of the hook exceeds this dimension (Fig. 20.5).

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.

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.

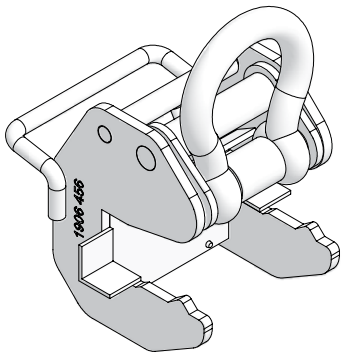

Fig. 20.1

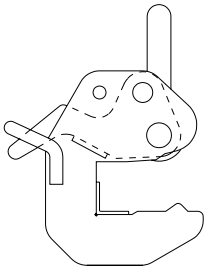

Fig. 20.2

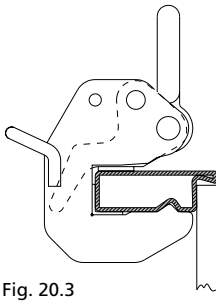

Fig. 20.3

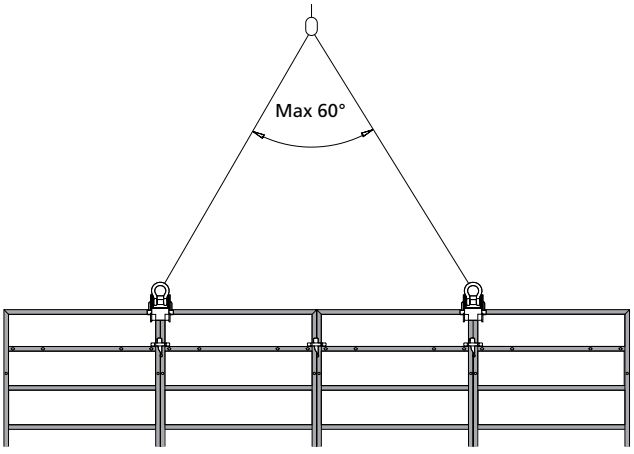

Fig. 20.4

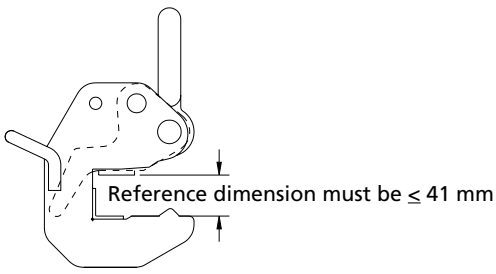

Fig. 20.5

Description	Ref. No.
AS crane hook	**29-203-89**

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Inside corner 90°

The StarTec inside corner is primed and cavity-sealed and is equipped with an alkus facing or replaceable steel sheet while the AluStar inside corner is made of aluminium with an annealed plastic coating.

Both the StarTec and the AluStar inside corners have tie holes and, like the standard panels up to a height of 270 cm, are connected with only 2 assembly locks on each side (Fig. 21.3) or with 3 assembly locks on each side, like the panels with height 330 cm (Fig. 21.1). Each outside is 25 cm long (Fig. 21.2).

Inside corner with filler
The filler is attached with 2 Uni-assembly locks per panel height (up to a height of 270 cm) – or with 3 assembly locks for panel height 330 cm. AS alignment rails on each multi-function profile are required to cover the joints between standard panel, filler and inside corner (Fig. 21.5).

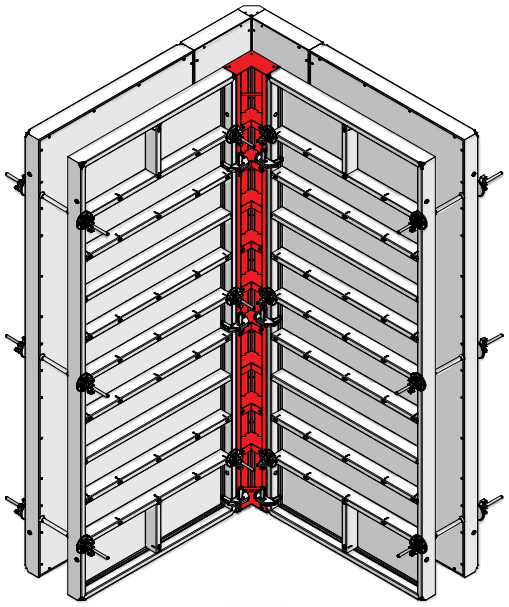

Fig. 21.1

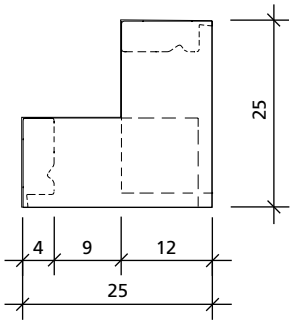

Fig. 21.2

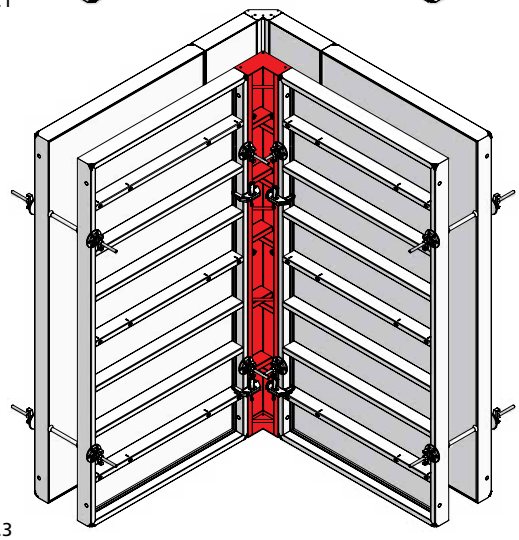

Fig. 21.3

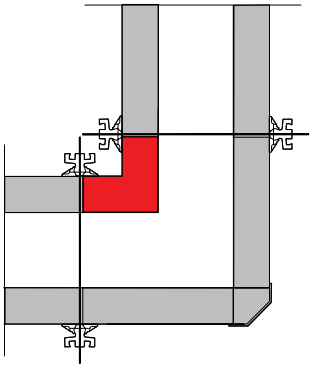

Fig. 21.4

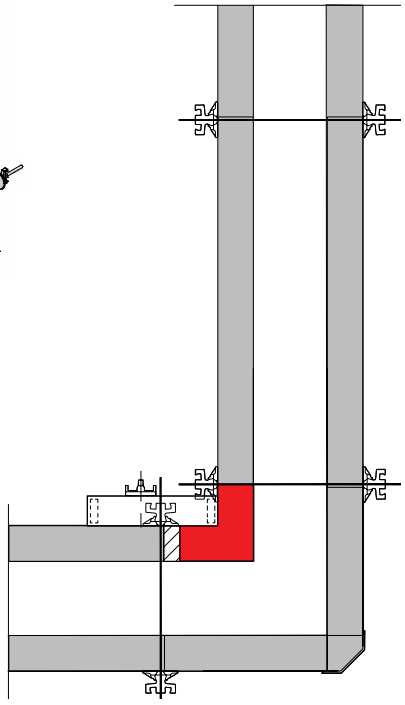

Fig. 21.5

Description	Ref. No.
StarTec inside corner	
270/25 AL	**21-251-00**
270/25 AL	**21-251-05**
135/25 AL	**21-251-35**
90/25 AL	**21-251-65**
AluStar inside corner	
270/25	**22-150-24**
135/25	**22-150-34**
Uni-assembly lock	
22	**29-400-85**
28	**29-400-90**

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Outside corner 90°

Made of aluminium with an annealed plastic coating, the AS/ST outside corners provide a solid 90° corner solution together with AS/ST panels and AS assembly locks (Fig. 22.1 and 22.3).

Corner height 330 cm
Panel heights of 330 cm (Fig. 22.1) require 4 assembly locks per joint at position a, all other joints (b) require 3 assembly locks.

Corner height 270 cm
Panel heights of 270 cm (Fig. 22.3) require 3 assembly locks per joint at position a, all other joints (b) require 2 assembly locks.

Corner heights 135 und 90 cm
Panel heights of 135 cm and 90 cm require 2 assembly locks per joint at all positions.

The width of the panel adjoining the outside corner (panel 1, Fig. 22.4) is calculated as follows: wall thickness (cm) plus 25 cm.

For the assembly locks required for height-extended outside corners refer to page ST/AS-24.

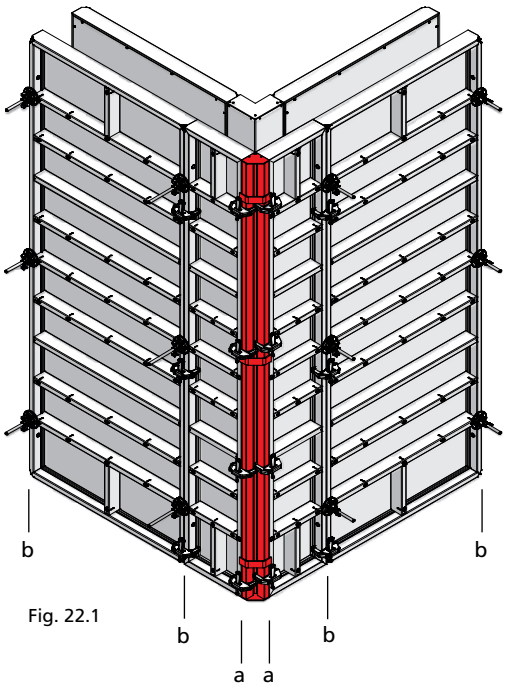

Fig. 22.1

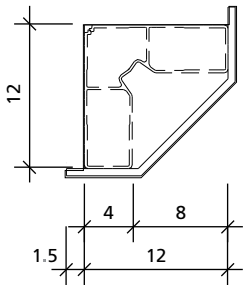

Fig. 22.2

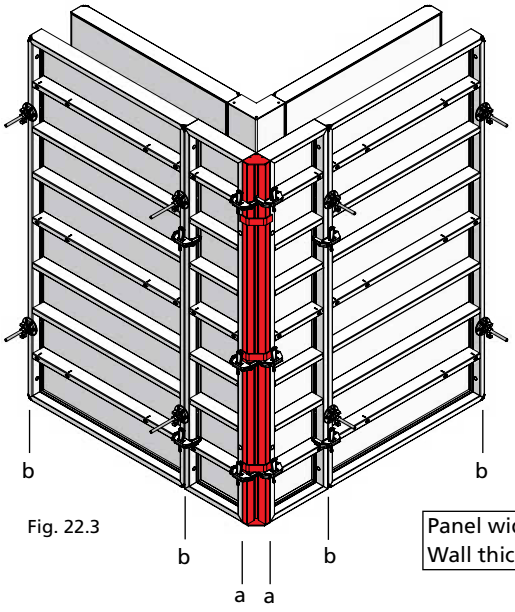

Fig. 22.3

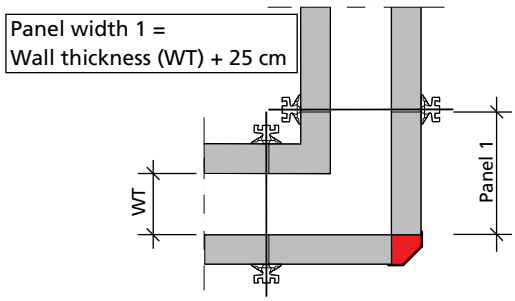

Fig. 22.4

Description	Ref. No.
AS/ST outside corner	
330	**22-140-10**
270	**22-140-20**
135	**22-140-30**
90	**22-140-40**

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Outside corner 90°

Outside corner 270/5 Alu and 135/5 Alu
The outside corners with a side length of 5 cm have a triangular fillet an annealed plastic coating (Fig.23.1 and 23.2). Together with AS/ST panels and AS assembly lock, they provide a solid 90° corner solution.

Corner height 270 cm
Panel heights of 270 cm (Fig. 23.3) require 3 assembly locks per joint at position a, all other joints (b) require 2 assembly locks.

Corner height 135 cm
Panel heights of 135 cm require 2 assembly locks per joint at all positions.

The width of the panel adjoining the outside corner (panel 1, Fig. 23.3) is calculated as follows: wall thickness (cm) plus 20 cm.

For the assembly locks required for height-extended outside corners refer to page ST/AS-24.

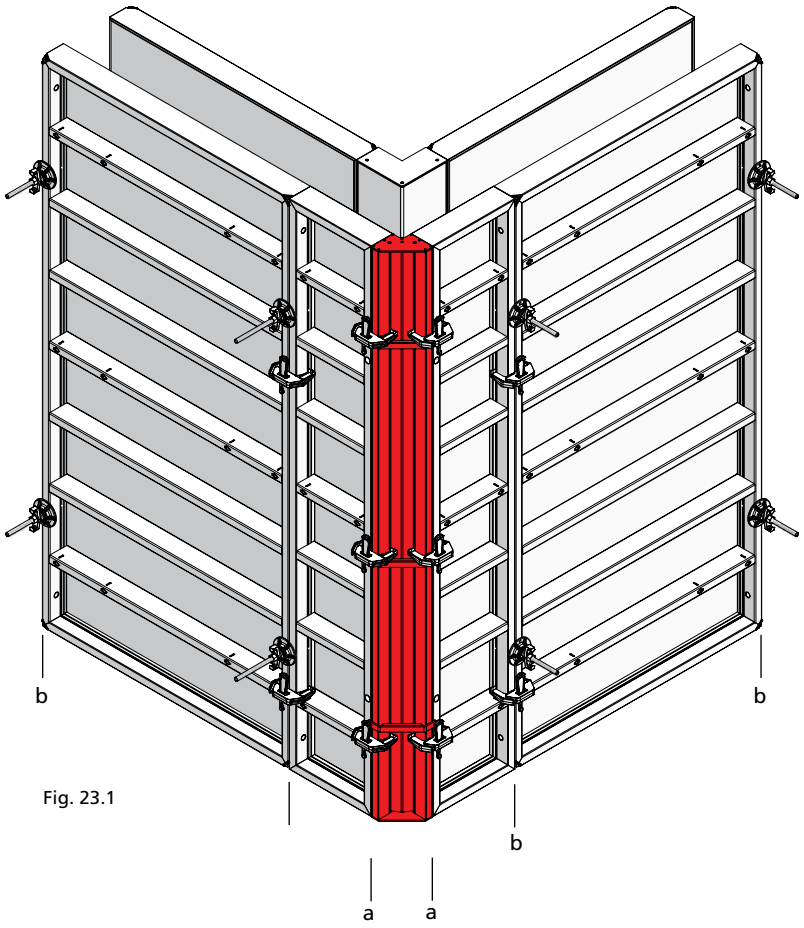

Fig. 23.1

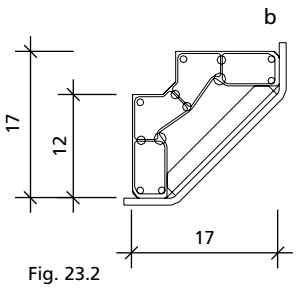

Fig. 23.2

Panel width 1 =
Wall thickness (WT) + 20 cm

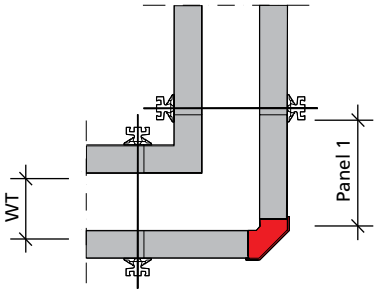

Fig. 23.3

Description	Ref. No.
Outside corner Alu(minium)	
270/5	**22-140-25**
135/5	**22-140-35**

Height-extended outside corners 90°

Pouring heights of 4.05 m (or higher) – see Fig. 24.1 – require the number of AS assembly locks and alignment rails shown in Table 24.3.

The alignment rails must be attached to the panels with 2 flange screws 18. Make sure to start attaching alignment rails at the bottom multi-function profile, i.e. the first alignment rail must be attached to the bottom multi-function profile of the bottom outside corner.

Note that the alignment rails must cover the next panel joint and be bolted at the corners (Fig. 24.1 and 24.2).

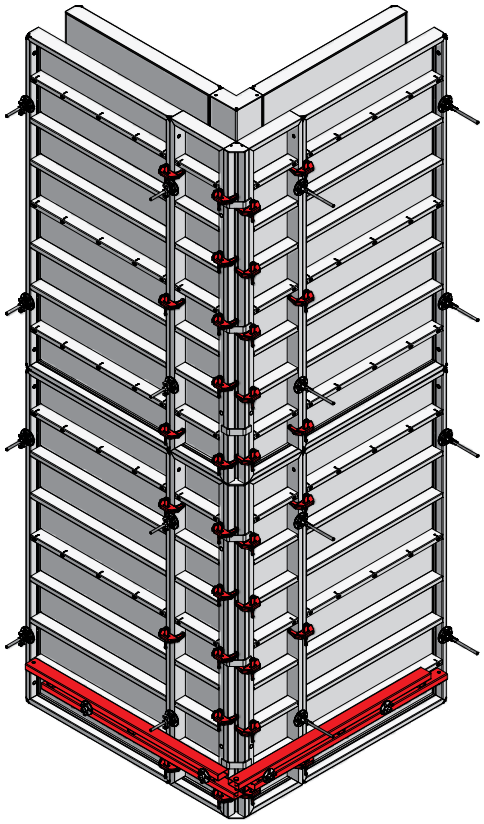

Fig. 24.1 Height 540 cm

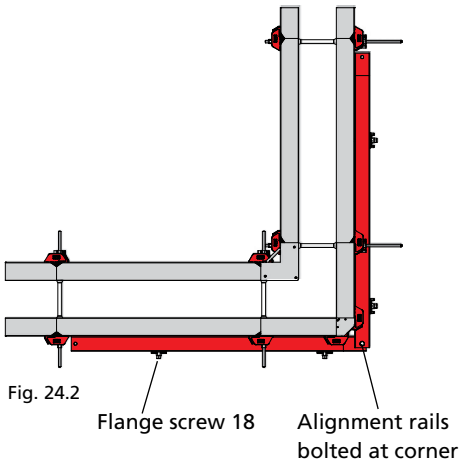

Fig. 24.2

Height-extended outside corners						
Pouring height h [cm]	Number of alignment rails (from bottom to top)					Number of AS assembly locks
	Wall thickness [cm]					
	0 - 30	31 - 50	51 - 75	76 - 90	91 - 135	
270 + 135 = 405	-	-	1	1	1	(5 + 2) = 7
270 + 135 + 90 = 495	-	-	1	1	1	(5 + 2 + 2) = 9
270 + 270 = 540	1	1	1	1	1	(5 + 5) = 10
330 + 270 = 600	1	1	1	1	2	(6 + 5) = 11
270 + 270 + 90 = 630	1	1	1	2	2	(5 + 5 + 2) = 12
330 + 330 = 660	1	1	2	3	3	(6 + 6) = 12
270 + 270 +135 = 675	1	1	2	2	3	(5 + 5 + 2) = 12
270 + 270 + 270 = 810	2	2	3	3	4	(5 + 5 + 5) = 15

Table 24.3

Description	Ref. No.
AS/ST outside corner	
330	**22-140-10**
270	**22-140-20**
135	**22-140-30**
90	**22-140-40**
AS alignment rail	
50	**29-201-73**
125	**22-201-75**

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Outside corner 90° with filler

270 cm high panels are connected with 2 Unit-assembly locks per height and 330 cm high panels with 3 Uni-assembly locks per height. An AS alignment rail must be attached to the multi-function profile or at tie hole level for alignment and bracing. One AS alignment rail is required per tie hole level (Fig. 25.1).

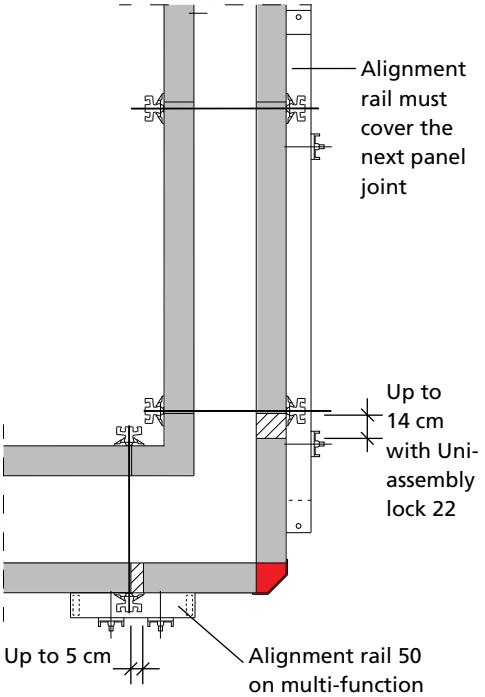

Fig. 25.1

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135° corners

Corners with a 135° angle are formed with the rigid 135° inside and outside corners.

Side length

- Outside corner 25 cm (Fig. 26.1)
- Inside corner 15 cm (Fig. 26.2).

Depending on the wall thickness, different timber fillers must be used according to values in table 26.6 and fig. 26.3 through 26.5. Timber fillers with a maximum width of 2 cm do not require an alignment rail if articulated flange nuts are used for tieing (Fig. 26.3).

135° outside corner

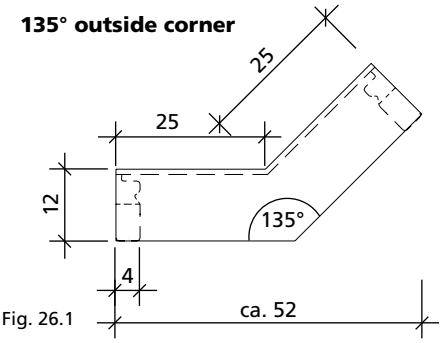

Fig. 26.1

135° inside corner

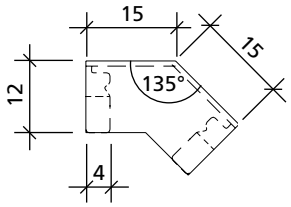

Fig. 26.2

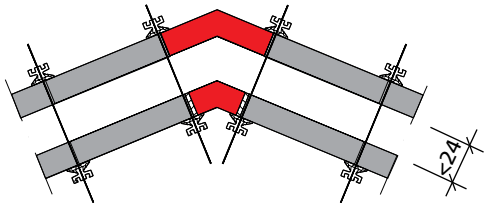

Fig. 26.3

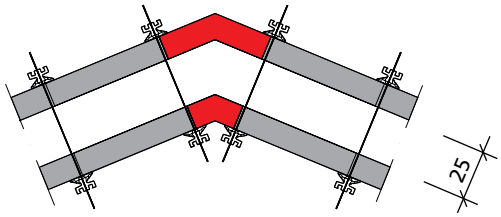

Fig. 26.4

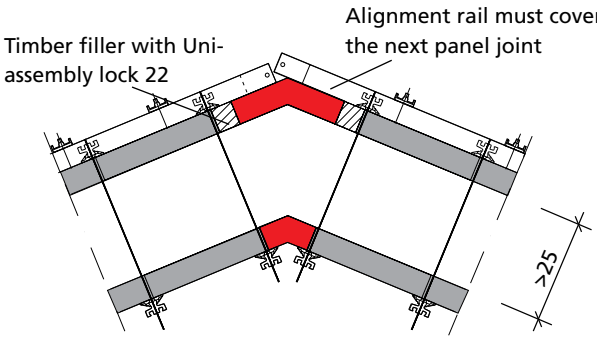

Fig. 26.5

Timber filler width			
Wall thickness	Inside filler	Outside filler	Alignment rail
20	2	–	–
24/25	–	–	–
30	–	2	RS 50
35	–	4	RS 125
40	–	6.3	RS 125

Tab. 26.6

Description	Ref. No.
ST inside corner	
135°, 270/15	**21-250-10**
135°, 135/15	**21-250-40**
ST outside corner	
135°, 270/25	**21-260-10**
135°, 135/25	**21-260-40**
AS inside corner	
135°, 270/15	**22-150-28**
AS outside corner	
135°, 270/25	**22-140-08**

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Hinged corners

Acute and obtuse angled corners are formed using hinged inside and outside corners (Fig. 27.1 and 27.2).

The outside corner requires alignment rails to be attached to the multi-function profiles of the adjacent panels using flange screws.

Inside angles of at least 100° also require alignment rails and a wooden blocking (Fig. 27.1).

Timber filler and Uni-assembly locks are used for length compensation.

Side length
- Outside corner 7.5 cm
- Inside corner 30 cm

Adjustment range
60° to 180°.

Please note
Acute and obtuse angled corners can also be formed using hinged corners and multi-purpose panels (see p. ST/AS-60).

