meva

Climbing scaffold KLK 230

Technical Instruction Manual

Product Characteristics

The KLK 230 is an efficient and economical climbing system, which allows for a high degree of adaptation to different building structures. It is designed to be strong enough to handle the loads resulting from concrete pressure and the dead weight of the formwork that is used.

The climbing scaffold KLK 230 consists of a climbing bracket, wall strut, platform and guard railing. Bottom extensions are used to build secondary platforms. The KLK 230 features an excellent ability to adapt to the building structure.

The climbing scaffold can be used as a working platform as well as a support platform for wall formwork.

By using the formwork clamping fixture the formwork can be tilt back.

When used in combination with the slide carriage, wall formwork and climbing scaffold can be transported as a unit.

The sophisticated design of the KLK 230 guarantees considerable time saving and easy handling:

• The suspension shoes permit easy attachment of the climbing scaffold.

• A large distance between the climbing brackets can be obtained by mounting additional steel or wood beams as support for the platfrom (depending upon static requirements).

• The carriage can be slid back by 2'-4" (70 cm) which gives enough space to clean the facing or to do rebar works.

• The platform has an overall width of 7'-6" (2.30 m) and provides sufficient working space even with the carriage slid back.

• The solid construction of the climbing brackets is suitable for formwork heights up to 23'-0" (7.00 m).

For transport purposes it is recommended to use the KLK transport spreader. The crane slings must always be attached to the integrated crane eyes of the KLK climbing scaffold. During transport neither personnel nor material are allowed to be on the platforms.

Personnel are not allowed to stay or move below the climbing scaffold.

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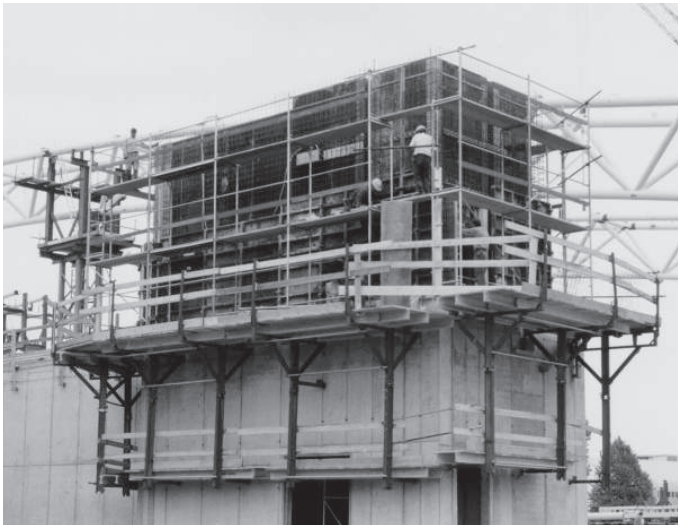

Please note

This technical manual contains information, instructions and hints describing how to use the MEVA Climbing System 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.

Details shown on the following pages are assembly sketches for demonstration purposes only. To display details more clearly, loading and safety factor aspects are not shown.

Please adhere to these technical instructions when applying the Climbing System.
Deviations require engineering calculations and analysis to guarantee safety.

Generally, only well maintained material may be used. Damaged parts must be sorted out. Please apply only original MEVA spare parts for replacement.
Do not wax or oil MEVA assembly locks.

Contents

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Climbing bracket KLK 230

The climbing scaffold KLK is a modular system, which allows for a high degree of adaptation to different building structures. The climbing bracket (Fig. 4.1) can be used in different configurations.

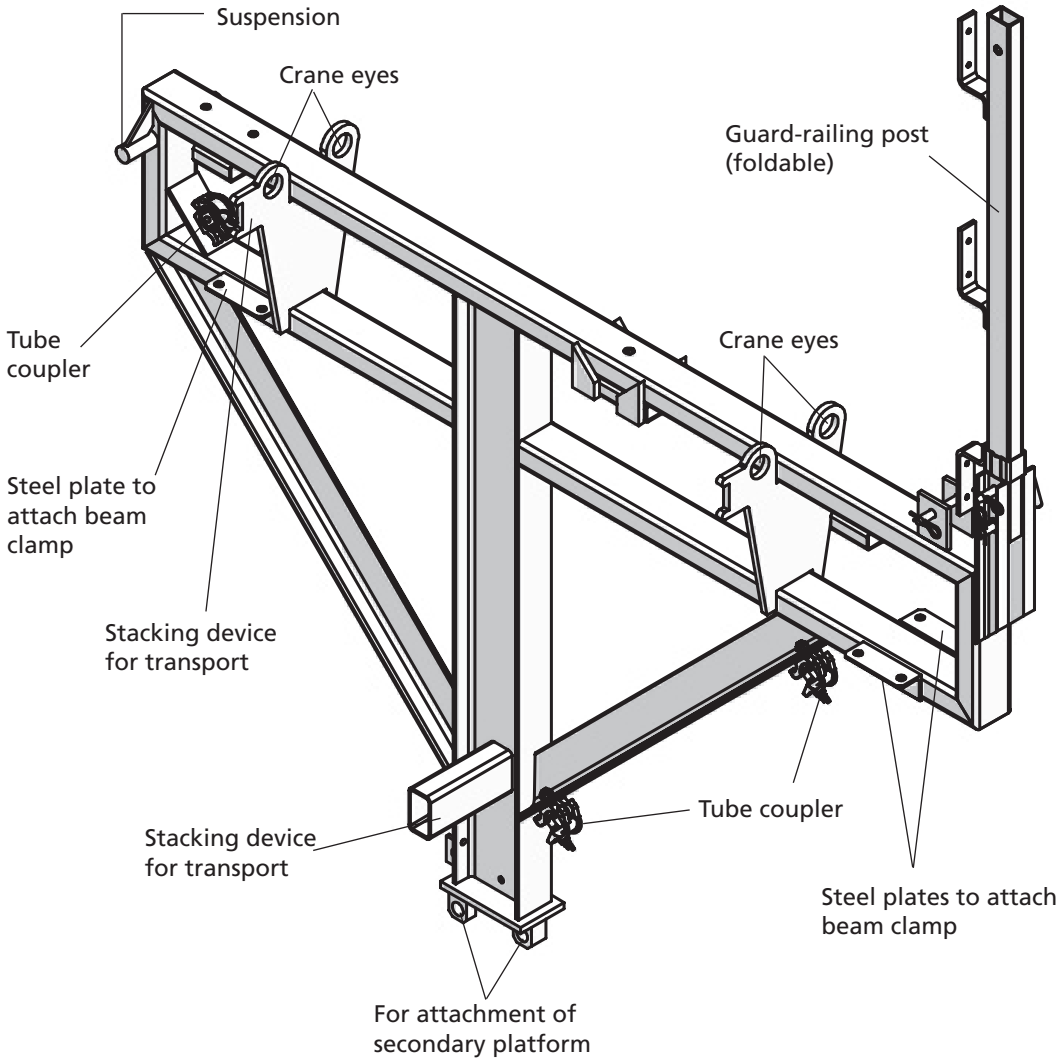

Fig. 4.1

Description	Ref.-No.
Climbing bracket KLK 230	**29-411-00**

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Typical applications

Working scaffold
The climbing bracket KLK 230 can be used to build working platforms with a width of 7'-6" (2.30 m) (Fig. 5.1).
In this configuration there is no formwork on the platform. Since the platform is built with single brackets the range of application is extremly flexible. It is easy to adapt the climbing system to the requirements of the building geometry.

When used as working scaffold the maximum load is 125 psf (600 kg/m²).