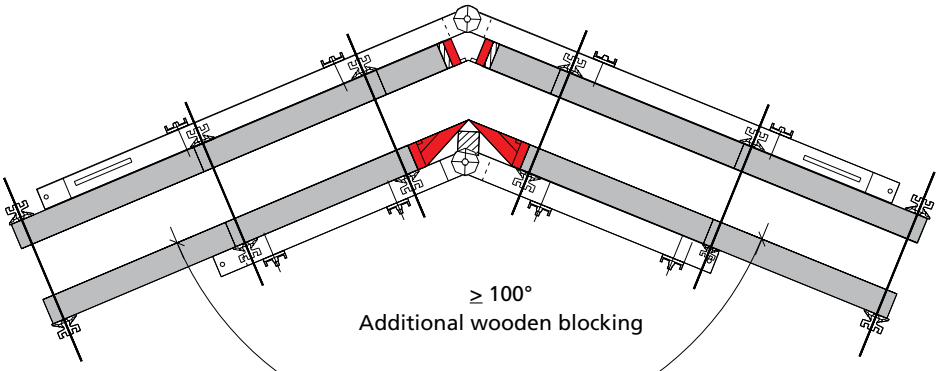

Fig. 27.1

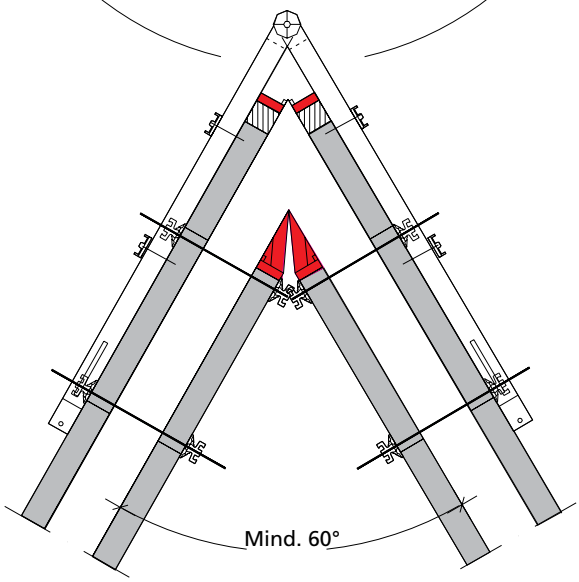

Fig. 27.2

Description	Ref. No.
ST hinged inside corner	
330/30	**21-270-20**
AS hinged inside corner	
270/30	**21-270-00**
135/30	**21-270-10**
ST hinged outside corner	
330/7.5	**21-280-20**
AS hinged outside corner	
270/7.5	**21-280-00**
135/7.5	**21-280-10**

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Hinged corners

If the inside angle α is smaller than 100°, alignment rails and a wooden blocking are not required on the inside (Fig. 28.1).

See table 28.2 to determine the dimension (y) between the hinged outside corner and the first panel where a tie can be used.

Please note
Acute and obtuse angled corners can also be formed using hinged corners and multi-purpose panels (see p. ST/AS-60).

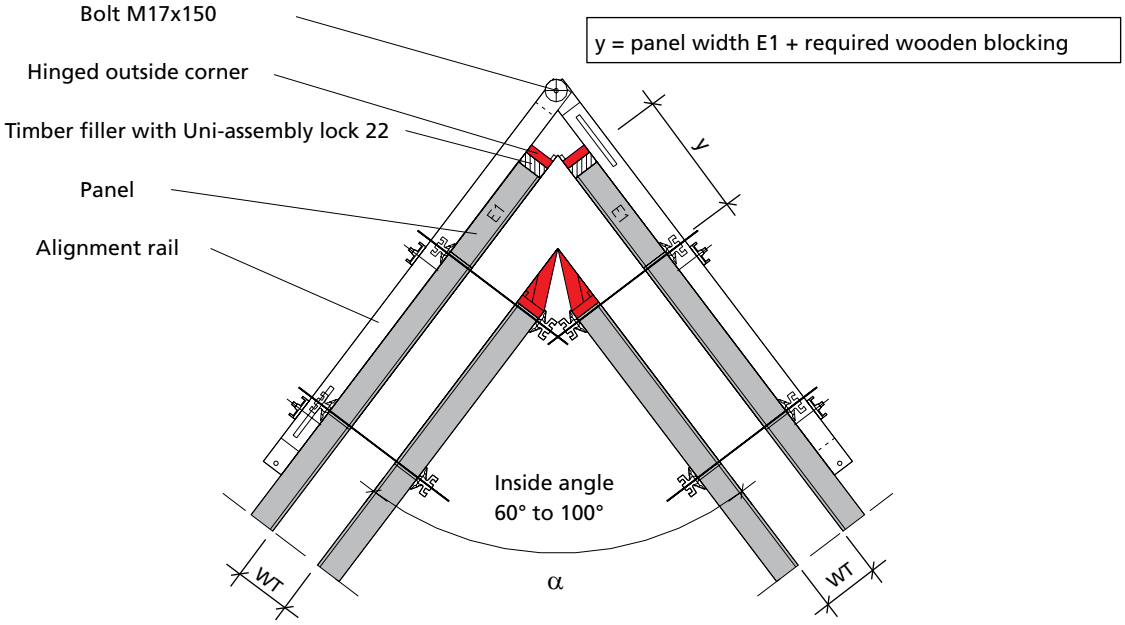

Fig. 28.1

WT = wall thickness

Equation to calculate the width y $y = \frac{WS}{\tan \frac{\alpha}{2}} + 22.5$ [cm]

Inside angle	Wall thickness (WT)						
(α)	24 cm	25 cm	30 cm	35 cm	40 cm	45 cm	50 cm
60°	Y = 64.1	Y = 65.8	Y = 74.5	Y = 83.1	Y = 91.8	Y = 100.4	Y = 109.1
65°	Y = 60.2	Y = 61.7	Y = 69.6	Y = 77.4	Y = 85.3	Y = 93.1	Y = 101.0
70°	Y = 56.8	Y = 58.2	Y = 65.3	Y = 72.5	Y = 79.6	Y = 86.8	Y = 93.9
75°	Y = 53.8	Y = 55.1	Y = 61.6	Y = 68.1	Y = 74.6	Y = 81.1	Y = 87.7
80°	Y = 51.1	Y = 52.3	Y = 58.3	Y = 64.2	Y = 70.2	Y = 76.1	Y = 82.1
85°	Y = 48.7	Y = 49.8	Y = 55.2	Y = 60.7	Y = 66.2	Y = 71.6	Y = 77.1
90°	Y = 46.5	Y = 47.5	Y = 52.5	Y = 57.5	Y = 62.5	Y = 67.5	Y = 72.5
95°	Y = 44.5	Y = 45.4	Y = 50.0	Y = 54.6	Y = 59.2	Y = 63.7	Y = 68.3
100°	Y = 42.6	Y = 43.5	Y = 47.7	Y = 51.9	Y = 56.1	Y = 60.3	Y = 64.5
105°	Y = 40.9	Y = 41.7	Y = 45.5	Y = 49.4	Y = 53.2	Y = 57.0	Y = 60.9
110°	Y = 39.3	Y = 40.0	Y = 43.5	Y = 47.0	Y = 50.5	Y = 54.0	Y = 57.5
115°	Y = 37.8	Y = 38.4	Y = 41.6	Y = 44.8	Y = 48.0	Y = 51.2	Y = 54.4
120°	Y = 36.4	Y = 36.9	Y = 39.8	Y = 42.7	Y = 45.6	Y = 48.5	Y = 51.4
125°	Y = 35.0	Y = 35.5	Y = 38.1	Y = 40.7	Y = 43.3	Y = 45.9	Y = 48.5
130°	Y = 33.7	Y = 34.2	Y = 36.5	Y = 38.8	Y = 41.2	Y = 43.5	Y = 45.8
135°	Y = 32.4	Y = 32.9	Y = 34.9	Y = 37.0	Y = 39.1	Y = 41.1	Y = 43.2
140°	Y = 31.2	Y = 31.6	Y = 33.4	Y = 35.2	Y = 37.1	Y = 38.9	Y = 40.7
145°	Y = 30.1	Y = 30.4	Y = 32.0	Y = 33.5	Y = 35.1	Y = 36.7	Y = 38.3
150°	Y = 28.9	Y = 29.2	Y = 30.5	Y = 31.9	Y = 33.2	Y = 34.6	Y = 35.9
155°	Y = 27.8	Y = 28.0	Y = 29.2	Y = 30.3	Y = 31.4	Y = 32.5	Y = 33.6
160°	Y = 26.7	Y = 26.9	Y = 27.8	Y = 28.7	Y = 29.6	Y = 30.4	Y = 31.3
165°	Y = 25.7	Y = 25.8	Y = 26.4	Y = 27.1	Y = 27.8	Y = 28.4	Y = 29.1
170°	Y = 24.6	Y = 24.7	Y = 25.1	Y = 25.6	Y = 26.0	Y = 26.4	Y = 26.9
175°	Y = 23.5	Y = 23.6	Y = 23.8	Y = 24.0	Y = 24.2	Y = 24.5	Y = 24.7
180°	Y = 22.5	Y = 22.5	Y = 22.5	Y = 22.5	Y = 22.5	Y = 22.5	Y = 22.5

Table 28.2

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Stripping corner

The ST stripping corners 330, 270 und 135 allow the shaft formwork to be removed from the poured shaft walls in a safe and fast way without damaging the walls or formwork. The stripping corners work according to the "jumping jack" principle.

The stripping corner is designed with 3 pieces to permit inward movement when being activated. The side length is 25 cm. The stripping corners can easily be height-extended (Fig. 29.1).

After pouring and when the concrete has sufficiently set, all stripping corners are activated (Fig. 29.2 and pages ST/AS-32 through 34) and the entire formwork can be lifted out of the shaft as one single unit with 4-rope crane slings (Fig. 29.3). There is no need to disassemble the formwork. For details see Fig. 29.4 A and 29.5 B.

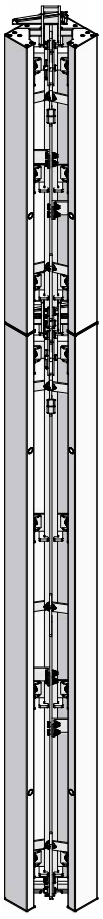

Fig. 29.1

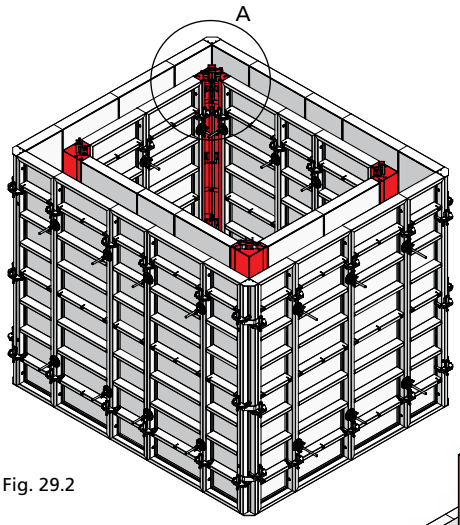

Fig. 29.2

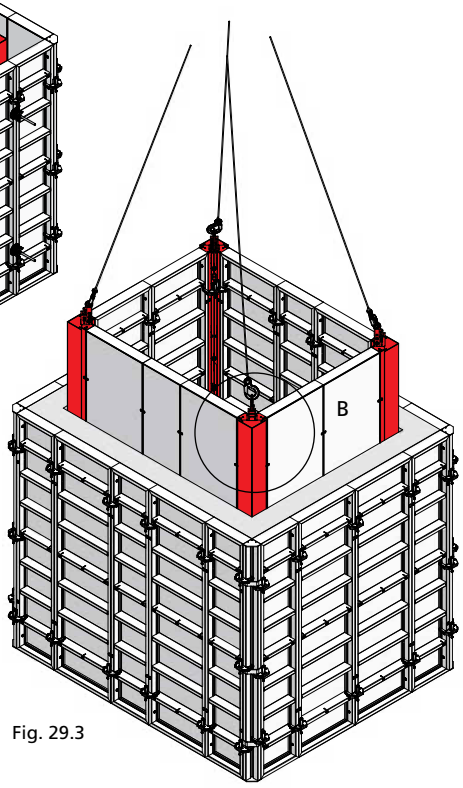

Fig. 29.3

Note

- Before pouring, cover the joints on the sides of the stripping corners with an adhesive tape. This will ease and reduce cleaning efforts.
- Make sure the entire formwork is completely detached from the poured walls before crane-lifting it.

Description	Ref. No.
ST stripping corner	
330/25	**21-262-05**
270/25	**21-262-10**
135/25	**21-262-30**
Adhesive tape	**41-912-10**

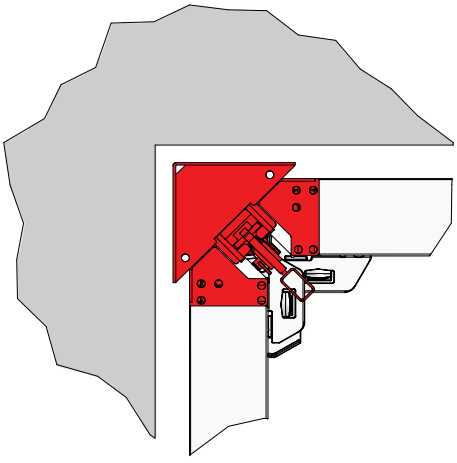

Fig. 29.4 A

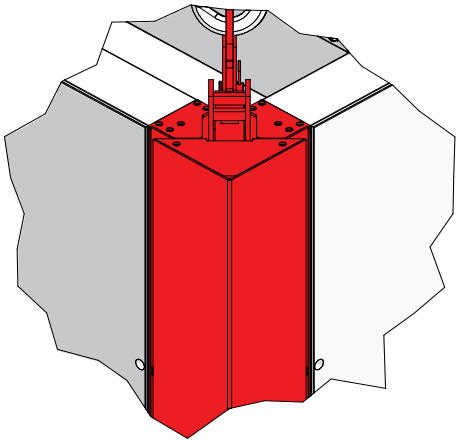

Fig. 29.5 B

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Stripping corner – Connection to panels

Height 330 cm: Attachment and position of assembly locks
The function of the stripping corner can only be guaranteed if the AS assembly locks connecting the stripping corner with the panels are positioned in certain areas of the stripping corner.

No assembly locks can be attached and positioned in the grey shaded areas.

Height 350 cm requires 3 assembly locks .

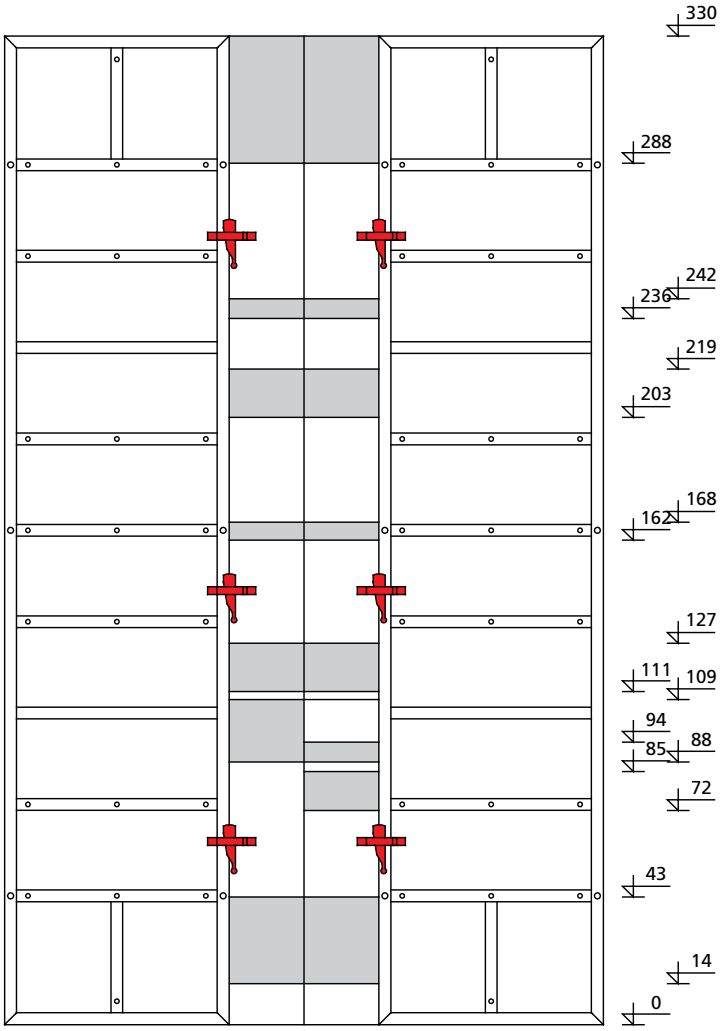

Fig. 30.1 ST stripping corner 330/25

No assembly locks possible in grey shaded areas

Description	Ref. No.
ST stripping corner 330/25.....	**21-262-05**

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Stripping corner – Connection to panels

Heights 270 / 135 cm: Attachment and position of assembly locks
The function of the stripping corner can only be guaranteed if the AS assembly locks connecting the stripping corner with the panels are positioned in certain areas of the stripping corner. No assembly locks can be attached and positioned in the grey shaded areas.

Heights 270 and 135 cm require 2 assembly locks (Fig. 31.1 and 31.2).

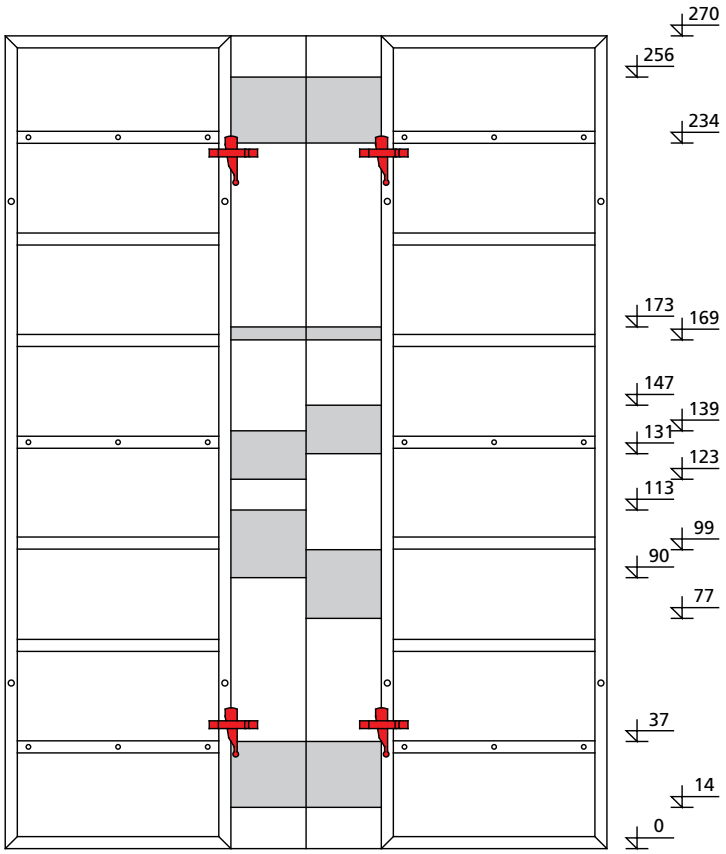

Fig. 31.1 ST stripping corner 270/25

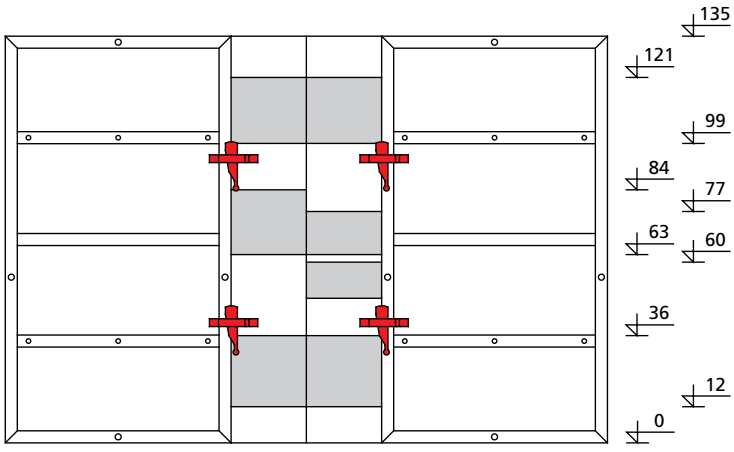

Fig. 31.2 ST stripping corner 135/25

No assembly locks possible in grey shaded areas

Description	Ref. No.
ST stripping corner	
270/25	**21-262-10**
135/25	**21-262-30**

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Stripping corner – Set up and handling

Set up and handling

1. Insert the integrated wedge into the connecting device (Fig. 32.6 C)
2. Connect the stripping corners and panels with AS assembly locks. See p. ST/AS-30 and 31.
3. After pouring and prior to stripping remove the wedges.
4. Activate the stripping corner by pushing the bell-crank lever upwards with a crowbar at position A (Fig. 32.3 A) or at position B (Fig. 32.4 B). This breaks the bond between formwork facing and concrete without much effort.

Pages ST/AS-33 and 34 describe how to activate the stripping corner with the stripping support.

5. Attach the stripping corners with crane slings to the crane gear. Make sure the entire formwork is completely detached from the poured walls before you crane-lift the formwork.
6. The entire formwork is moved in one single lift and detached from the crane when it is in its new position.
7. The stripping corner can be reset for the next pour by positioning the crowbar at position C (Fig. 32.5 C) and pushing the bell-crank lever down.
8. Insert the wedge again into the connecting device (Fig. 32.6 C).

Description	Ref. No.
ST stripping corner	
330/25	**21-262-05**
270/25	**21-262-10**
135/25	**21-262-30**

9. A few hammer blows onto the wedge will move the lateral parts of the stripping corner to the outside and keep them in the pouring position.

Heigh extension

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. 32.1 D).

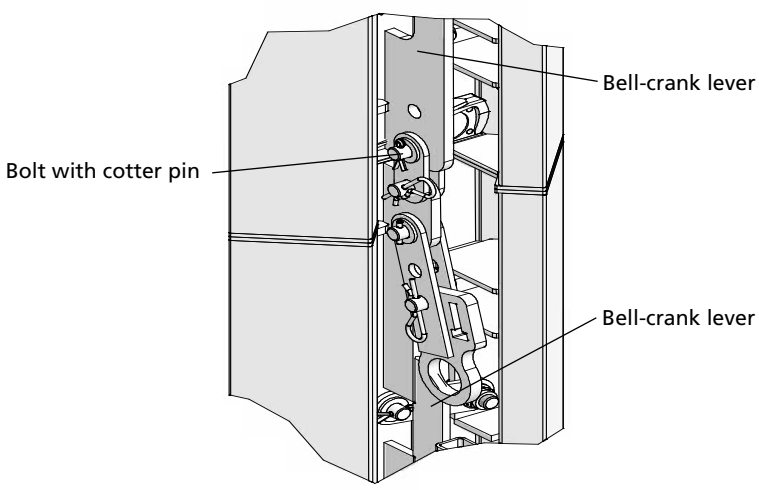

Fig. 32.1 D

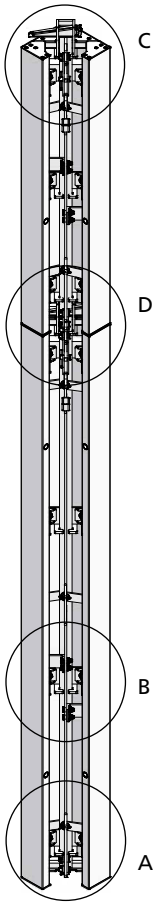

Fig. 32.2

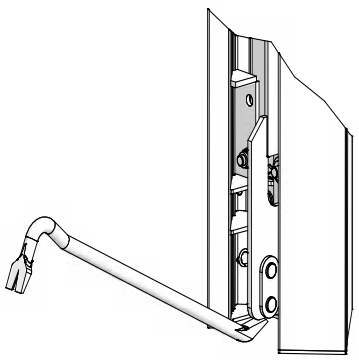

Fig. 32.3 A

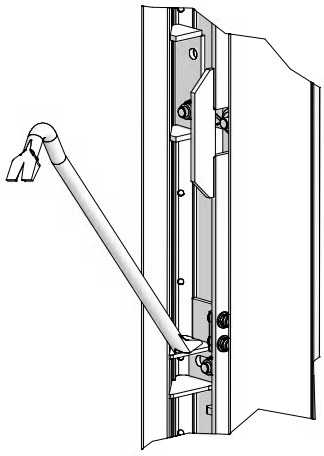

Fig. 32.4 B

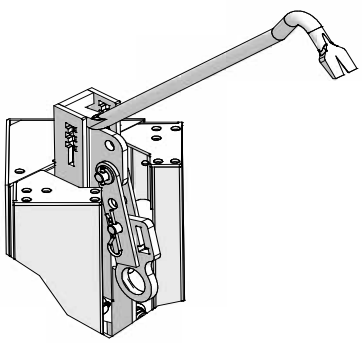

Fig. 32.5 C

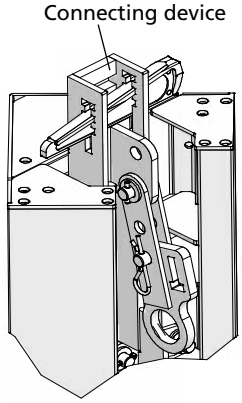

Fig. 32.6 C - Pouring position

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Stripping support for stripping corner

Stripping support
The stripping support (Fig. 33.1) is used to easily activate the stripping corner from above with a power screwdriver, a ratchet wrench or a spanner. The tools must have SW 27, 30 or 36.

Assembly
1. Place the stripping support onto the connecting device at the top of the stripping corner. Make sure the suspension is inclined downwards (Fig. 33.2).
2. Connect the stripping support to the stripping corner with the head bolt 16/40 and cotter pin 4 that are both integrated in the tensioning screw of the stripping support (Fig. 33.2).
3. Lock the stripping support to the stripping corner by driving the stripping corner's wedge with a few hammer blows into the opening of the stripping support (Fig. 33.2).

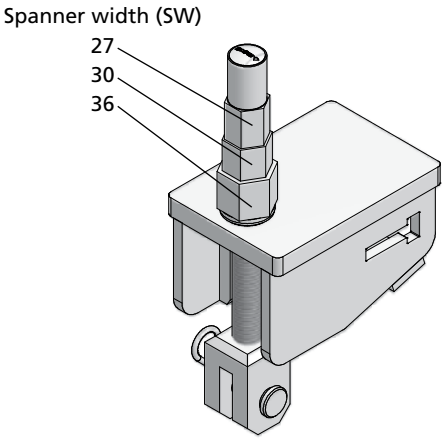

Fig. 33.1

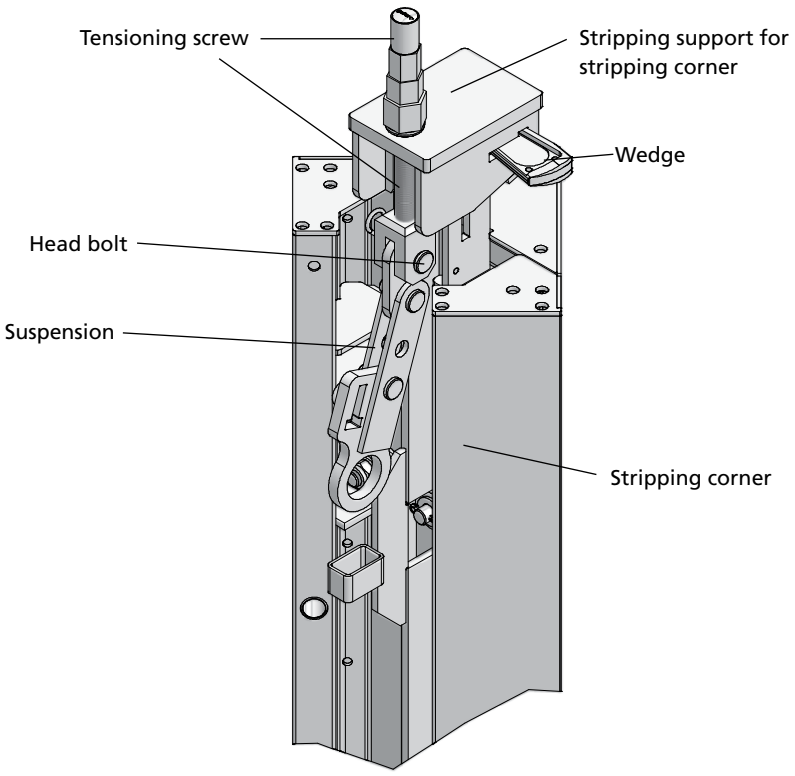

Fig. 33.2

Description	Ref. No.
Stripping support for stripping corner	29-306-30
Spanner SW 27	29-800-10

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Stripping support for stripping corner

Working principle of the stripping support
The stripping support has 3 hexagonal nuts that are operated with tools having SW 27, 30 und 36.

Turning the hexagonal nut at the tensioning screw with an electrical powerdrive (Fig. 34.1), a ratchet wrench (Fig. 34.2) or a spanner moves the bell-crank lever upwards. This activates the stripping corner and removes the shaft formwork from the poured walls (Fig. 34.4).

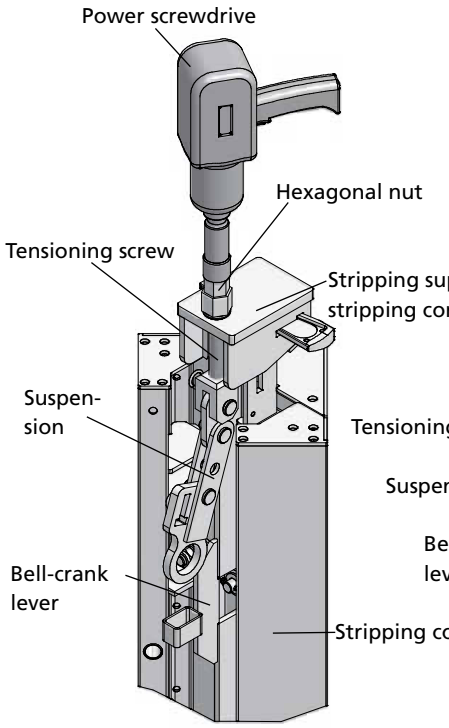

Fig. 34.1

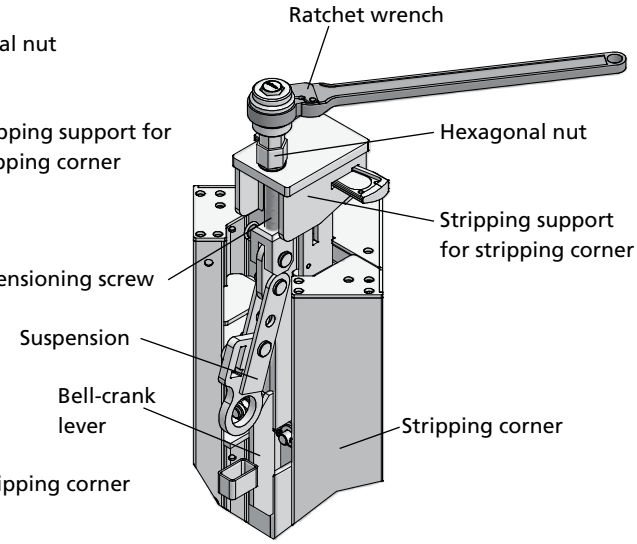

Fig. 34.2

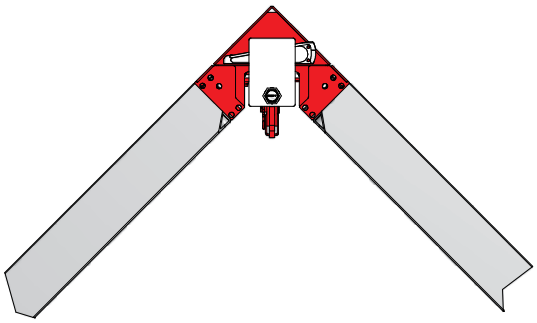

Fig. 34.3 Stripping corner before activating the stripping support

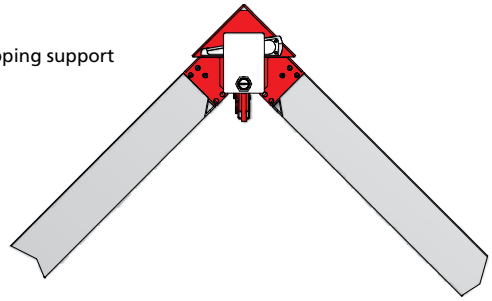

Fig. 34.4 Stripping corner before activating the stripping support

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Using stripping corners for easy stripping outside shafts

The ST stripping corner can also be used as a stripping support for panels between corners inside a room. In this case, the stripping corner is used to reduce the tension between the panels so that they can easily be removed from the poured wall between the corners.

Stripping procedure
1. Remove the AS assembly locks connecting the stripping corners with the panels (Fig. 35.1).
2. Activate the ST stripping corners (Fig. 35.2 and p. ST/AS-32 through 34).
3. Lift the ST stripping corners out of their position, then strip the panels (Fig. 35.3).

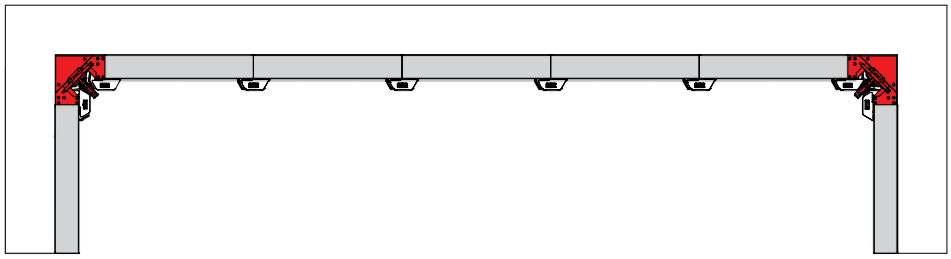

Fig. 35.1

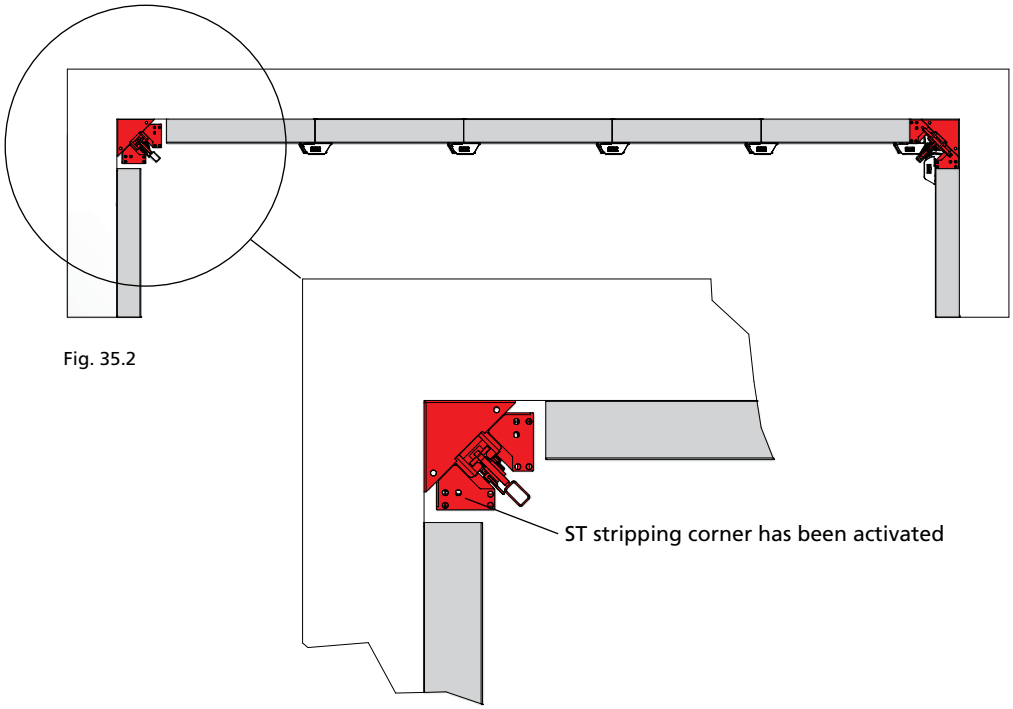

Fig. 35.2

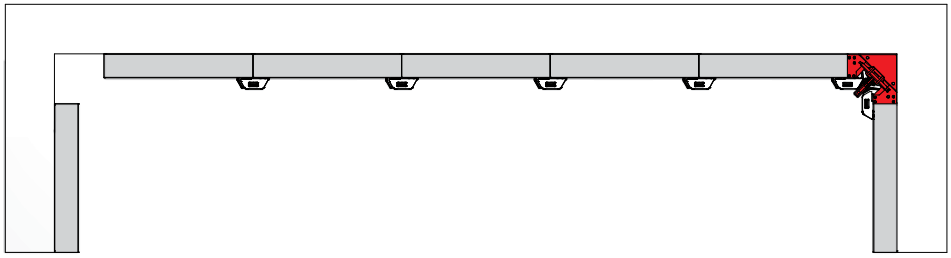

Fig. 35.3

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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 (Fig. 36.1 and 36.2).

For the use and load capacity of alignment rails see p. ST/AS-46.

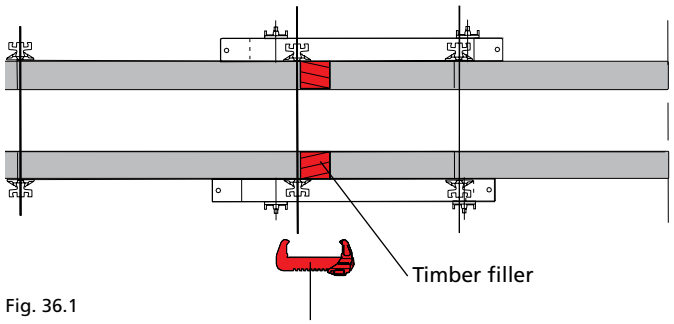

Fig. 36.1

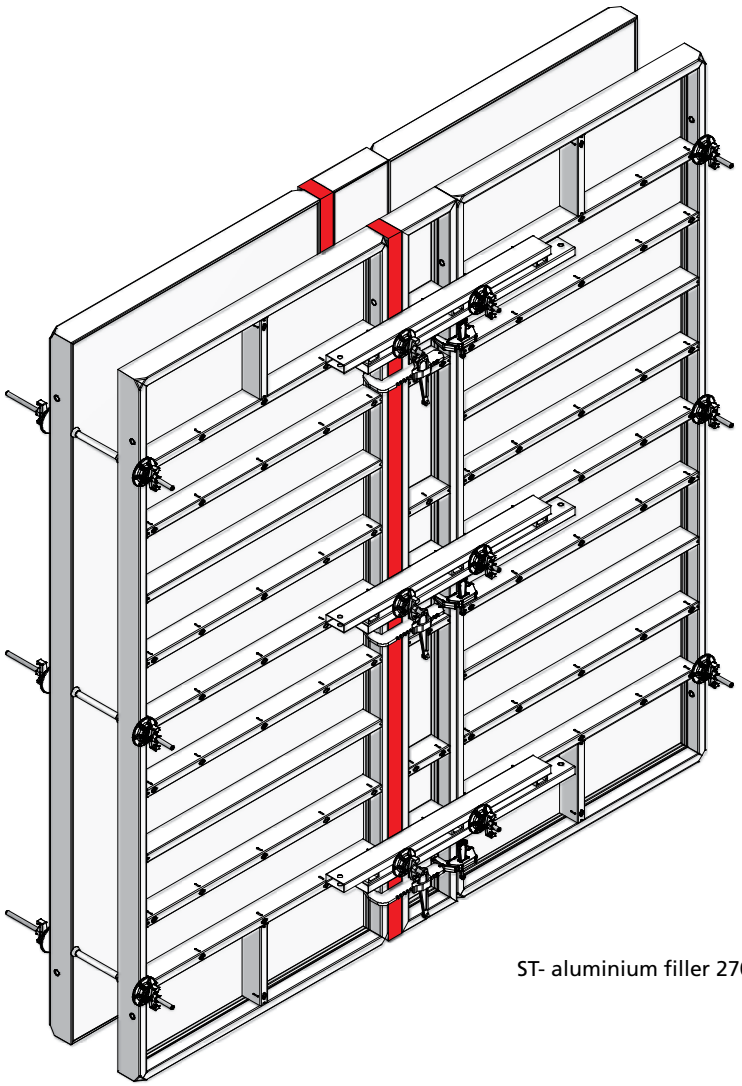

Fig. 36.2

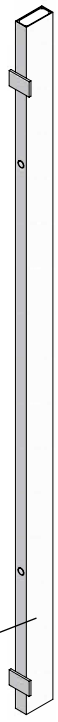

Fig. 36.3

Description	Ref. No.
Uni-assembly lock	
22	**29-400-85**
28	**29-400-90**
ST aluminium filler	
270/5	**21-270-60**
135/5	**21-270-65**

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Length compensation

Timber profiles
Timber profiles (Fig. 37.4) are used for gaps exceeding 14 cm (Fig. 37.1 and 37.2). A forming face is cut to size and attached to the timber profiles. Reinforcement is achieved with alignment rails which are attached with flange screws to the multi-function profiles. For problem areas (Fig. 37.5 and 37.6), the forming face is attached to the panels with timber profiles. Timber profiles are always delivered in pairs.

ST compensation plate
Alternately, an ST compensation plate (Fig. 37.3) can be used for a gap between 8 and 20 cm. It is attached to the panel with 2 AS assembly locks. Alignment rails must be used for alignment and reinforcement.

Please note
For the use and load capacity of alignment rails see p. ST/AS-46.

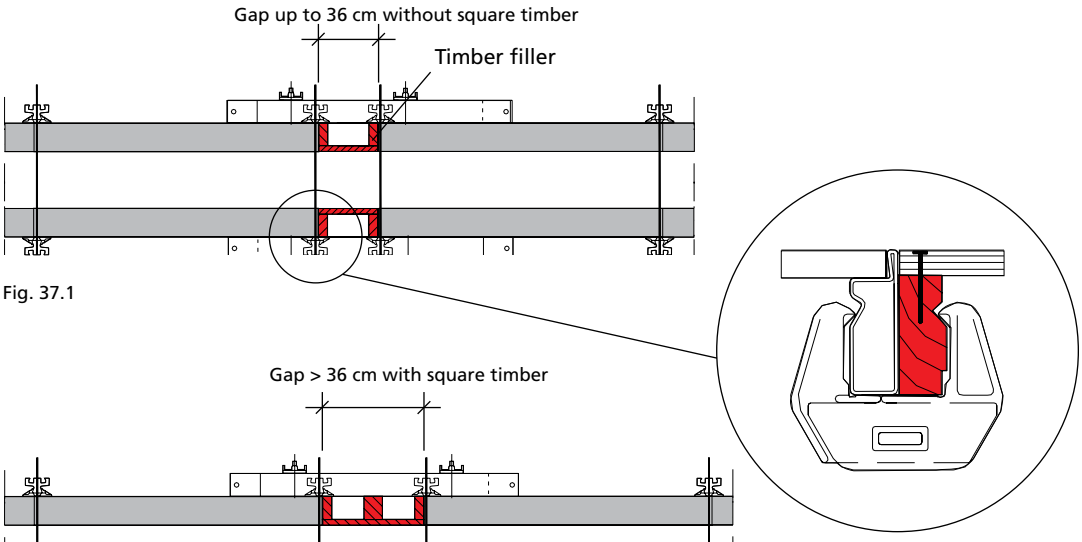

Fig. 37.1

Fig. 37.4

Fig. 37.2

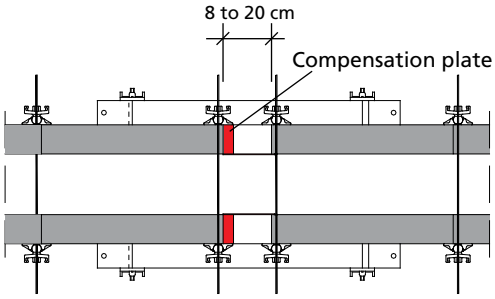

Fig. 37.3

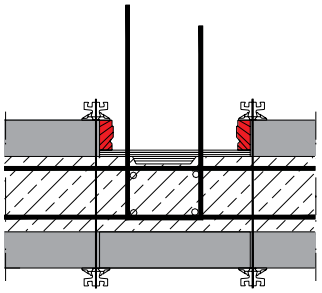

Fig. 37.5

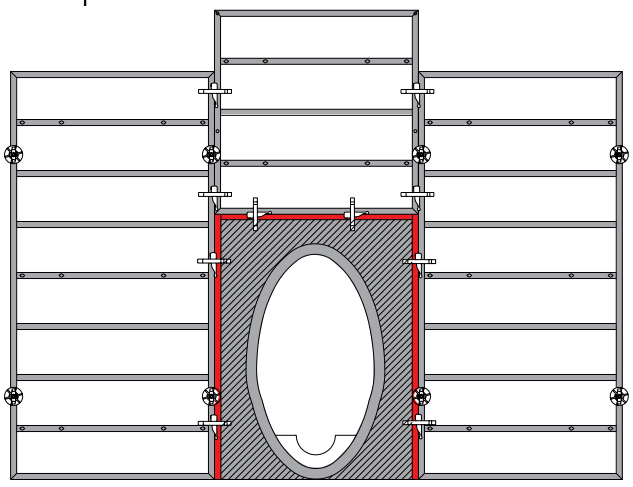

Fig. 37.6

Description	Ref. No.
AS timber profile	
270/21	**29-200-03**
135/21	**29-200-05**
ST compensation plate	
270/20	**21-300-20**
135/20	**21-300-30**

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T-wall connection

Fig. 38.1 through 38.5 show a T-wall connection using 2 inside corners.

Different wall widths can be compensated with a timber profile (Fig. 28.4) or a wood filler (Fig. 38.5)

For the use and load capacity of alignment rails see p. ST/AS-46.

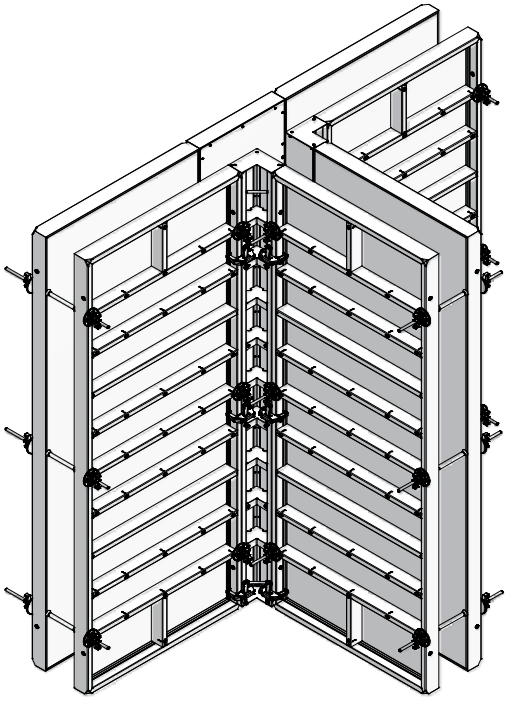

Fig. 38.1

The admissible width depends on the alignment rail and tieing

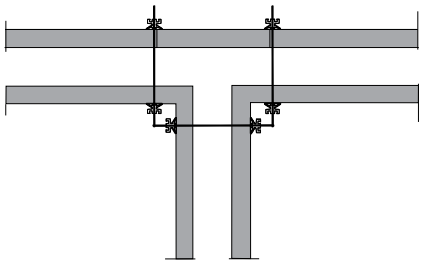

Fig. 38.2

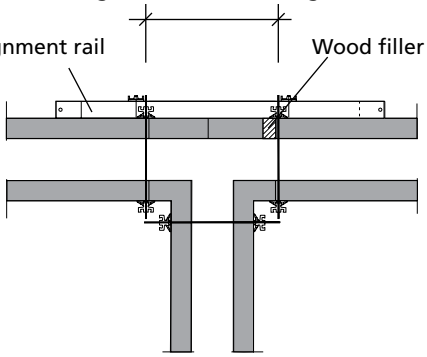

Fig. 38.3

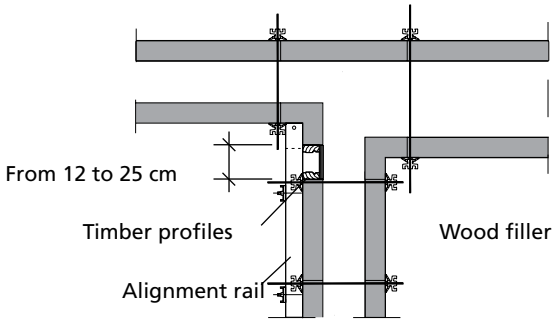

Fig. 38.4

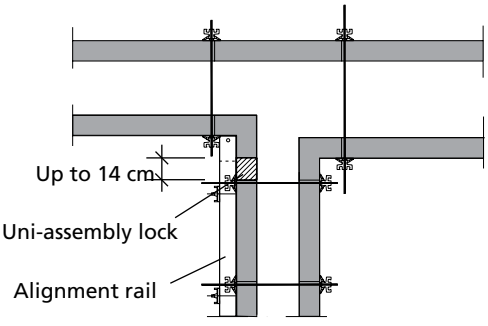

Fig. 38.5

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Connection to existing walls

Fig 39.1 through 39.7 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.

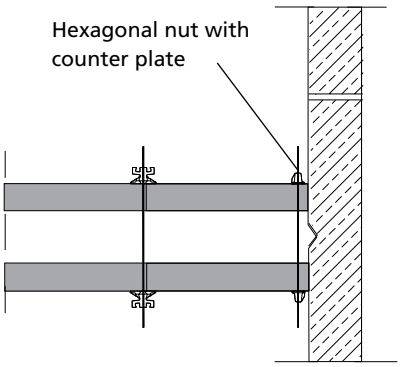

Fig. 39.1

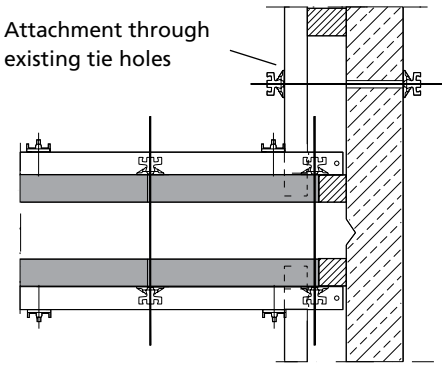

Fig. 39.2

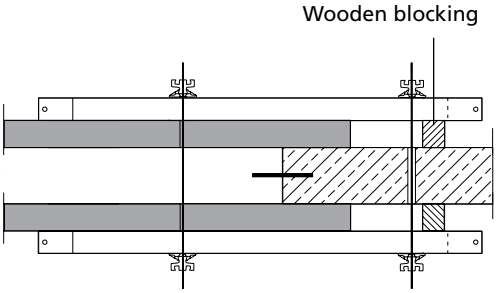

Fig. 39.3

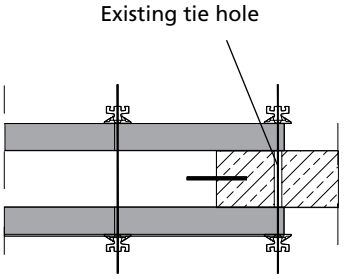

Fig. 39.4

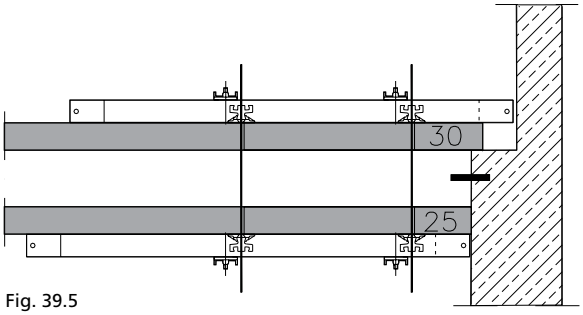

Fig. 39.5

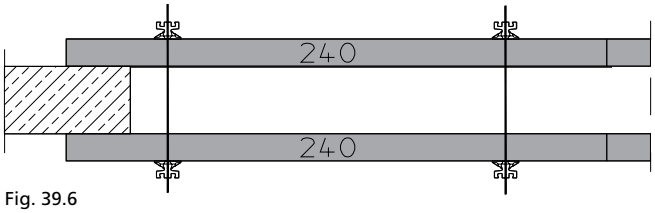

Fig. 39.6

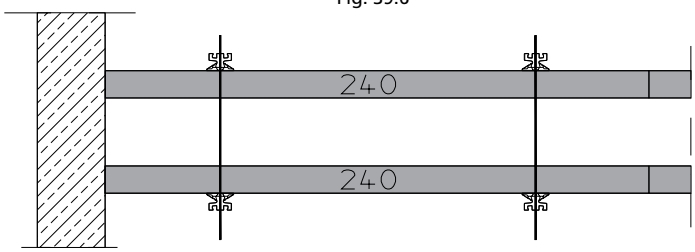

Fig. 39.7

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Stop ends

With outside corners and standard panels
Stops ends can be formed using outside corners and standard panels (Fig. 40.1 through 40.3).

Panels that are 50 cm wide or wider require an additional bracing with alignment rails (Fig. 40.3). Use one alignment rail per tie hole level.

Rounded stop ends up to 60 cm thick can be formed using a circular half of the circular steel column formwork Circo. The circular half is attached with a Uni-assembly lock 22 (Fig. 40.4).

Also observe the Circo Technical Instruction Manual.

For the required number of AS assembly lock at the outside corners and panel joints see Table 40.5.

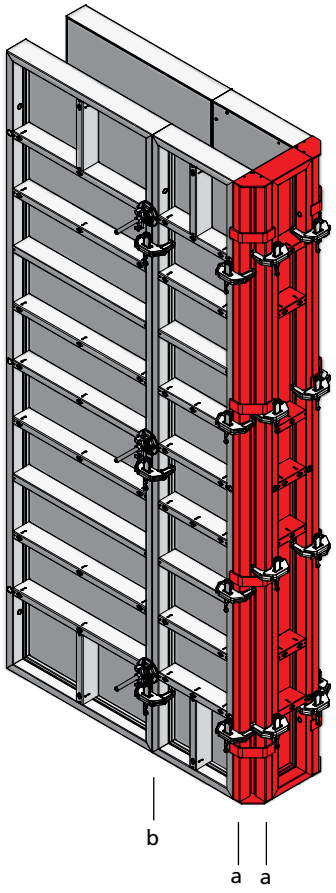


Fig. 40.1 Height 330 cm

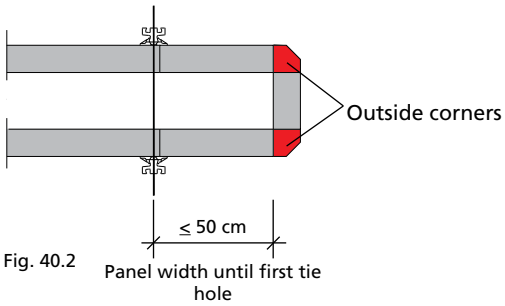


Fig. 40.2

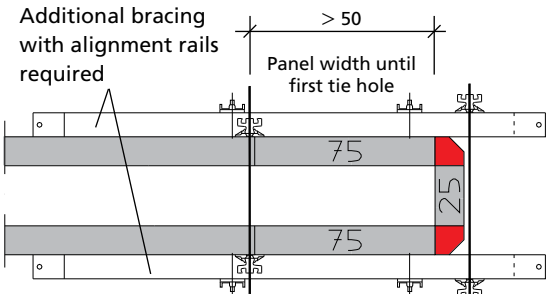
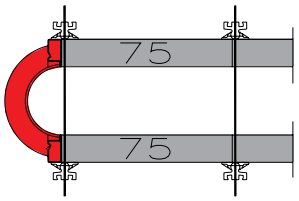


Fig. 40.3



The circular half of the circular steel column formwork Circo must be attached with the Uni-assembly lock 22

Fig. 40.4

Pouring height	Number of AS assembly locks	
	Corner (a)	Panel joint (b)
h = 90 cm	2	2
h = 135 cm	2	2
h = 270 cm	3	2
h = 330 cm	4	3
h = 405 cm	5	4
h = 465 cm	6	5
h = 540 cm	6	5

Table 40.5

Description	Ref. No.
AS/ST outside coner	
330	**22-140-10**
270	**22-140-20**
135	**22-140-30**
90	**22-140-40**

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Stop ends

With stop end brackets
Stop ends can also be formed using the stop end bracket 23/40 for a wall thickness up to 30 cm or the stop end bracket 40/60 for a wall thickness up to 40 cm (Fig. 41.2).

When using a stop end bracket, there is no need to use a tie rod.

One stop end bracket is required per tie hole level (Fig. 41.1).

With stop end fixtures and alignment rails
Another method of forming a stop end is using 2 stop end fixtures 23/40, 2 flange nuts 100 und 1 alignment rail (Fig. 41.3 and 41.4).

When using stop end fixtures and alignment rails, tieing is also required outside the panels by using 2 Uni-tie claws, 1 tie rod DW 15 and 2 flange nuts 100 for each additional tie hole (Fig. 41.3 and 41.4).

One stop end fixture and one alignment rail plus the addition tie hole are used per tie hole level (Fig. 41.3).

Description	Ref. No.
Stop end bracket	
40/60	**29-105-50**
23/40	**29-105-45**
Stop end fixture	
23/40 yellow	**29-402-85**
Uni-tie claw	**29-901-41**
Uni-assembly lock 22	**29-400-85**
Flange nut 100	**29-900-20**
AS alignment rail	
50	**29-201-73**
125	**29-201-75**

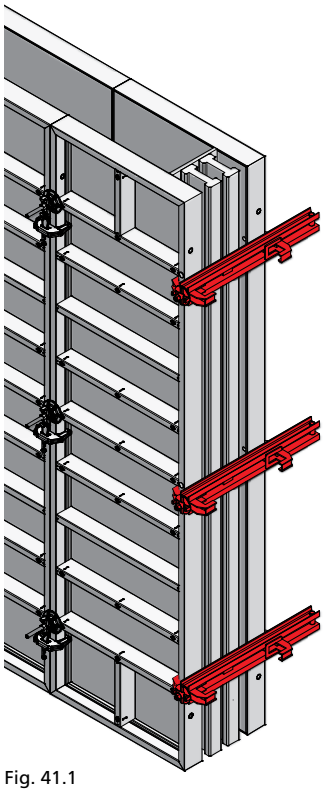

Fig. 41.1

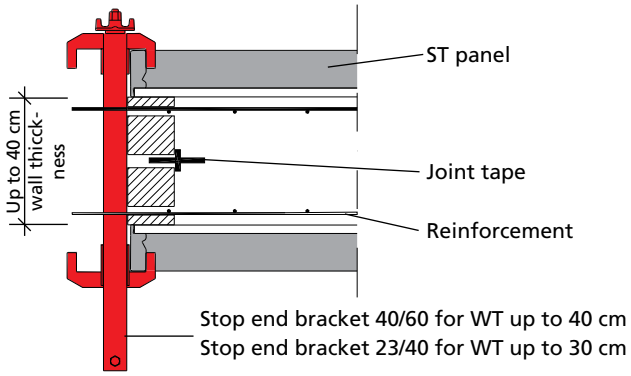

Fig. 41.2

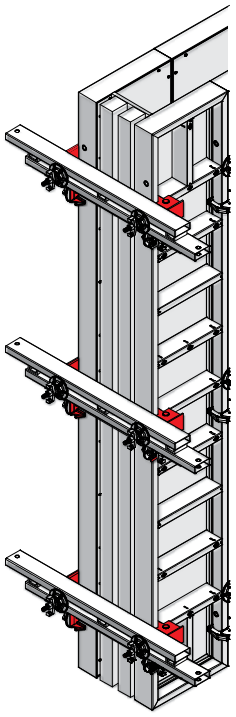

Fig. 41.3

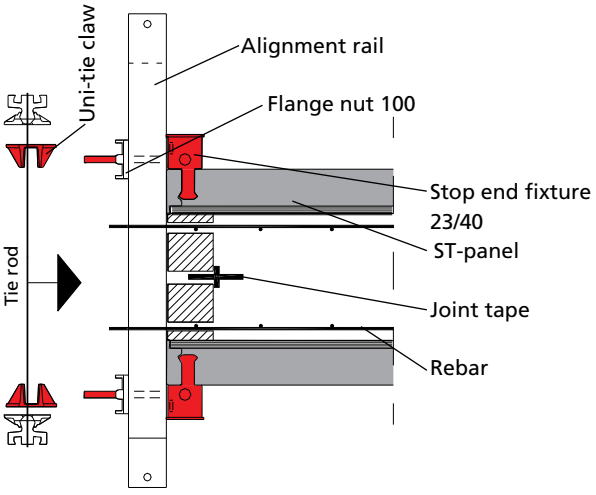

Fig. 41.4

Wall offset

One-sided wall off-sets of up to 10 cm are formed by moving back the corresponding panel (Fig. 42.1 and 42.4).

For offsets exceeding 13 cm, inside corners should be used (Fig. 42.2 and 42.5).

If both sides of the wall are offset as shown in Fig. 42.3, inside corners and M outside corner brackets or corner angle 40/60 should be used.

All types of wall offsets require alignment rails for bracing.

Even when the panels are arranged as shown in Fig. 42.3, they can be connected with the Uni-assembly lock (Fig. 42.5).

Job-built tied rods of any length can be used for the solid bridging of problem areas such as pilaster, offsets or projecting building parts. Bridging is possible at any multi-function profile and independent of the tie hole location.

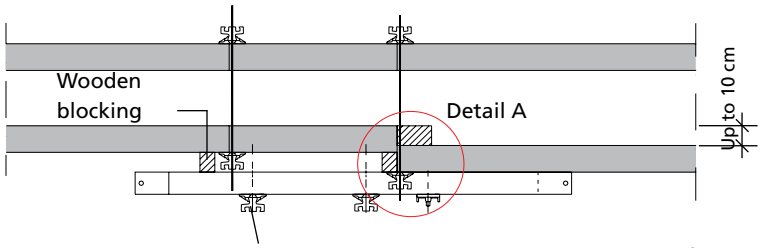

Fig. 42.1 Wall offset

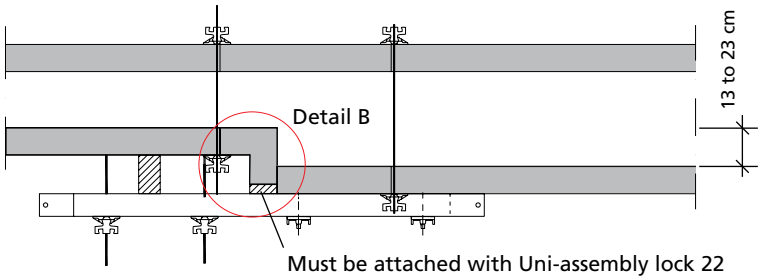

Fig. 42.2 Wall offset

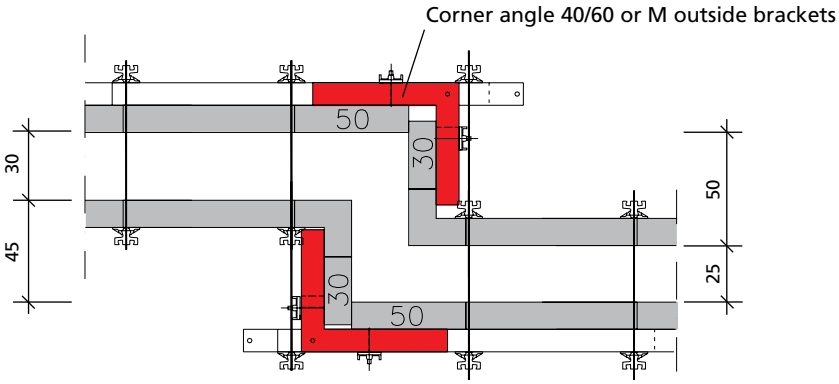

Fig. 42.3 Wall offset on both sides

Detail A

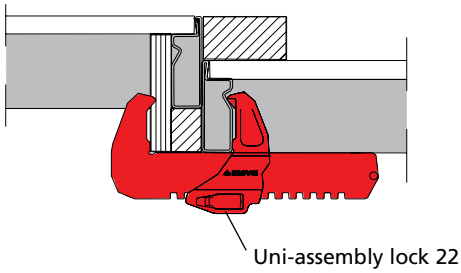

Fig. 42.4

Detail B

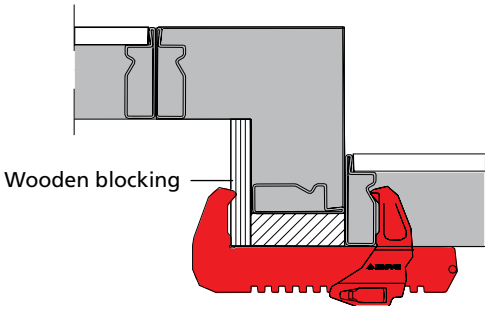

Fig. 42.5

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

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Pilasters

Pilasters are easily formed with inside corners, standard panels and, where necessary, wooden blockings. The static reinforcement is achieved with alignment rails (Fig. 43.1 through 43.3).

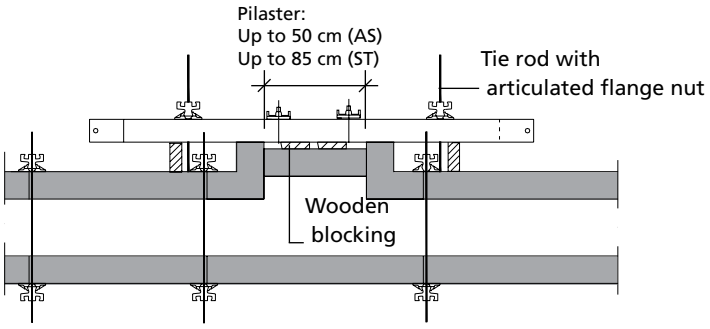

Fig. 43.1

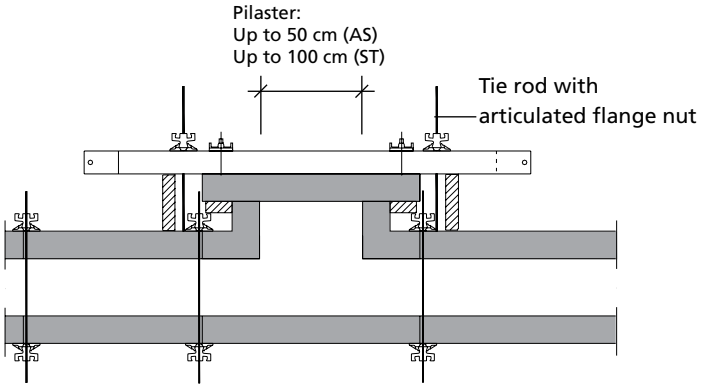

Fig. 43.2

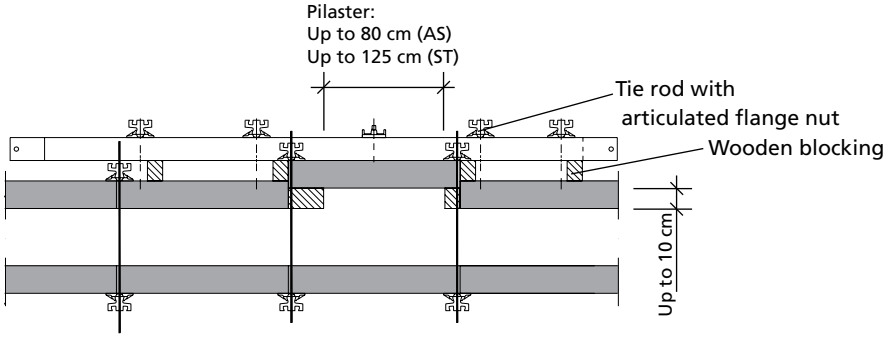

Fig. 43.3

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Differences in height

The assembly lock can be attached at any position on the frame profile (Fig. 44.1), 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 AS assembly locks, even with differences in height (Fig. 44.1).

Job-built fillers are made with square timbers and an alkus plastic sheet or plywood cut to size. When required, use a square timber for reinforcing.

Square timbers and panels are simply connected to each other with AS assembly locks (Fig. 44.1 and 44.2).

The wood filler areas need special attention (see page ST/AS-37). The use of rails and/or blockings may be required.

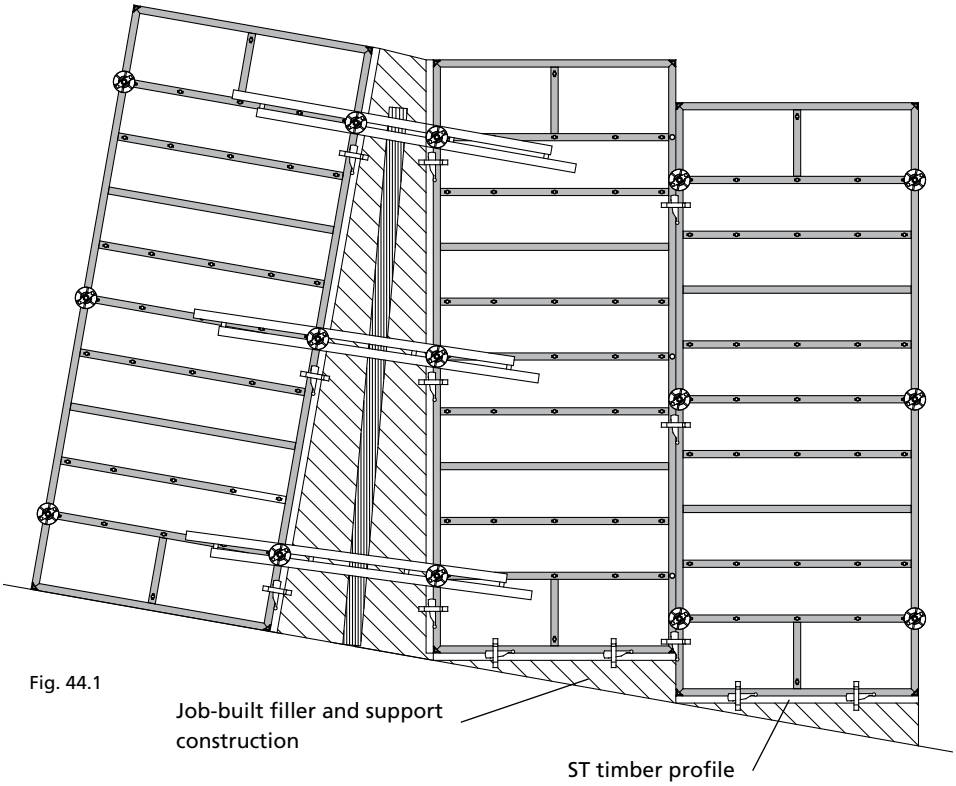

Fig. 44.1

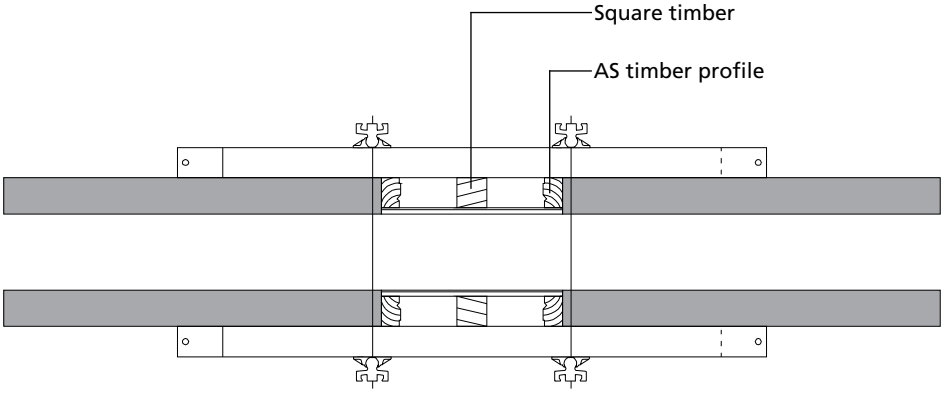

Fig. 44.2

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Panels in horizontal position

A lot of forming problems can easily be solved by using panels horizontally, e.g. when pouring basin walls in water treatment plants, foundations and strip footings. Having a centered tie hole, the 135 cm wide StarTec and AluStar panels are also ideal for foundations.

When using foundation tapes and tensioners AS/ST for foundation tapes, there is no need to put tie rods through the lower tie holes, a task that is very time-consuming (Fig. 45.1 to 45.4). The tensioner is attached to the formwork with a wedge.

The top tie in the concrete can be replaced as follows:
- by a push-pull strut that firmly connects the opposite panels up to a wall or foundation thickness of 60 cm (Fig. 45.3).
- or by a Uni-tie claw. Two Uni-tie claws, 1 tie rod DW 15 und 2 flange nuts 100 are required per tie (Fig. 45.4 and 45.5). We recommend using an anchor sleeve D22 to serve as a spacer and prevent the tie from soiling.

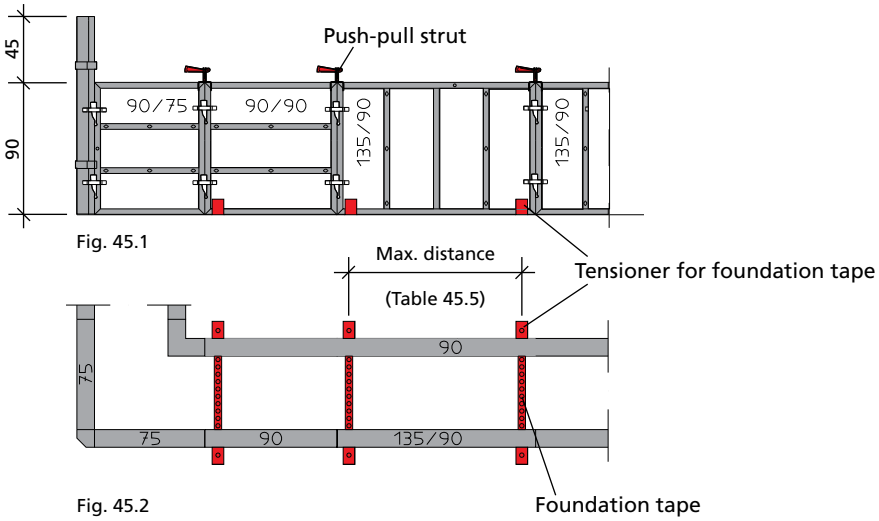

Fig. 45.1

Fig. 45.2

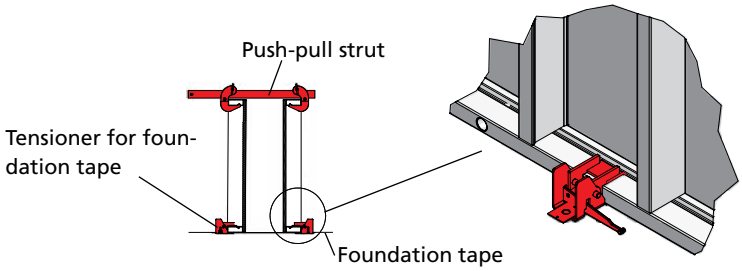

Fig. 45.3

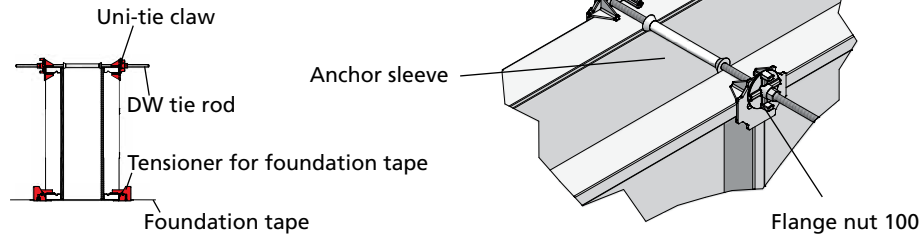

Fig. 45.4

Fig. 45.5

Description	Ref. No.
Push-pull strut	29-105-70
Uni-Kralle	29-901-41
Foundation tape 50 m	29-307-50
Tensioner AS/ST for foundation tape	29-307-70
Trolley for foundation tape	29-307-55
Plastic tube D22	29-902-30
Cone for plastic tube D22/10	29-902-40
D22/30	29-902-50

Max. spacing of tensioners	
Pouring height 75 cm	185 cm
Pouring height 100 cm	120 cm
Pouring height 135 cm	70 cm

Table 45.6

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Substitution of ties

In certain cases alignment rails can reduce the number of tie rods.

When extending a horizontal StarTec panel 270/240 with a horizontal panel 270/90 and placing 3 alignment rails on the multi-function profile, the alignment rails substitute 1 row of ties (Fig. 46.1).

Compensation areas are reinforced with alignment rails. It is not necessary to install ties at the filler. The length of the filler is determined by the following items:
- the panel – StarTec or AluStar
- the type of aligment rail that is used
- the location of the alignment rail – at tie hole elevation or at the multi-function profile.

For a perfect alignment we recommend attaching the alignment rails at the multi-function profile and limit the filler width to half the length of the alignment rails (Fig. 46.2, Tables 46.3 and 46.4).

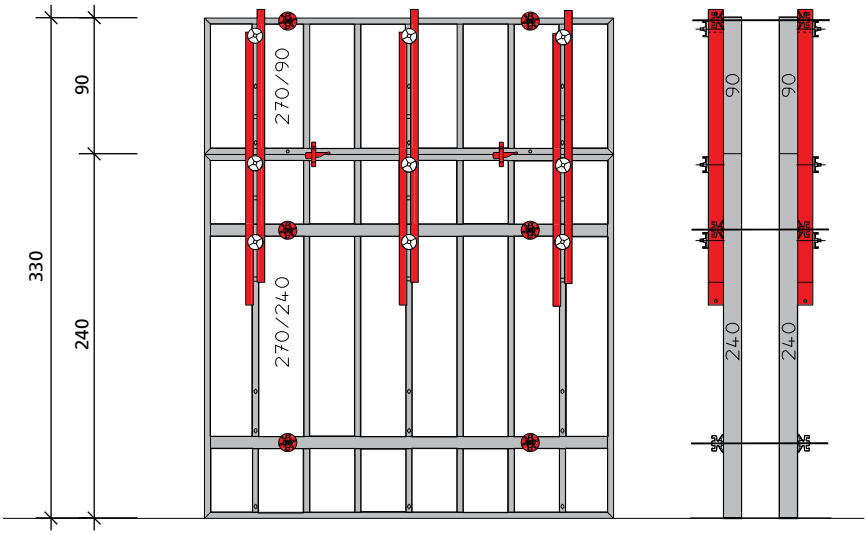
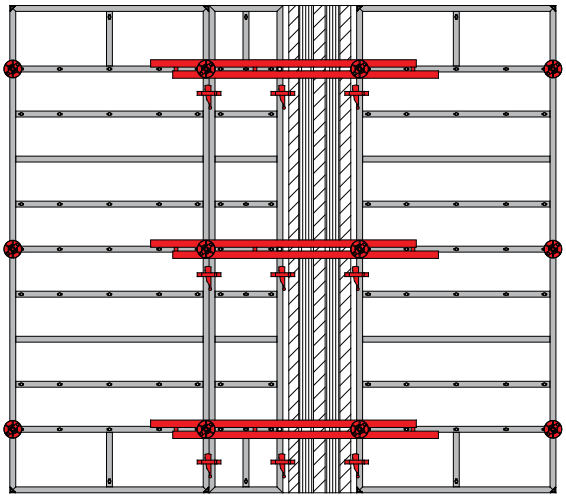


Fig. 46.1



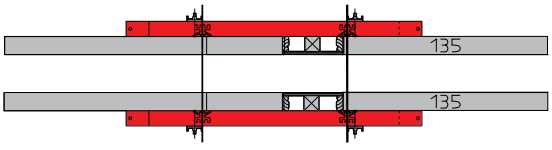
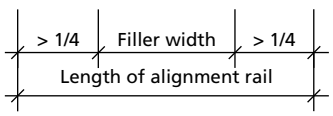


Fig. 46.2



If the fresh concrete pressure is P_{bmax} = 70 kN/m² and if lines 5 and 6 of DIN 18202 are observed (see p. ST/AS-12), the following filler width (in cm) can be bridged, depending on the alignment rail and its location (tie hole or multi-function profile):

Alignment rail	Filler width (tie hole)	Filler width (mfp)
AS-RS 50	35	25
AS-RS 125	70	70
AS-RS 200	70	80
M-RS 180	80	100
M-RS 250	80	110
M-RS 450	125	175

Table 46.3 StarTec

If the fresh concrete pressure is P_{bmax} = 60 kN/m² and if lines 5 and 6 of DIN 18202 are observed (see p. ST/AS-12), the following filler width (in cm) can be bridged, depending on the alignment rail and its location (tie hole or multi-function profile):

Alignment rail	Filler width (tie hole)	Filler width (mfp)
AS-RS 50	35	25
AS-RS 125	70	70
AS-RS 200	80	80

Table 46.4 AluStar

Description	Ref. No.
AS alignment rail	
50	**29-201-73**
125	**29-201-75**
200	**29-201-80**
M alignment rail	
180	**29-400-92**
250	**29-402-50**
450	**29-402-40**
350 reinforced	**29-402-45**
450 reinforced	**29-402-38**

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Height extension

Note the following for horizontal height extension:

- Tie rods must be used for all tie holes for a height extension with a panel that is wider than 50 cm (Fig. 47.1).

- Only the top ties need to be placed if the height is extended with a panel that has a width over 30 cm and up to 50 cm (Fig. 47.2).

- For a height extension with a panel that is up to 30 cm wide, 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, it is required to install a tie 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.

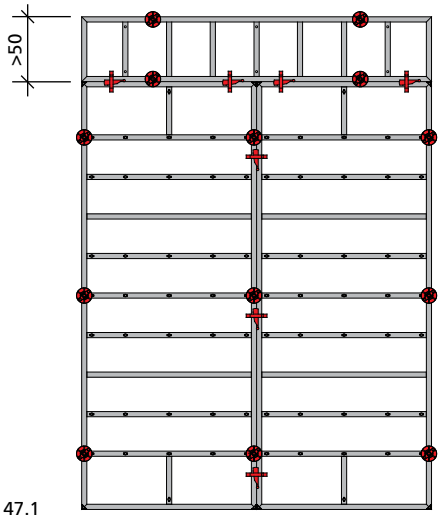

Fig. 47.1

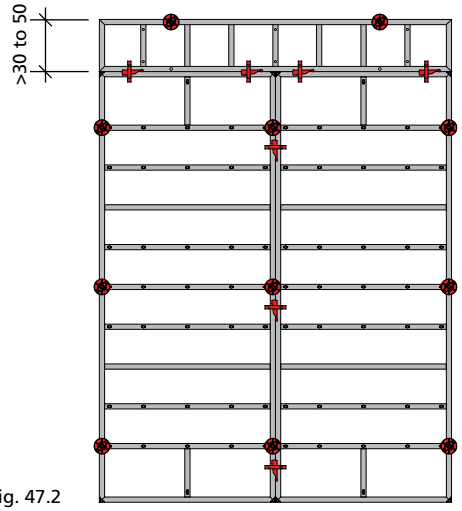

Fig. 47.2

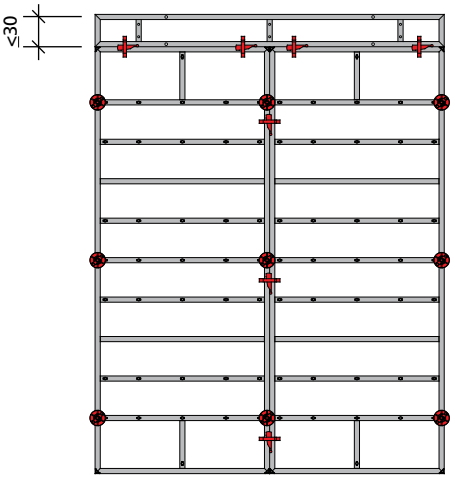

Fig. 47.3

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Height extension

Combinations for height extension

All panels can be height-extended vertically or horizontally and must always be connected with the AS assembly lock (see p. ST/AS-8). Since the standard panels have heights of 330, 270, 135 and 90 cm (StarTec), height extensions are possible in increments of 45 cm.

By extending the panels horizontally, almost any formwork height can be achieved. The 270/240 cm large-size panel (StarTec) is used horizontally when extending the formwork height.

When extending panels with a height of 270 or 90 cm with a panel that is 90 cm high, an alignment rail must be attached for alignment (Fig. 48.3).

Foundation

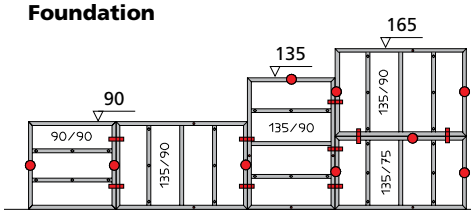

Fig. 48.1 Without taking the concrete pressure into account

One-storey up to 330 cm

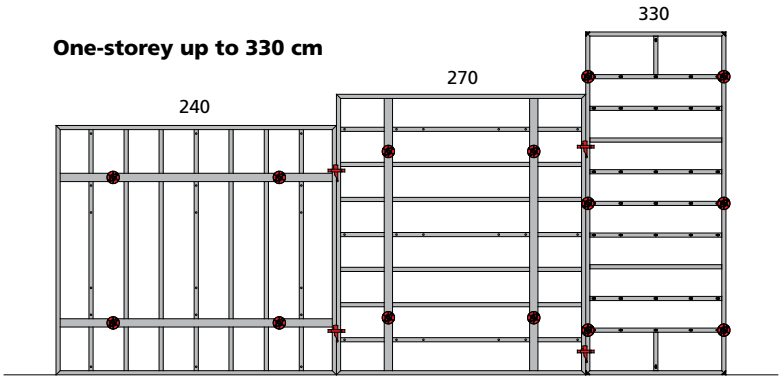

Fig. 48.2 Without taking the concrete pressure into account

Possible height extensions

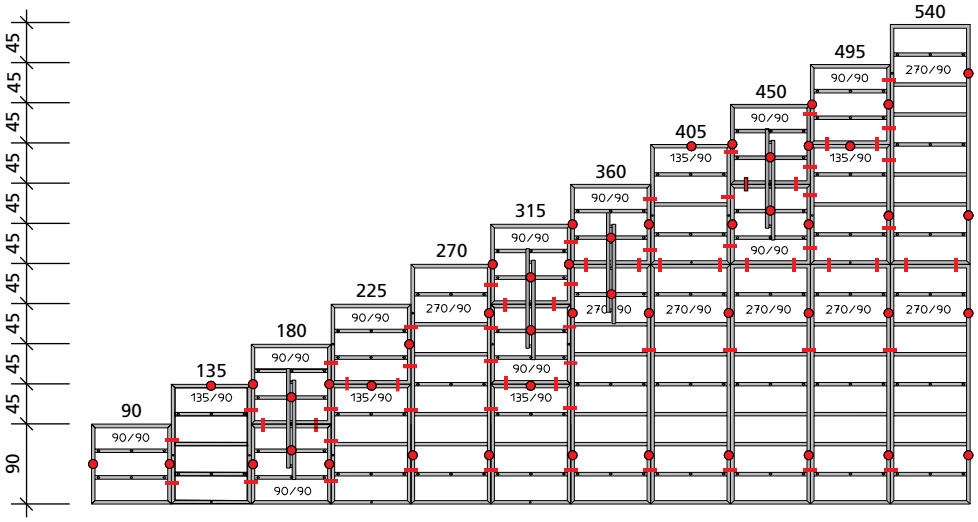

Fig. 48.3

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Height Extension

Combinations for Height Extension
All panels can be height-extended vertically or horizontally and must always be connected with the AS assembly lock (see p. ST/AS-8).

As vertical and horizontal panels can be freely combined, the vertical joint is always continuous and formwork projections are minimised.

When extending panels with a height of 270 or 90 cm with a panel that is 90 cm high, an alignment rail must be attached for alignment (Fig. 49.1 und 49.2).

Height-extended over 270 cm

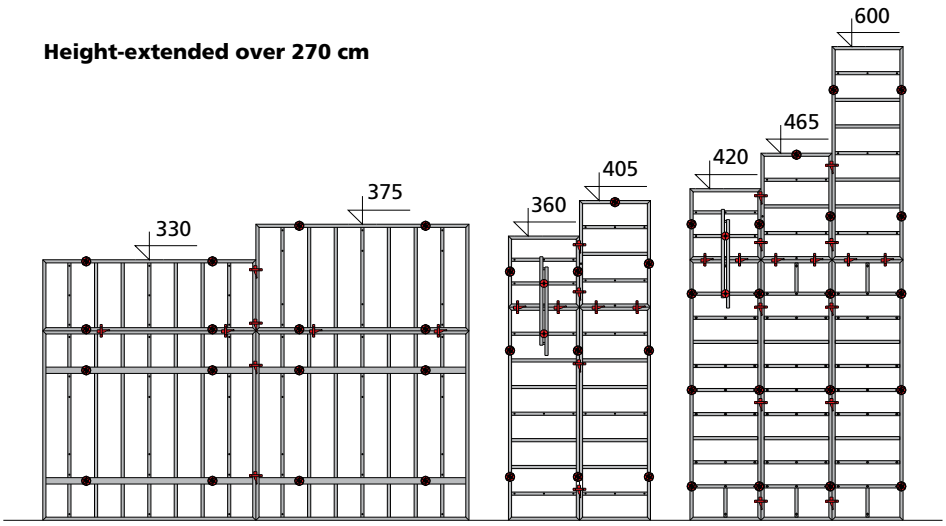

Fig. 49.1

Vertical or horizontal extension

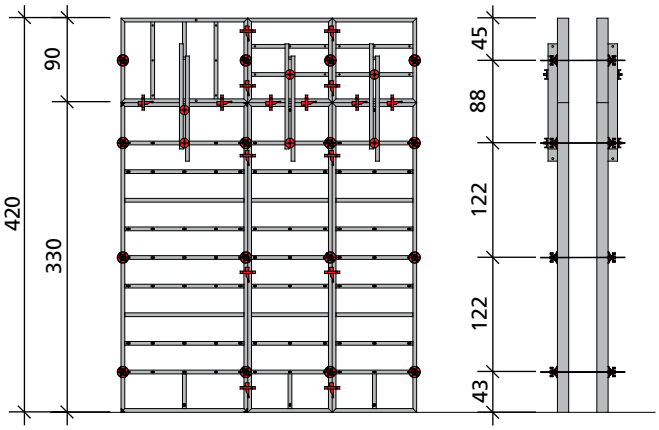

Fig. 49.2

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Crane-ganging – Important notes

When crane-ganging panels, make sure to check if the crane hook is attached to a cross tiffener made of aluminium or to a cross stiffener made of steel as this will determine how you have to crane-lift the panels.

It also makes a difference if you lift panels in vertical or horizontal position and the year the panels were produced also plays a role.

Methods 1 trough 5 on pages ST/AS-51 through 55 show how to lift and crane-gang the various panels.

Note that depending on the type of panel, the AS crane hook's maximum load capacity of 15 kN may be reduced. For a general description and notes on how to use the AS crane hook refer to page ST/AS-20.

The StarTec panels 270/90 and 270/75 that were produced until 2006 are equipped with cross stiffeners made of aluminium and steel (Fig. 50.1). Such StarTec panels that have been produced since 2006 only have cross stiffeners made of steel (Fig. 50.2).

Cross stiffeners made of aluminium can be identified by their grip profiles (Fig. 50.3). Cross stiffeners made of steel do not have grip profiles (Fig. 50.4).

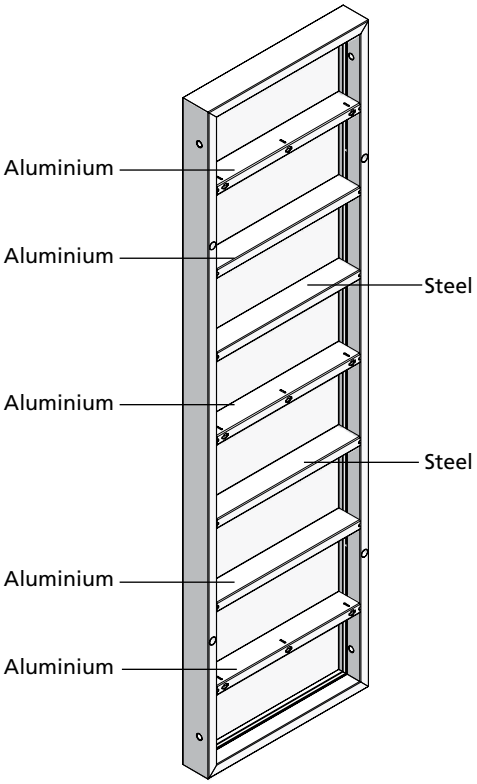

Fig. 50.1 StarTec panels 270/90 and 270/75, built until 2006

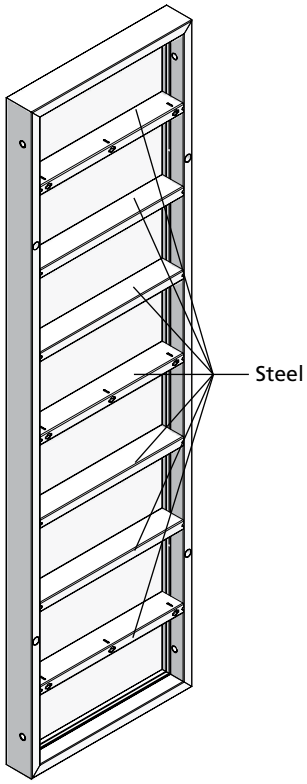

Abb. 50.2 StarTect panels 270/90 and 270/75, built from 2006

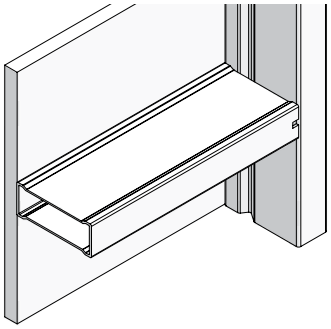

Fig. 50.3 Cross stiffener made of aluminium (with grip profile)

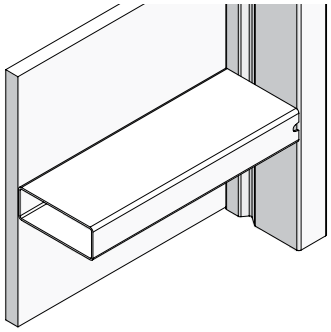

Fig. 50.4 Cross stiffener made of steel (without grip profile)

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Crane-ganging – Method 1

Apply this method for single vertical AluStar and StarTec panels or vertical panel gangs, no matter when the panels were produced (Abb. 51.1).

The crane hook's load capacity is 15 kN (1.5 t).

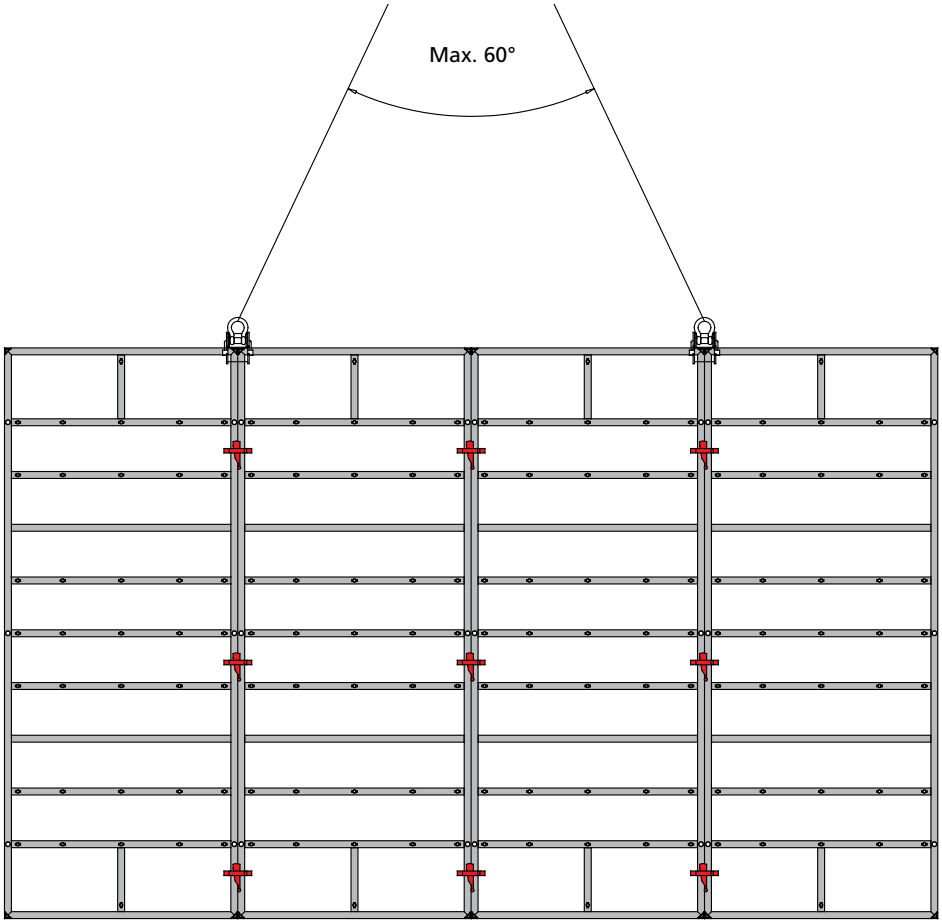

Fig. 51.1

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Crane-ganging – Method 2

Apply this method for single horizontal panels or for units height-extended with horizontal panels when using StarTec panels built in 2006 or later (Abb. 52.1).

The crane hook's load capacity is 15 kN (1.5 t).

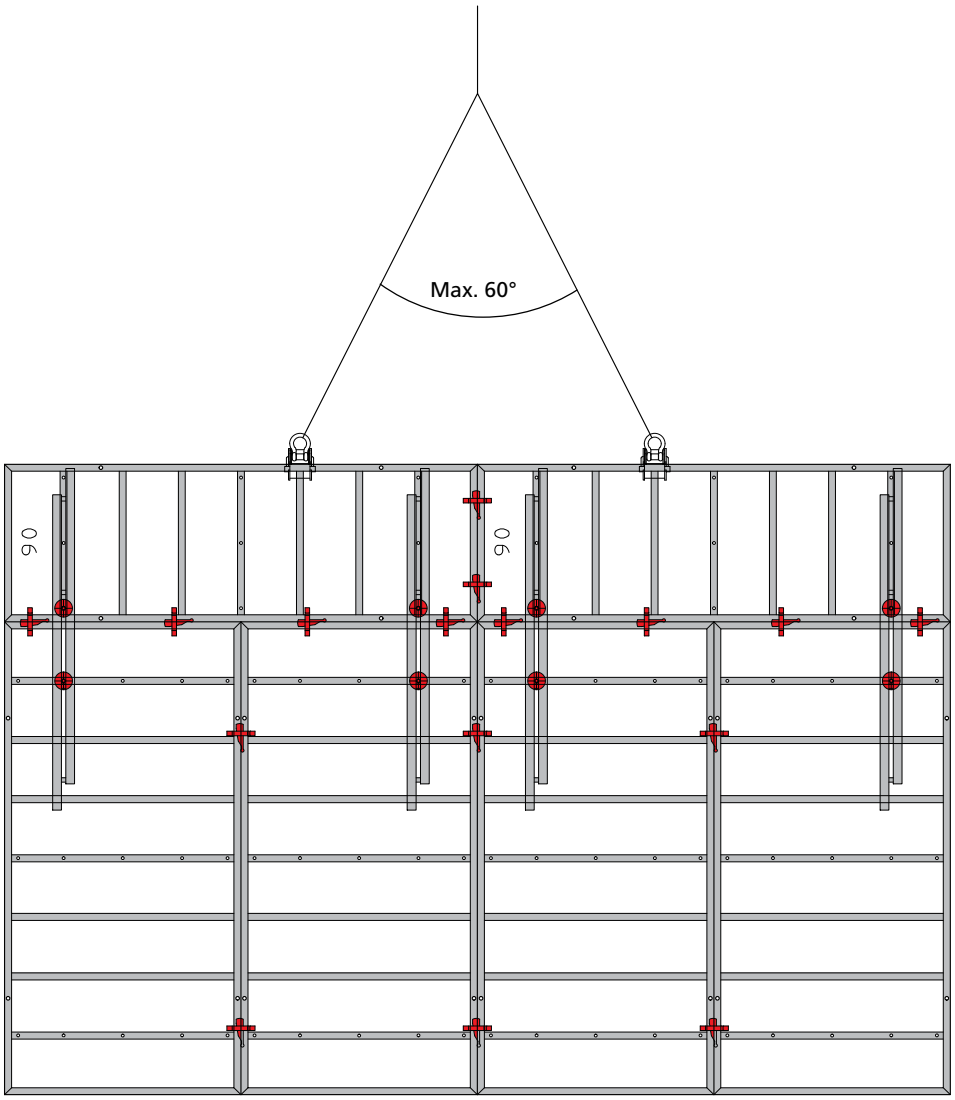

Fig. 52.1

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Crane-ganging – Method 3

Apply this method for single horizontal panels (Fig. 53.1 and 53.2) or for units height-extended with horizontal panels (Fig. 53.3) if these panels are StarTec panels 270/90 or 270/75 built until 2006.

Note that the AS crane hooks must be attached to the 3rd and 5th cross stiffener which are botht made of steel (Fig. 53.1 through 53.3 and page ST/AS-50).

The crane hook's load capacity is 15 kN (1.5 t).

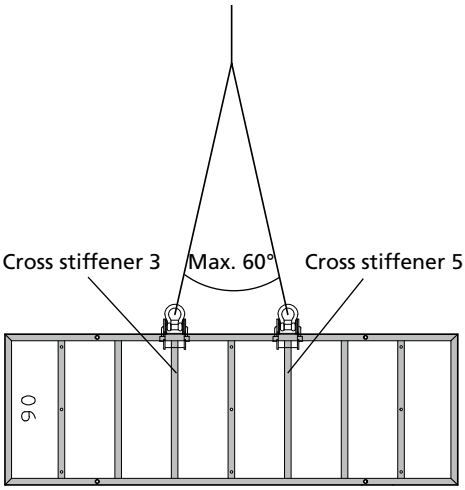

Abb. 53.1 StarTec panel 270/90

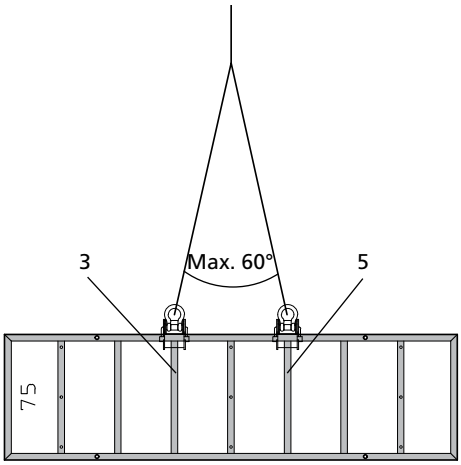

Abb. 53.2 StarTec panel 270/75

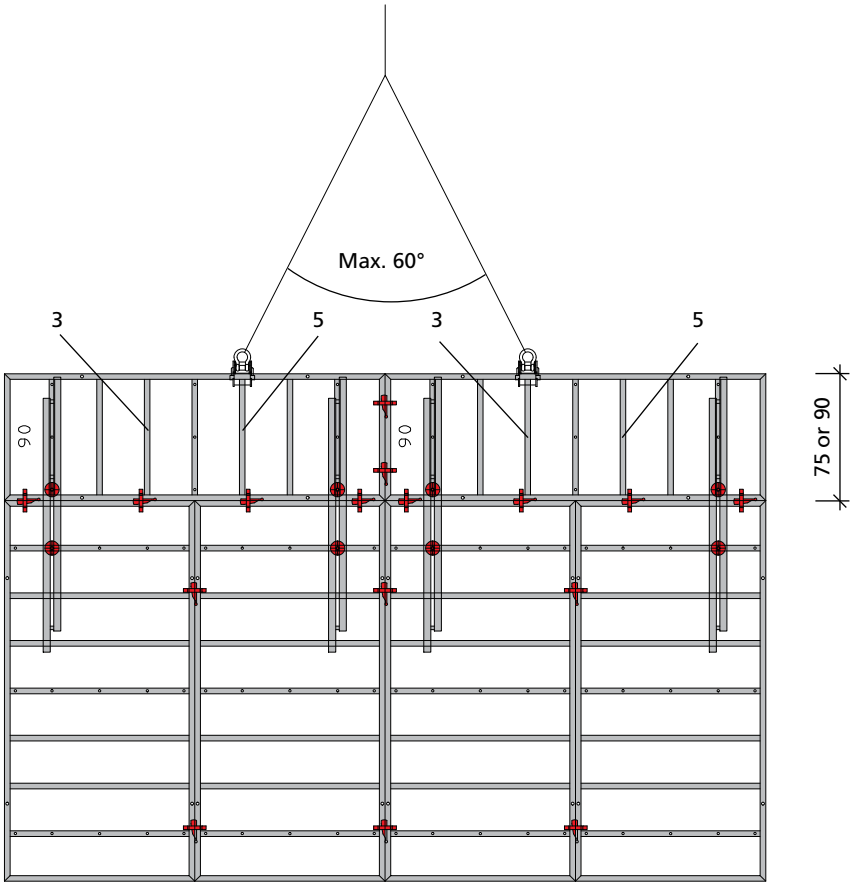

Abb. 53.3 Height extension with horizontal StarTec panels 270/90 or 270/75

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Crane-ganging – Method 4

Apply this method for single horizontal panels (Fig. 54.1 and 54.2) or for units height-extended with horizontal panels (Fig. 54.3) if these panels are StarTec panels 270/90 or 270/75 built until 2006.

The crane hooks may be attached to any cross stiffener but the load capacity of each crane hook is reduced to 9 kN (0.9 t).

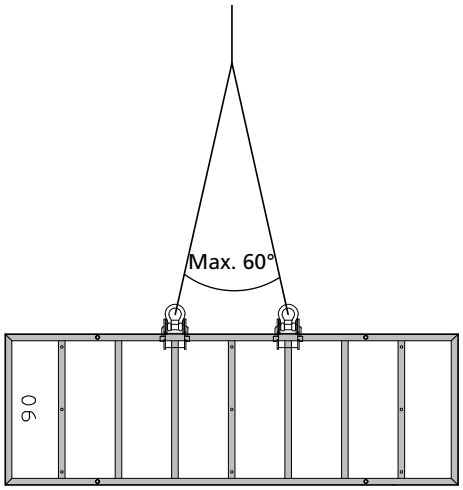

Fig. 54.1 StarTec panel 270/90

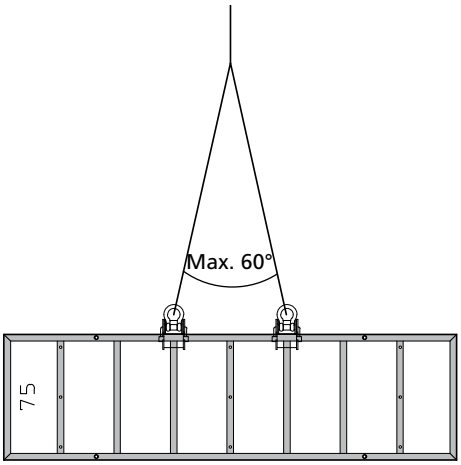

Fig. 54.2 StarTec panel 270/75

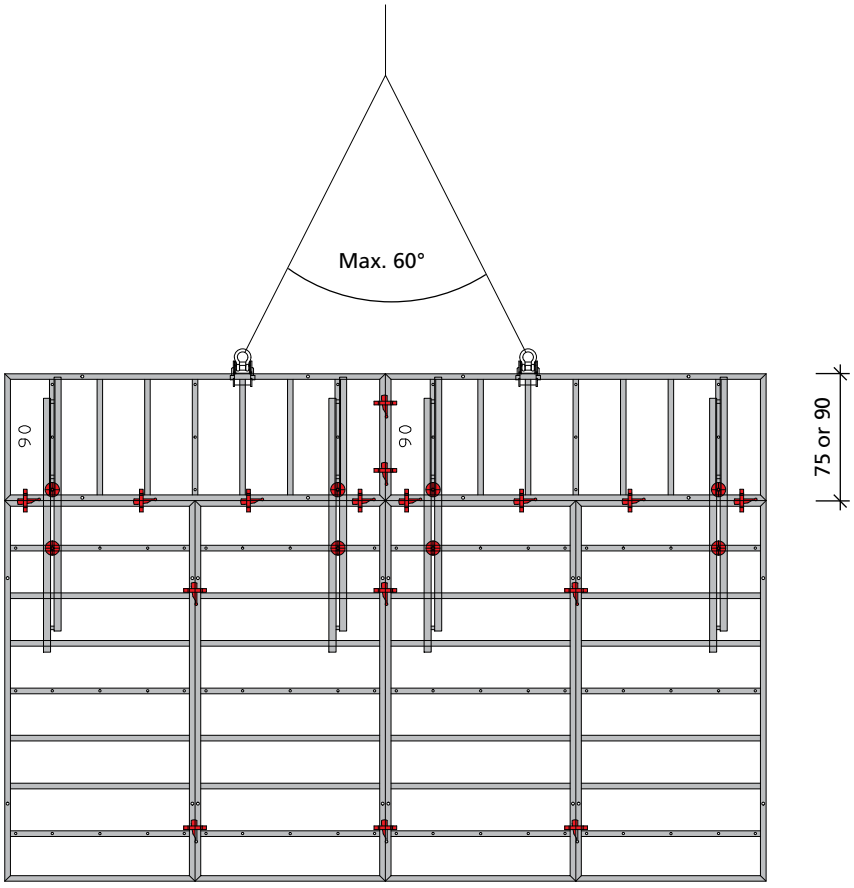

Fig. 54.3 Height extension with horizontal StarTec panels 270/90 or 270/75

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Crane-ganging – Method 5

Apply this method for single horizontal panels (Fig. 55.1) or for units height-extended with horizontal panels (Fig. 55.2) if these panels are AluStar panels.

The crane hook's load capacity is 11 kN (1.1 t).

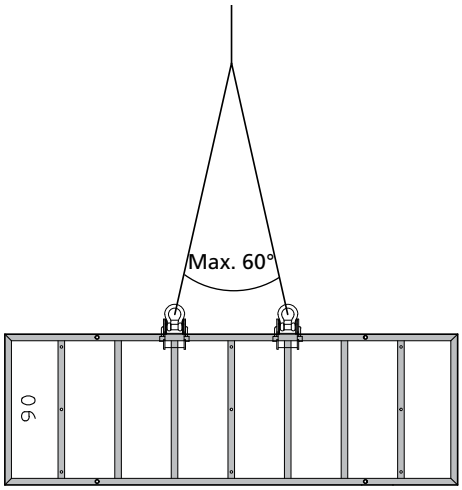

Fig. 55.1 AluStar panel 270/90

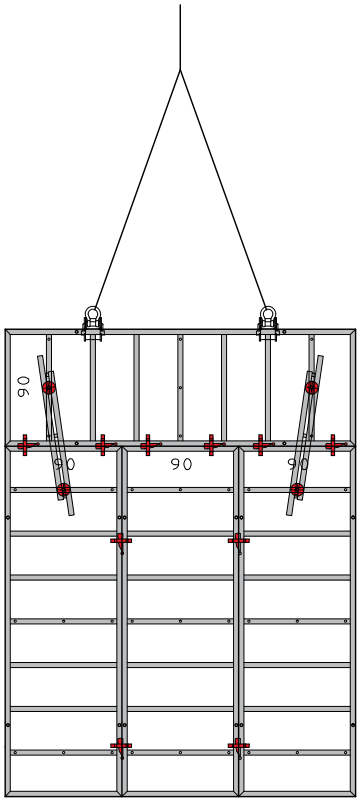

Fig. 55.2 Height extension with horizontal AluStar panel 270/90

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Crane ganging

Each transport unit requires two AS 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 by means of flange screws (Fig. 56.3).

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. 56.1 and 56.2).

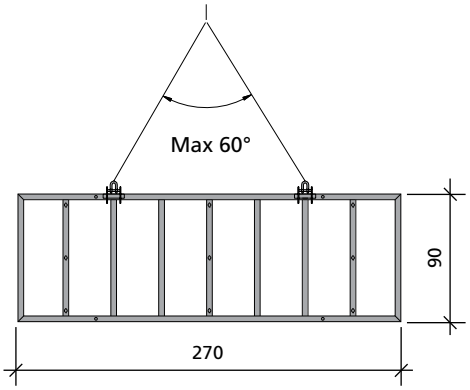

Fig. 56.1 AluStar/StarTec

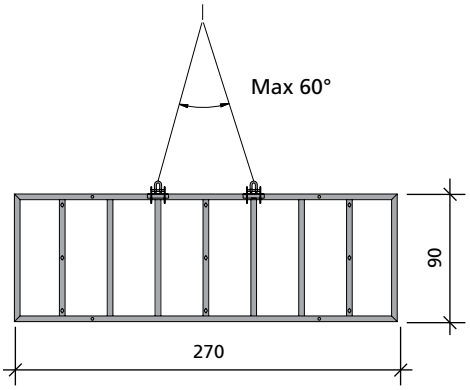

Fig. 56.2 AluStar/StarTec

Fig. 56.1 and 56.2
Panel unit with alkus forming face. Size:
2.70 x 0.90 m = 2.43 m²
Weight:
AluStar = 65 kg
StarTec = 103.4 kg

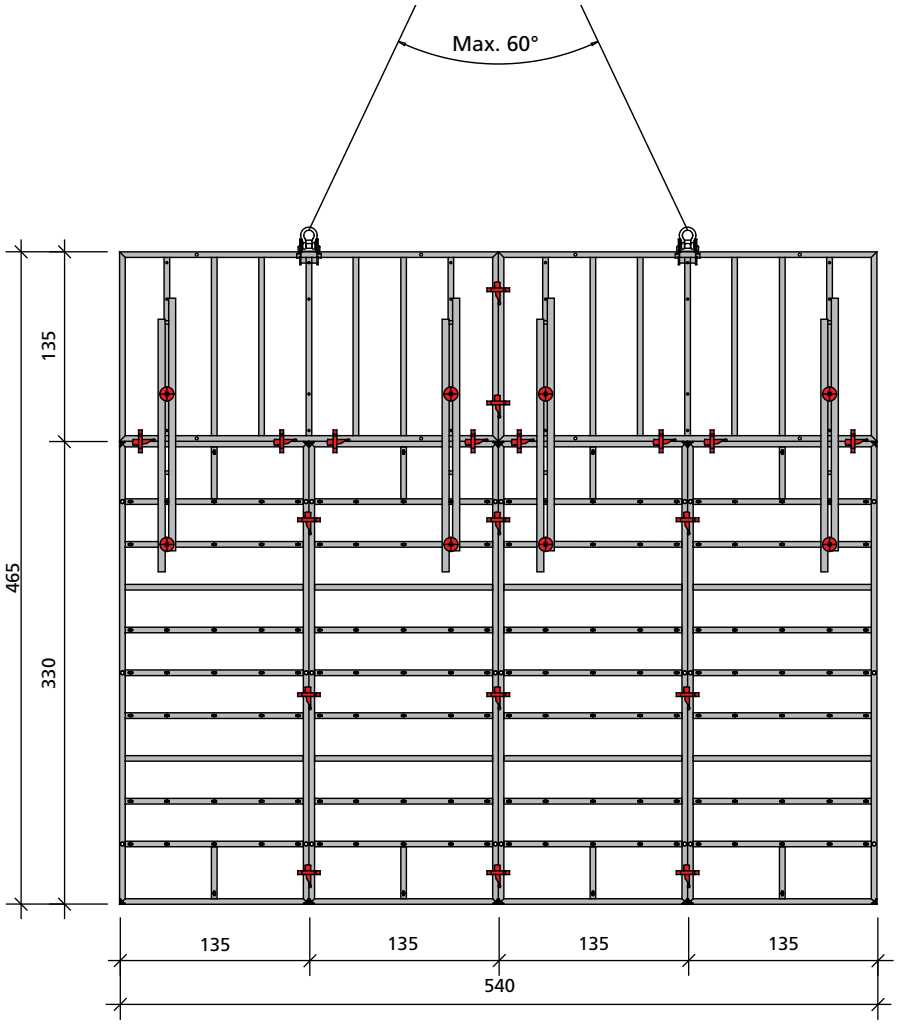

Fig. 56.3

Fig. 56.3
StarTec panel unit with alkus forming face. Size:
5.40 x 4.65 m = 25.11 m²
Weight including 4 alignment rails 180:
1605 kg.

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Crane ganging

Fig. 57.1
StarTec panel unit with alkus forming face. Size: 5.40 x 3.30 m = 17.82 m²
Weight: 1065 kg.

Fig. 57.2
StarTec panel unit with alkus forming face. Size: 5.40 x 6.60 m = 35.64 m²
Weight including 4 alignment rails 180: 2250 kg.

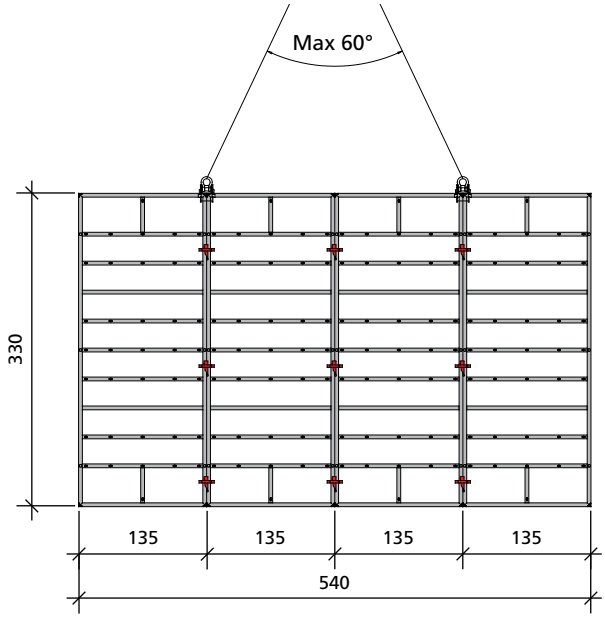

Fig. 57.1

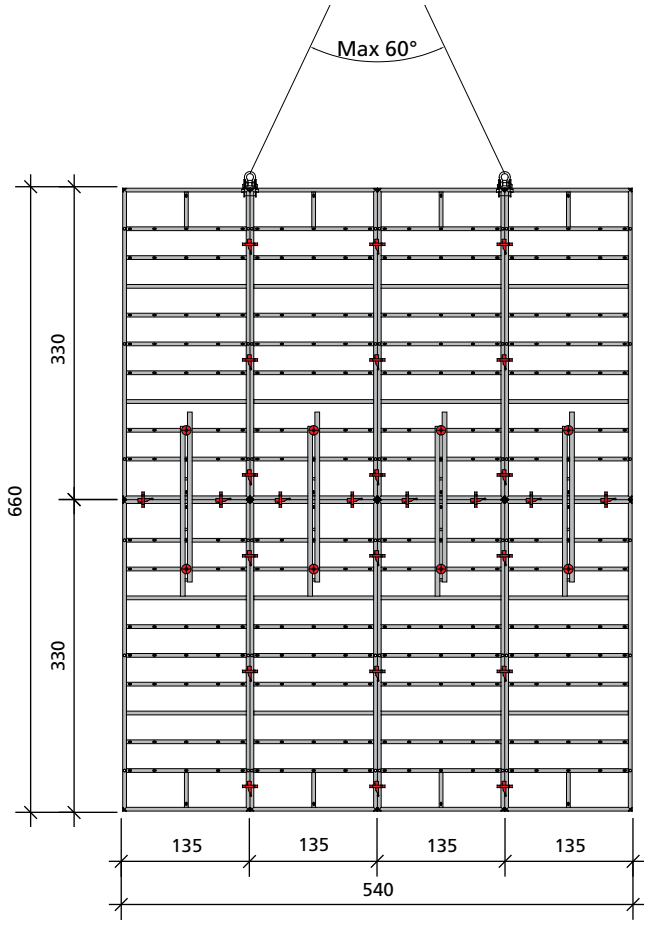

Fig. 57.2

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StarTec column formwork

Columns with a maximum side length of 50 cm and a maximum pouring height of 495 cm can be formed using standard panels and outside corners.

For the number of the required assembly locks refer to table 58.1.

The higher fresh concrete pressure resulting from columns higher than 495 cm or from side lengths exceeding 50 cm also requires additional braces with alignment rails for reinforcement (Table 58.1). Each brace must be attached to the panel with 2 articulated flange screws 18. Make sure that beginning at the bottom all multi-function profiles are used all-around (Fig. 58.3). Also, observe DIN 18218 (fresh concrete pressure) and DIN 4235 (vibration of concrete with a vibrator).

Foundations: 2 assembly locks are required per height for a foundation with a height of 135 cm and a maximum side length of 135 cm.

StarTec column formwork						
Formwork height h [cm]	Number of required alignment rails for reinforcement from bottom to top Column side length [cm]					Number of required AS assembly locks
	25	30 - 50	75	90	135	
135	-	-	-	-	-	2
270	-	-	-	-	-	3
330	-	-	-	-	-	6
270 + 135 = 405	-	-	1	1	1	(5 + 2) = 7
270 + 135 + 90 = 495	-	-	1	1	1	(5 + 2 + 2) = 9
270 + 270 = 540	1	1	1	1	1	(5 + 5) = 10
330 + 270 = 600	1	1	1	1	2	(6 + 5) = 11
270 + 270 + 90 = 630	1	1	1	2	2	(5 + 5 + 2) = 12
330 + 330 = 660	1	1	2	3	3	(6 + 6) = 12
270 + 270 +135 = 675	1	1	2	2	3	(5 + 5 + 2) = 12
270 + 270 + 270 = 810	2	2	3	3	4	(5 + 5 + 5) = 15

Table. 58.1

Note for the horizontal joint of all standard panels:
- A panel width of 135 cm requires 4 AS assembly locks.
- A panel width of 90 cm requires 3 AS assembly locks.
- A panel width of less than 90 cm requires 2 AS assembly locks.

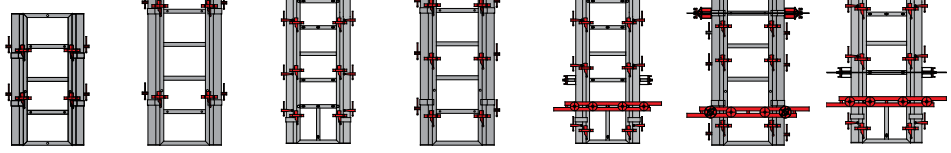

Fig. 58.2

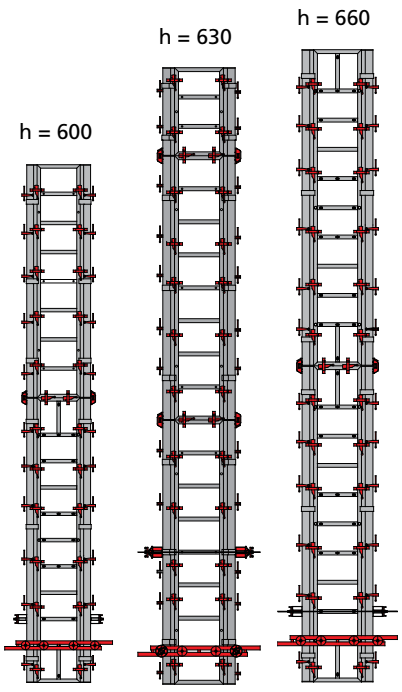

Fig. 58.3

Description	Ref. No.
AS/ST outside corner	
330	**22-140-10**
270	**22-140-20**
135	**22-140-30**
90	**22-140-40**

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AluStar column formwork

Columns with a maximum side length of 50 cm and a maximum pouring height of 405 cm can be formed with standard panels and outside corners.

3 assembly locks are sufficent for a formwork height of up to 270 cm (Fig. 59.3).

A pouring height of 405 cm (panels of 270 and 135 cm) requires 5 assembly locks for the 270 cm panel and 2 assembly locks for the 135 cm panel (Fig. 59.4).

The higher fresh concrete pressure of columns higher than 405 cm or with side lengths exceeding 50 cm also requires alignment rails for reinforcement (Table 59.1). Each alignment rail must be attached to the panel with 2 articulated flange screws 18. Make sure that beginning at the bottom all multi-function profiles are used all-around (Fig. 59.5). Also, observe DIN 18218 (fresh concrete pressure) and DIN 4235 (vibration of concrete with a vibrator).

Foundation: 2 assembly locks are required for a foundation with a maximum side length of 135 cm and a maximum height of 90 cm or vice versa.

AluStar column formwork					
Formwork height [cm]	Number of alignment rails for strengthening from bottom to top Column side length [cm]				Number of AS assembly locks
	25	30 - 50	75	90	
135	-	-	-	-	2
270	-	-	-	-	3
270 + 135 = 405	-	-	1	1	(5 + 2) = 7
270 + 135 + 90 = 495	1	1	1	1	(5 + 2 + 2) = 9
270 + 270 = 540	1	1	1	1	(5 + 5) = 10
270 + 270 + 90 = 630	1	1	2	2	(5 + 5 + 2) = 12
270 + 270 + 135 = 675	2	2	3	3	(5 + 5 + 2) = 12
270 + 270 + 270 = 810	2	3	4	4	(5 + 5 + 5) = 15

Table 59.1

Note for the horizontal joint of all standard panels:
- A panel width of 135 cm requires 4 AS assembly locks.
- A panel width of 90 cm requires 3 AS assembly locks.
- A panel width of less than 90 cm requires 2 AS assembly locks

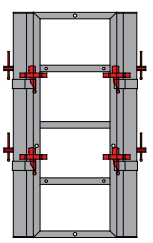

Fig. 59.2

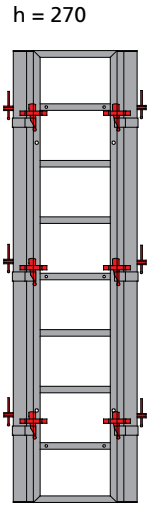

Fig. 59.3

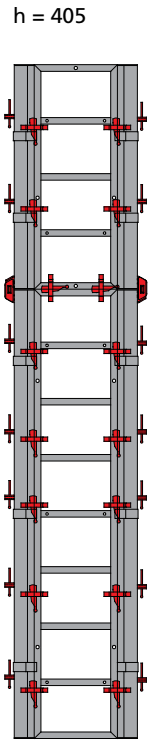

Fig. 59.4

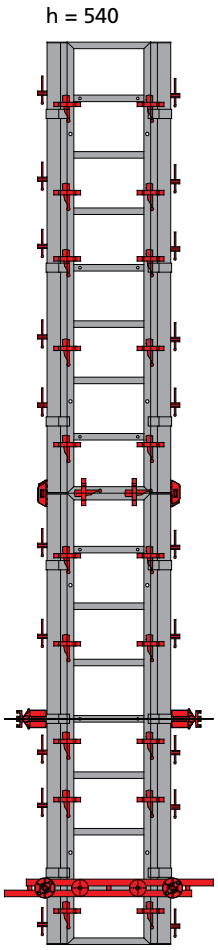

Fig. 59.5

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Multi-Purpose Panel

Multi-purpose panels (MPP) are used as a column formwork, for wall connections (Fig. 60.1), pilasters (Fig. 60.2) and obtuse angled corners (Fig. 60.3).

The multi-purpose panels are equipped with a multi-adjustment profile (Fig. 61.1 on p. ST/AS-61) to attach the stop end fixtures, the tie rods and flange screws.

In the case of double-sided formwork, the profile with 13 positions ensures complete multi-functionality for tieing (Fig. 60.1).

Fig. 43.3 – If length X is smaller than L/2, no alignment rails for an additional reinforcement are required on the outside.

Wall connection

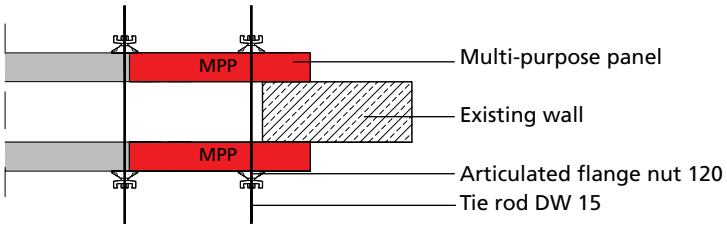

Fig. 60.1

Column projection ≤ 29 cm Wall thickness (WT)

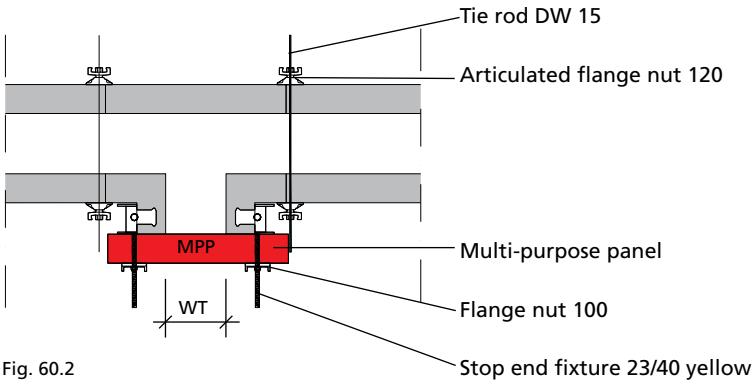

Fig. 60.2

Obtuse angled corner

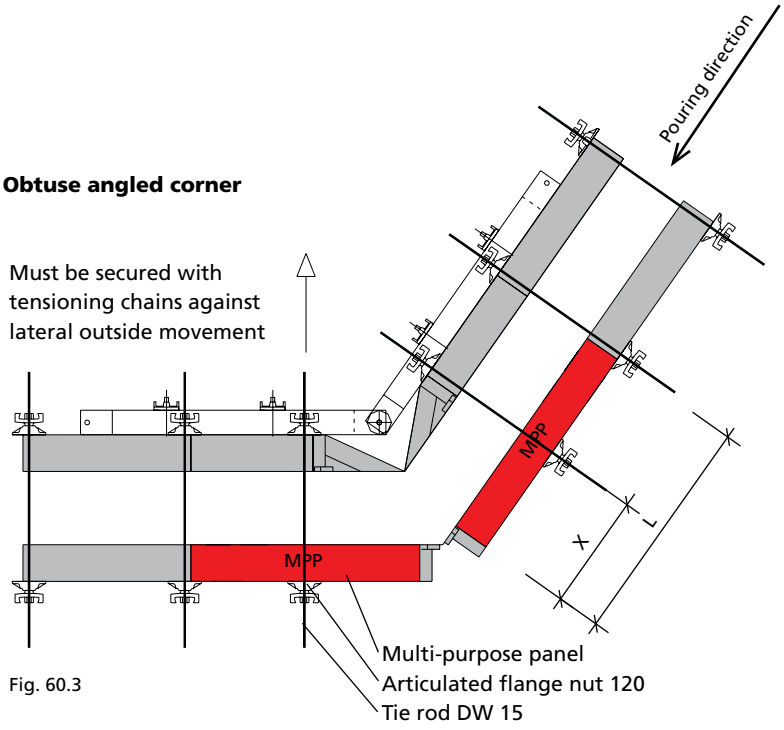

Fig. 60.3

Description	Ref. No.
ST multi-purpose panel AL17	
270/75	**21-212-26**
135/75	**21-212-46**
Stop end fixture 23/40	**29-402-85**
Flange nut 100	**29-900-20**
Articulated flange nut 15/120	**29-900-10**
Tie rod 15/120	**29-900-80**

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Multi-Purpose Panel

The multi-adjustment profile (Fig. 61.1) permits an accurate forming of square and rectangular columns up to 60 cm, stop ends, pilasters up to a width of 29 cm, 90° corner formations and wall offsets up to 30 cm in all standard dimensions. Tieing at the multi-adjustment profile is possible at 13 positions.

Further formwork dimensions can be achieved by turning the panels by 180° (Fig. 61.2 and 61.3, Table 61.4).

Attention
When using the multi-purpose panel (MPP) for a column or corner application, the flange screw must never be used with holes no. 1 and 13 (standard tie hole).

Detailed view of the multi-adjustment profile

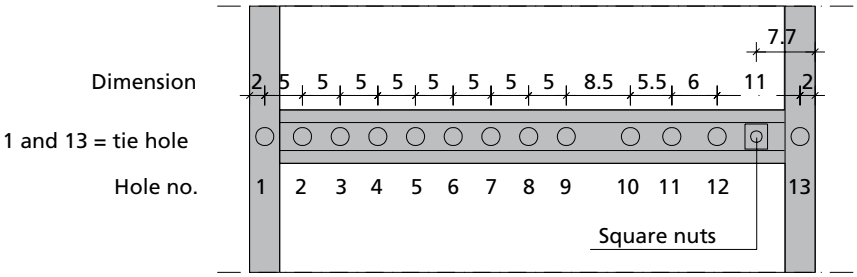

Fig. 61.1

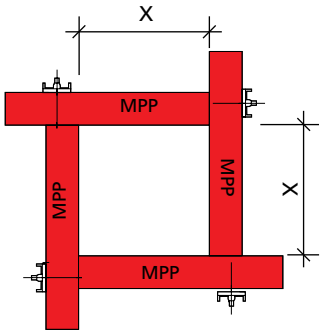

Fig. 61.2 Example A, counterclockwise

MPP = multi-purpose panel

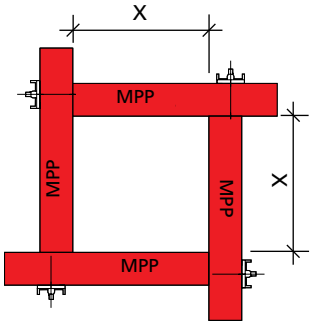

Fig. 61.3 Example B, clockwise

Tieing overview for column and corner solutions with 2 or 4 multi-purpose panels

Hole no.	Column dimension x Windmill vane principle Example A	Dimension	Column dimension x Windmill vane principle Example B
2		7 | 68	60 x 60 cm
3		12 | 63	55 x 55 cm
4		17 | 58	50 x 50 cm
5		22 | 53	45 x 45 cm
6	19 x 19 cm	27 | 48	40 x 40 cm
7	24 x 24 cm	32 | 43	35 x 35 cm
8	29 x 29 cm	37 | 38	30 x 30 cm
9	34 x 34 cm	42 | 33	25 x 25 cm
10	42.5 x 42.5 cm	50.5 | 24.5	16.5 x 16.5 cm
11	48 x 48 cm	56 | 19	
12	54 x 54 cm	62 | 13	

Table 61.4

Description	Ref. No.
ST multi-purpose panel AL17	
270/75	**21-212-26**
135/75	**21-212-46**

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Corner solutions with multi-purpose panels

This page shows how to form a 90° corner with 2 multi-purpose panels (MPP) 270/75 or 135/75 in windmill vane form, with DW 15 threads in the side profile and flange screws for connection.

By using multi-purpose panels the wall thickness can be formed in increments of 5 cm up to a thickness of 35 cm. The flange screw connects both multi-purpose panels solidly, tightly and with a rectangular angle.

The multi-purpose panel 135/75 requires only 1 flange screw for connection while the multi-purpose panel 270/75 requires 3 flange screws 18.

Attention
When using the multi-purpose panel for a column or corner application, the flange screws must never be used with holes no. 1 and 13 (standard tie hole).

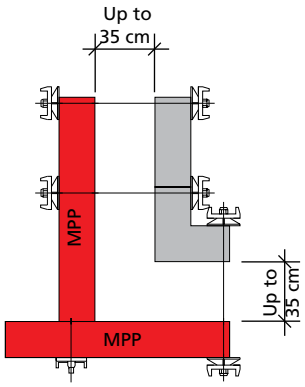

Fig. 62.1

MPP = multi-purpose panel

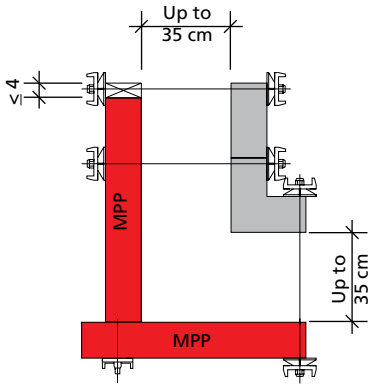

Fig. 62.2

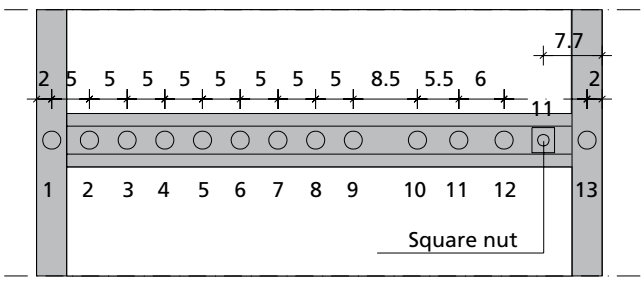

Fig. 62.3

Description	Ref. No.
ST multi-purpose panel AL17	
270/75	**21-212-26**
135/75	**21-212-46**

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Corner solutions with multi-purpose panels

This page shows how to form a 90° corner with a multi-purpose panel 270/75 or 135/75 and a standard panel, a stop end fixture 23/40 and a flange nut 100 for connection.

The multi-purpose panel (MPP) 135/75 requires only 1 stop end fixture 23/40 for connection at tie hole elevation while the 270/75 multi-purpose panel requires 3 stop end fixtures 23/40 at tie hole elevation.

Attention
When using the multi-purpose panel for columns or corner solutions, the flange screw must never be used with holes no. 1 and 13 (standard tie holes).

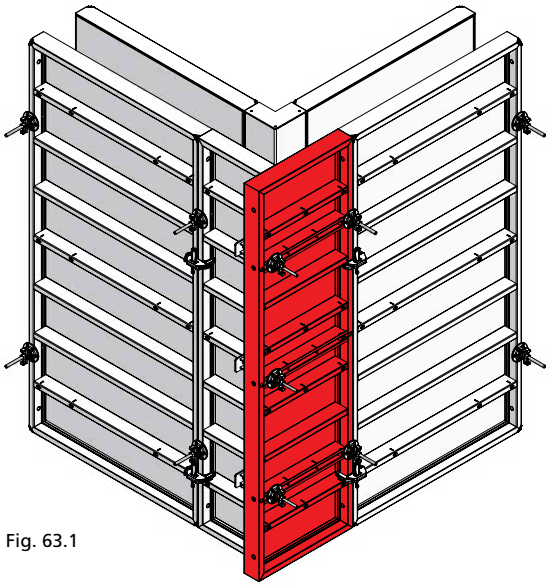

Fig. 63.1

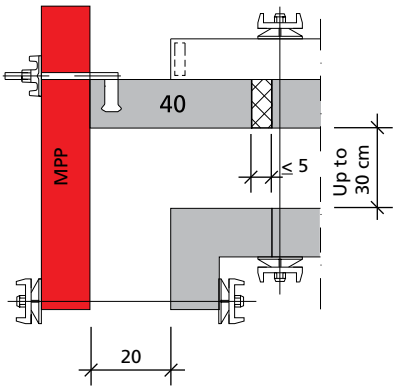

Fig. 63.2

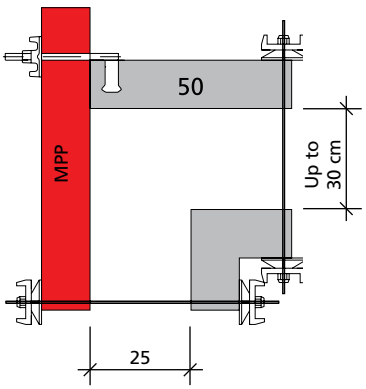

Fig. 63.3

MPP = multi-purpose panel

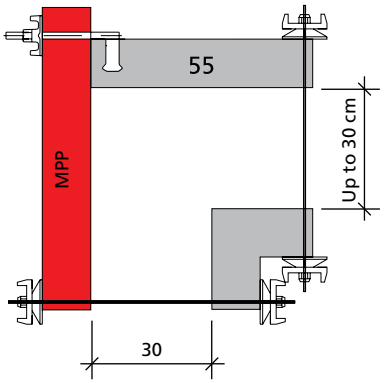

Fig. 63.4

Description	Ref. No.
ST multi-purpose panel AL17	
270/75	**21-212-26**
135/75	**21-212-46**
Stop end fixture 23/40	**29-402-85**
Flange nut 100	**29-900-20**

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Panel with filling nozzle / concreting window

The ST panel AL 17 270/45 with a filling nozzle (Fig. 64.1) is used when concrete cannot be poured from above, e.g. in the case of tunnel formwork.

The manual gate valve SK (Fig. 64.2) is used to avoid the return flow of concrete when pumping is interrupted. The valve is attached to the filling nozzle with the lever coupling SK-H (Fig. 64.3)

After taking off the concrete hose, the filling nozzle cleaner SK (Fig. 64.4) 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. 64.6) 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.

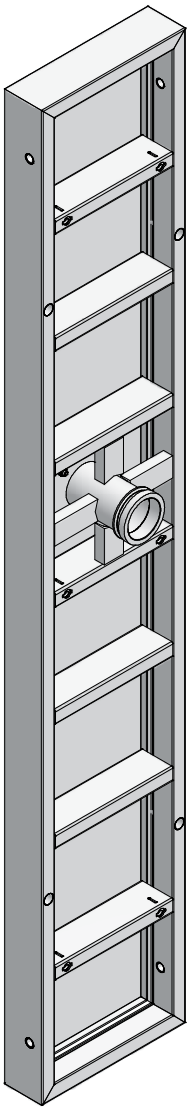

Fig. 64.1 Panel with filling nozzle

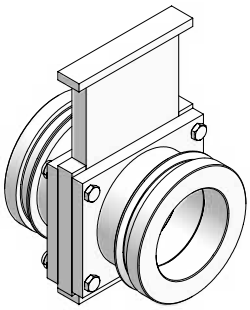

Fig. 64.2 Manual gate valve SK

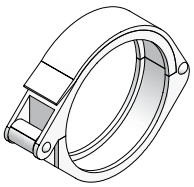

Fig. 64.3 Lever coupling SK-H

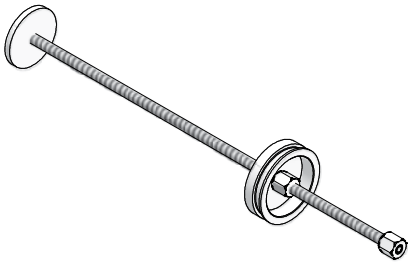

Fig. 64.4 Filling nozzle cleaner SK

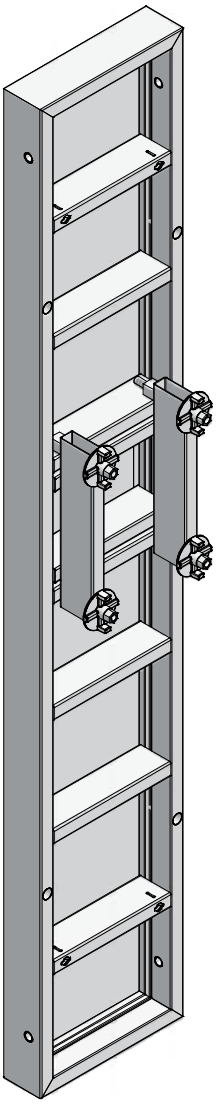

Fig. 64.6 Panel with concreting window

Description	Ref. No.
ST panel 270/45 AL 17 with filling nozzle	21-213-55
concreting window	21-213-60
Manual gate valve SK 100 - 4 1/2	29-914-50
Filling nozzle cleaner SK 100/800	29-207-50
Lever coupling SK-H DN 100 - 4 1/2	29-207-60
Sealing washer A SK 100 - 4 1/2	62-031-55

Component	Quantity
ST panel 270/45 AL 17 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. 64.5 Components required for a panel with filling nozzle

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Circular formwork

Circular buildings can be formed polygonally with standard panels, radius panels and tensioning bows (Fig. 65.1 and 65.2).

The ties are placed through the radius panels. The load is transferred through the tensioning bows. The minimum radius is 1.75 m.

When extending the panels on top of each other, the panels need to be connected with two assembly locks.

Fig. 65.1

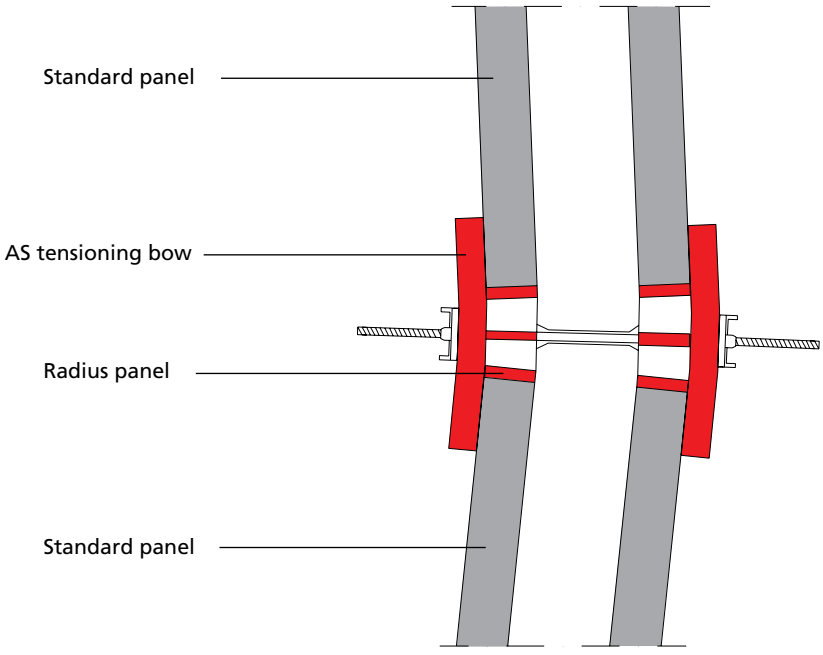

Fig. 65.2

Description	Ref. No.
AS radius panels	
270/15	**21-500-00**
270/20	**21-500-10**
270/25	**21-500-20**
135/15	**21-500-40**
135/20	**21-500-50**
135/25	**21-500-60**
AS tensioning bow	**21-500-95**

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Circular formwork

When planning formwork for a full circle, make sure there are enough Uni-assembly locks 22 and timber profiles for compensation.

When forming pitch circles make sure that the formwork can overlap for the next cycle or for stop ends.

A functional polygonal formwork requires the inside and outside formwork to be planned in proportion to each other.

The smaller the panels, the lower is the height of arch (Fig. 66.1 and table 66.2).

Height of arch (h) in cm for different radii and panel widths

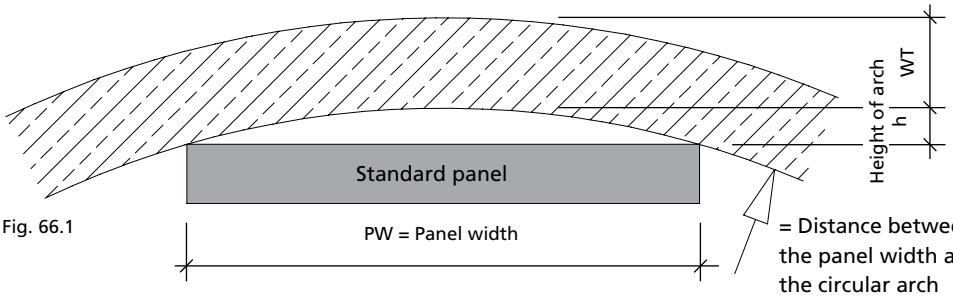

Fig. 66.1

$$h = r_i - \sqrt{r_i^2 - (PW/2)^2}$$

Radius r_i

WT = Wall thickness
h = Height of arch (vertical distance between panel middle and circular arch)
r_i = Inside radius

Table to determine the height of arch h in cm (depending on the wall radius and panel width)

Wall radius r_i [m]	Panel width PW [cm]								
	25	30	40	45	50	55	75	90	135
1.75	0.45	0.64	1.15	1.45	—	—	—	—	—
2.00	0.39	0.56	1.00	1.27	1.57	—	—	—	—
2.50	0.31	0.45	0.80	1.01	1.25	1.55	—	—	—
3.00	0.26	0.37	0.66	0.85	1.04	1.26	—	—	—
3.50	—	0.33	0.57	0.72	0.89	1.08	2.00	—	—
4.00	—	0.28	0.50	0.63	0.78	0.95	1.76	—	—
4.50	—	0.25	0.44	0.56	0.69	0.84	1.56	—	—
5.00	—	0.22	0.40	0.51	0.63	0.76	1.41	2.03	—
6.00	—	—	0.33	0.42	0.52	0.63	1.17	1.69	3.81
7.00	—	—	0.28	0.36	0.45	0.54	1.01	1.44	3.26
8.00	—	—	0.25	0.32	0.39	0.47	0.88	1.27	2.85
9.00	—	—	0.22	0.28	0.35	0.42	0.78	1.13	2.53
10.00	—	—	0.20	0.25	0.31	0.38	0.70	1.01	2.28
12.00	—	—	—	—	0.26	0.32	0.59	0.84	1.90
15.00	—	—	—	—	0.21	0.25	0.47	0.68	1.52
20.00	—	—	—	—	0.15	0.19	0.35	0.51	1.14

Table 66.2

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Single-sided formwork / Climbing formwork

Support Frame STB for single-sided formwork
The StarTec and AluStar 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 with height extensions allow for wall heights over 12 m (Fig. 67.1).

Please observe the Technical Instruction Manual for the support frame.

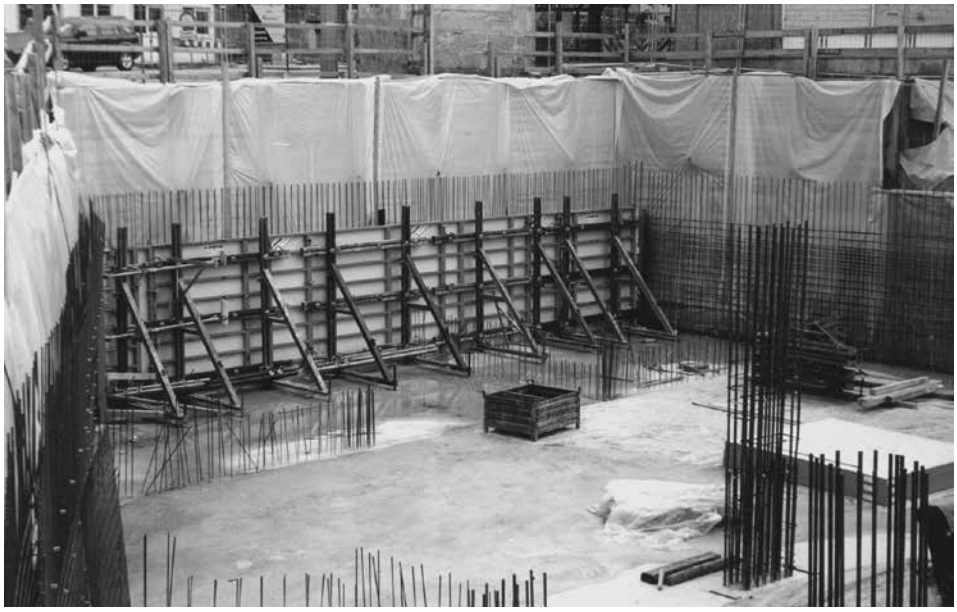

Fig. 67.1

Climbing Scaffold KLK 230
When forming high walls, facades, pillars, staircases or elevator shafts, the StarTec or AluStar formwork is set and secured on climbing scaffolds KLK 230 (Fig. 67.2).

Please observe the Technical Instruction Manual for the climbing scaffold.

Attention
The use of support frame and climbing scaffold requires detailed formwork planning!

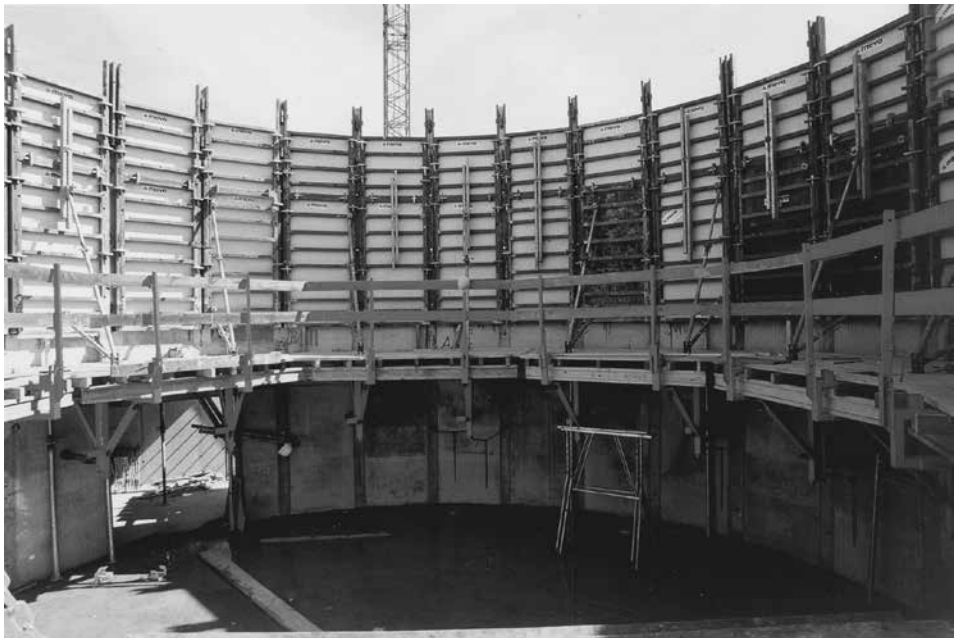

Fig. 67.2

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Formwork assembly and stripping

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

Note
Note that if the formwork is 2 m high or higher, both the inside and the outside formwork must be protected against falling over.

Planning
If you want to benefit fully from the efficient and economical use that the StarTec/AluStar 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 panel 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 details see p. ST/AS-72 through 75.

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 pouring height, build in the reinforcements and bloxouts

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

Refer to the following pages for a detailed deschription of the formwork assembly including the working platform, and for a description of formwork stripping.

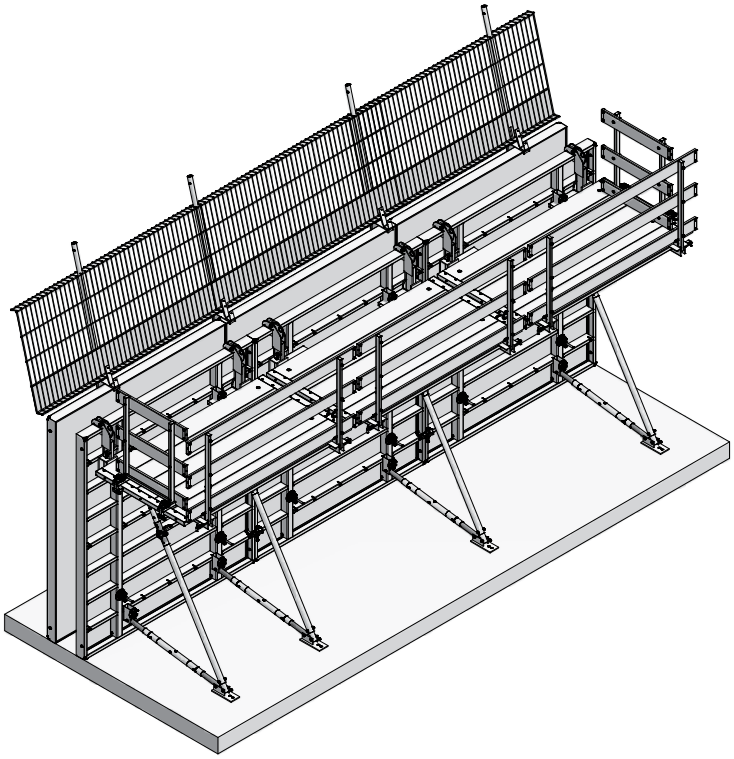

Fig. 68.1 Double-sided formwork

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Formwork assembly and stripping

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. 69.3) 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. 69.1). 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. 70.1 on page ST/ AS-70 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 AS assembly locks (see p. ST/AS-8).

The panels are usually connected with 2 assembly locks (Fig. 69.1). However, outside corner configurations require 3 assembly locks (see pages ST/AS-22 through 24).

Step 2 - Pouring height, reinforcements and boxouts
Following step 1, the pouring 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.

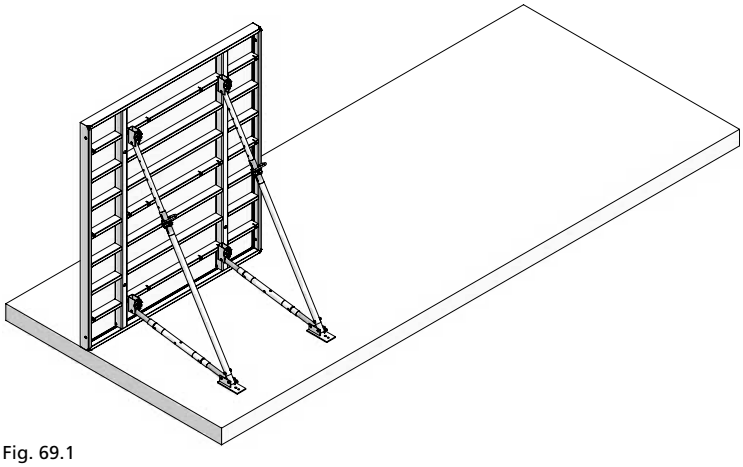

Fig. 69.1

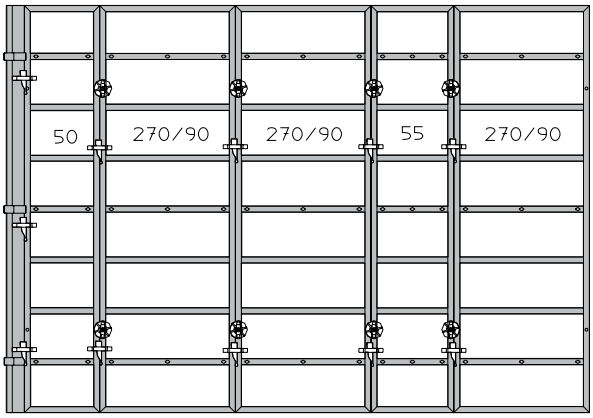

Fig. 69.2

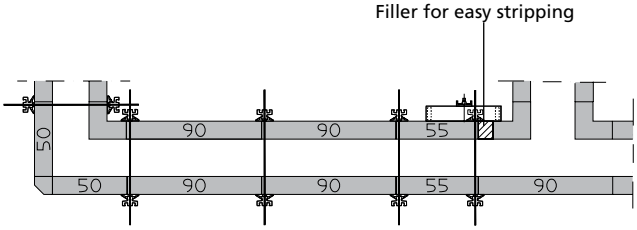

Fig. 69.3

Formwork assembly and stripping

Working scaffold
The plug-in scaffolding bracket (the figures show the BKB) 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.

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. ST/ AS-11).

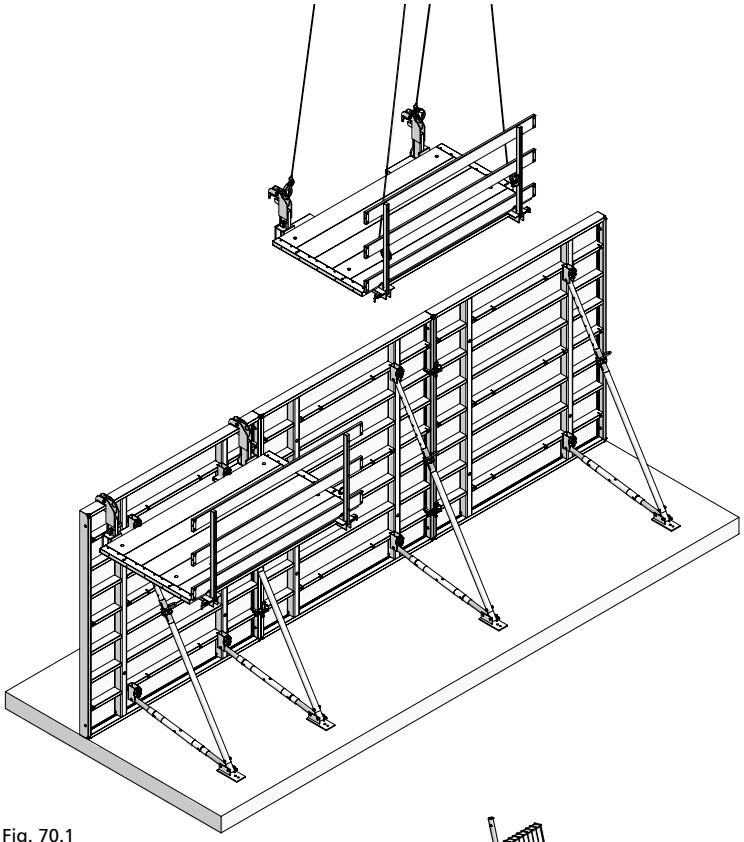

Fig. 70.1

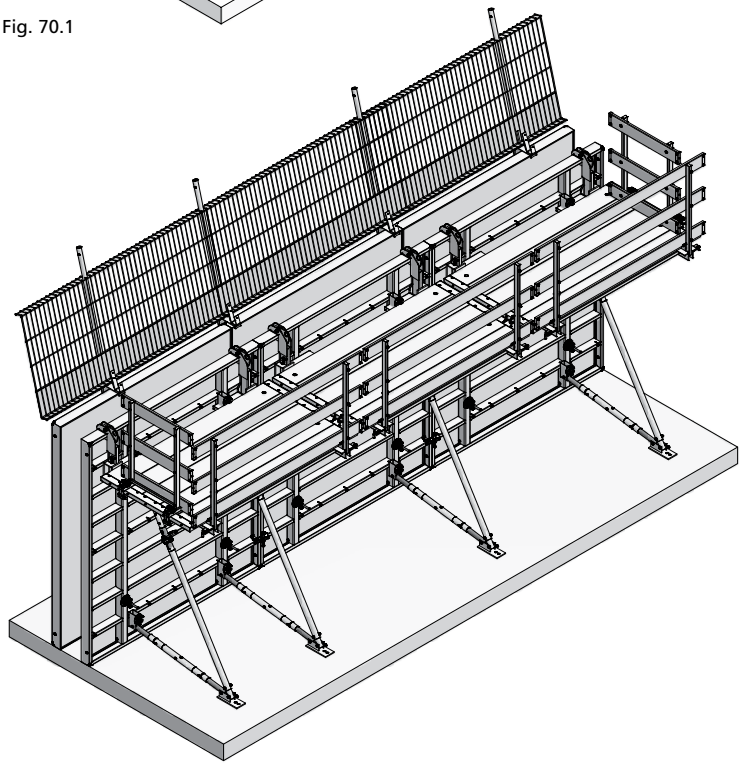

Fig. 70.2 Double-sided formwork with a working scaffold attached to the outside formwork

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Formwork assembly and stripping

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. Start stripping with the inside formwork. Stripping of both the outside and the 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.

Attention
The release agent must not be stored in galvanized containers

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. ST/AS-50 through 57).

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.

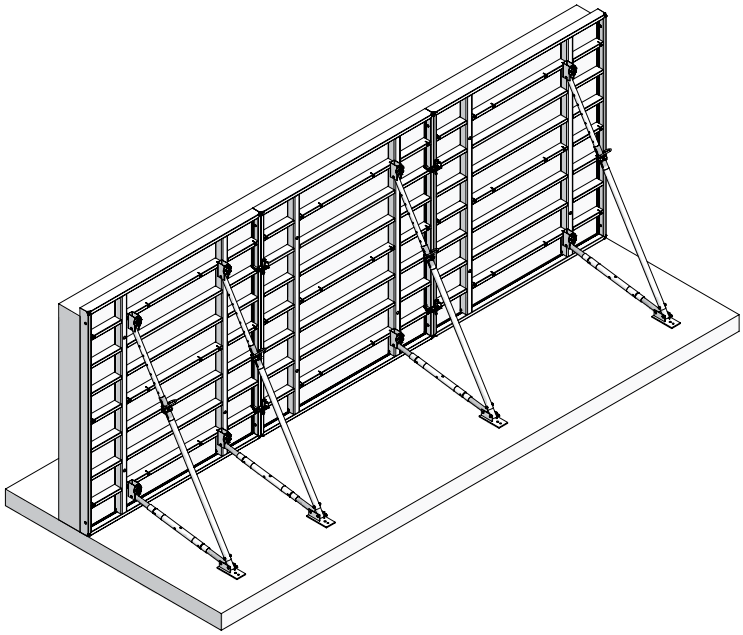

Fig. 71.1

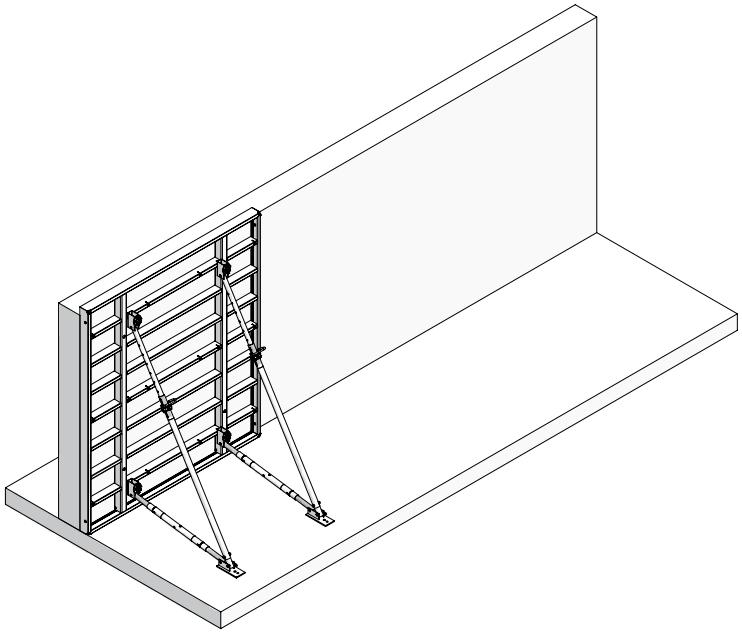

Fig. 71.2

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Crane slings Stapos 40

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. 72.1).

Attention
Four crane slings Stapos 40 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. 72.2).
2. Push the suspension device under the stack with your foot (Fig. 72.3).
3. Yank the sling up (Fig. 72.5). The elastic fastening pin will engage completely in the profile groove and secure the stack against accidental uplift (Fig. 72.4).

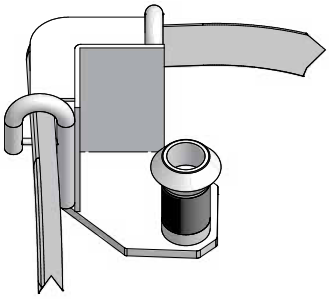

Fig. 72.1

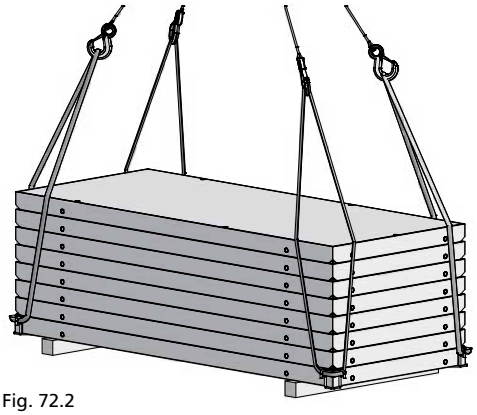

Fig. 72.2

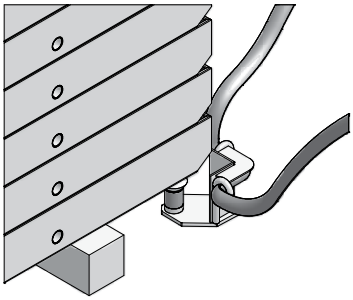

Fig. 72.3

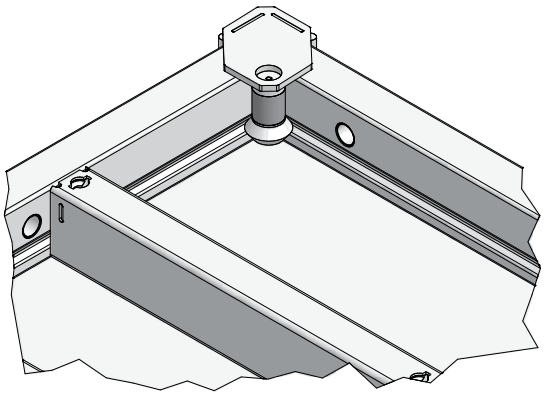

Fig. 72.4

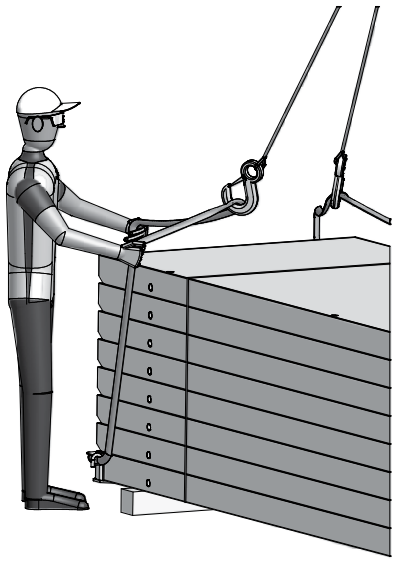

Fig. 72.5

Description	Ref. No.
Crane slings Stapos 40	**29-403-20**

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Crane slings Stapos 40

While transporting the stack by crane the load-bearing capacity of the crane slings Stapos 40 is uniformly distributed to all slings. Just one person is required for attachment and removal of the slings.

Attention
The Stapos crane slings 40 may be used only in conjunction with double-rope crane devices in compliance with applicable safety regulations (Fig. 73.1) .

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

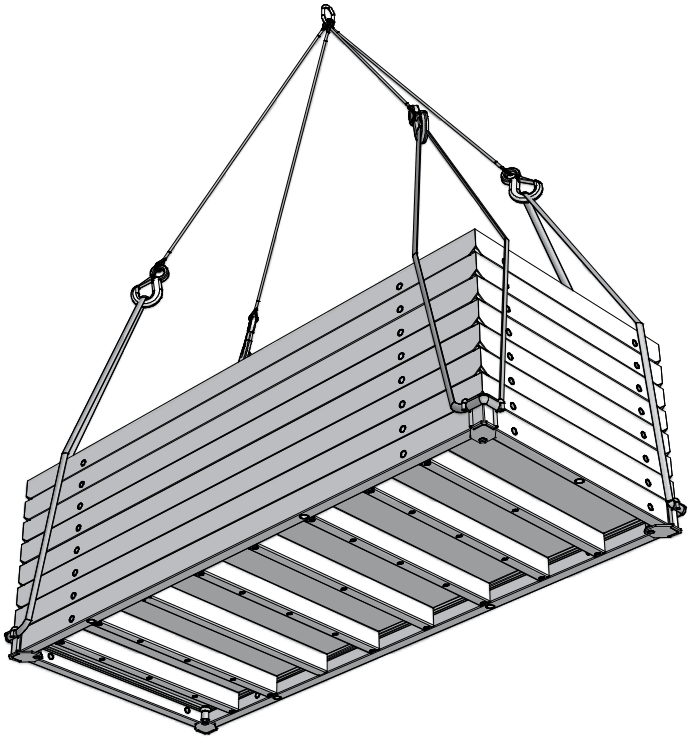

Fig. 73.1

Technical Data

Description	Crane slings Stapos 40
Ref. No.	29-403-20
Weight	3.1 kg
Colour	Green
Admissible load	10 kN (1 ton) per sling
Admissible unit weight	2 tons
Usable for frame profile thickness	40 mm
Maximum stack height	126 cm (10 panels)
Maximum stack height for large-size panels	5 panels StarTec 270/240

Tabel 73.2

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Crane slings 40 / Lifting hook 40

Crane slings
The crane slings (Fig. 74.1) help to quickly load and unload trucks and move the StarTec panel stacks near the ground. The lifting hooks are inserted into the welded sleeves of the bottom panel frame. After tightening the crane slings check to make sure the hooks are safely locked. (Fig. 74.2).

Attention
A lifting hook must only be used if its eccentric is easy to turn or automatically falls into the locked position (Fig. 74.2). 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 StarTec panels 270/240 or 10 StarTec panels 270/135 and smaller.

Lifting hook
The lifting hook (Fig. 74.2 and 57.3) can be used with any four-rope crane device on the construction site to transport Startec panel stacks. Always use 4 hooks together (Fig. 74.1). To calculate the admissible load-bearing capacity, assume only 2 hooks.

When using a lifting hook, observe the Attention paragraph in the left column.

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. ST/AS-76).

Technical Data
- Weight 1.7 kg
- Max. load 10 kN (1 ton)

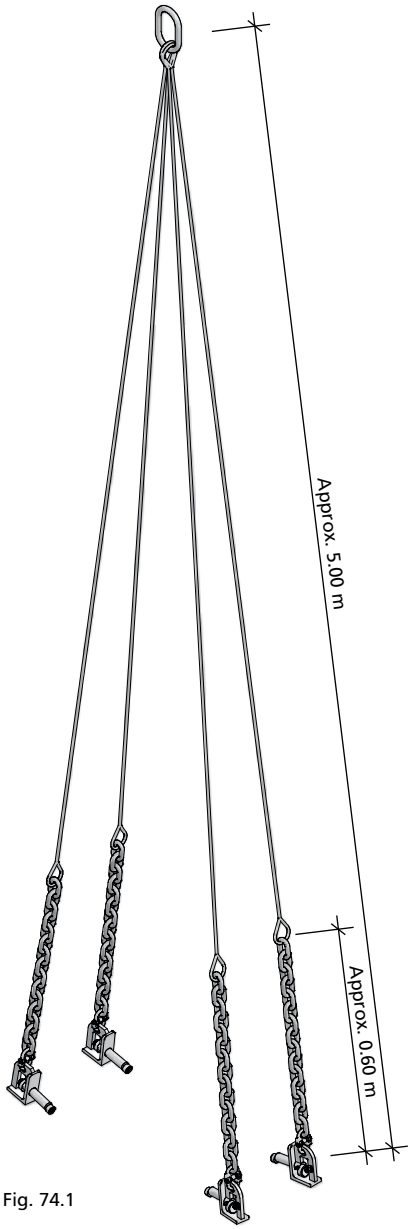

Fig. 74.1

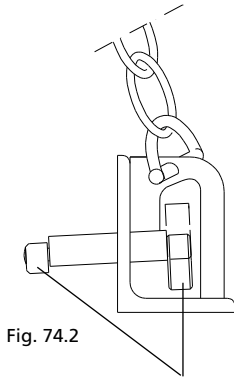
Fig. 74.2

Locked position

Description	Ref. No.
Crane slings 40	**29-401-44**
Lifting hook 40	**29-401-42**

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Transport angle

By using transport angles (Fig. 75.1), 5 to 12 ST/AS panels can be stacked, stored and transported without the need for square timber under the stack. We recommend using 2 foldable angles and 2 of the rigid type for each stack.

The maximum load capacity is 10 kN (1 ton) per angle. For safety reasons consider 20 kN (2 tons) as maximum capacity for the whole stack.

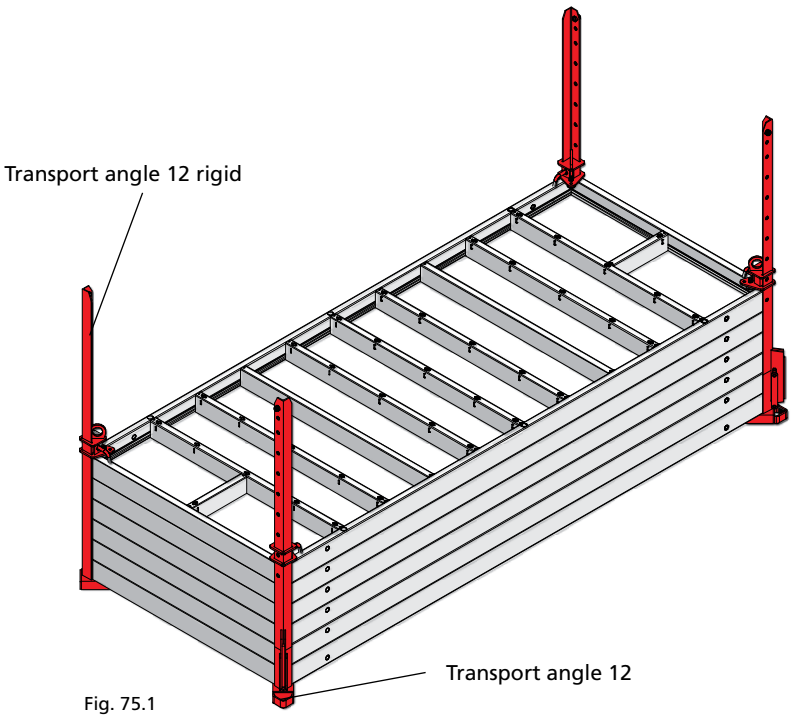

Fig. 75.1

Description	Ref. No.
Transport angle 12	29-305-20
12 rigid	29-305-25

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Transport

Make sure that all material is secured properly.

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

ST/AS panels require 2 or 3 straps respectively. Due to their low weight, ST/AS corners require only 2 straps.

When moving panel stacks make sure that panels are secured. MEVA secures StarTec panels 270/240 with the grey safety bolts 270/240 and all other AluStar and StarTec panels with the black ST/AS safety bolt (Fig. 76.2). 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.

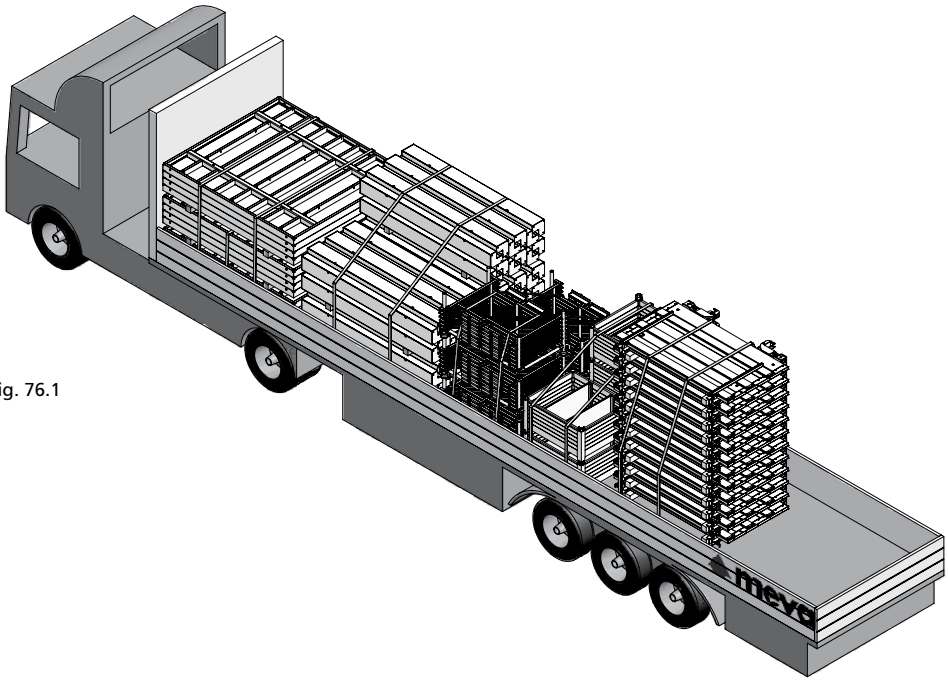

Fig. 76.1

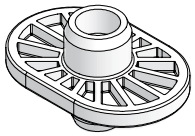

Fig. 76.2

Description	Ref. No.
Safety bolt	
AS/ST black	**40-131-10**
ST 270/240 grey	**40-131-15**

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Service

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.

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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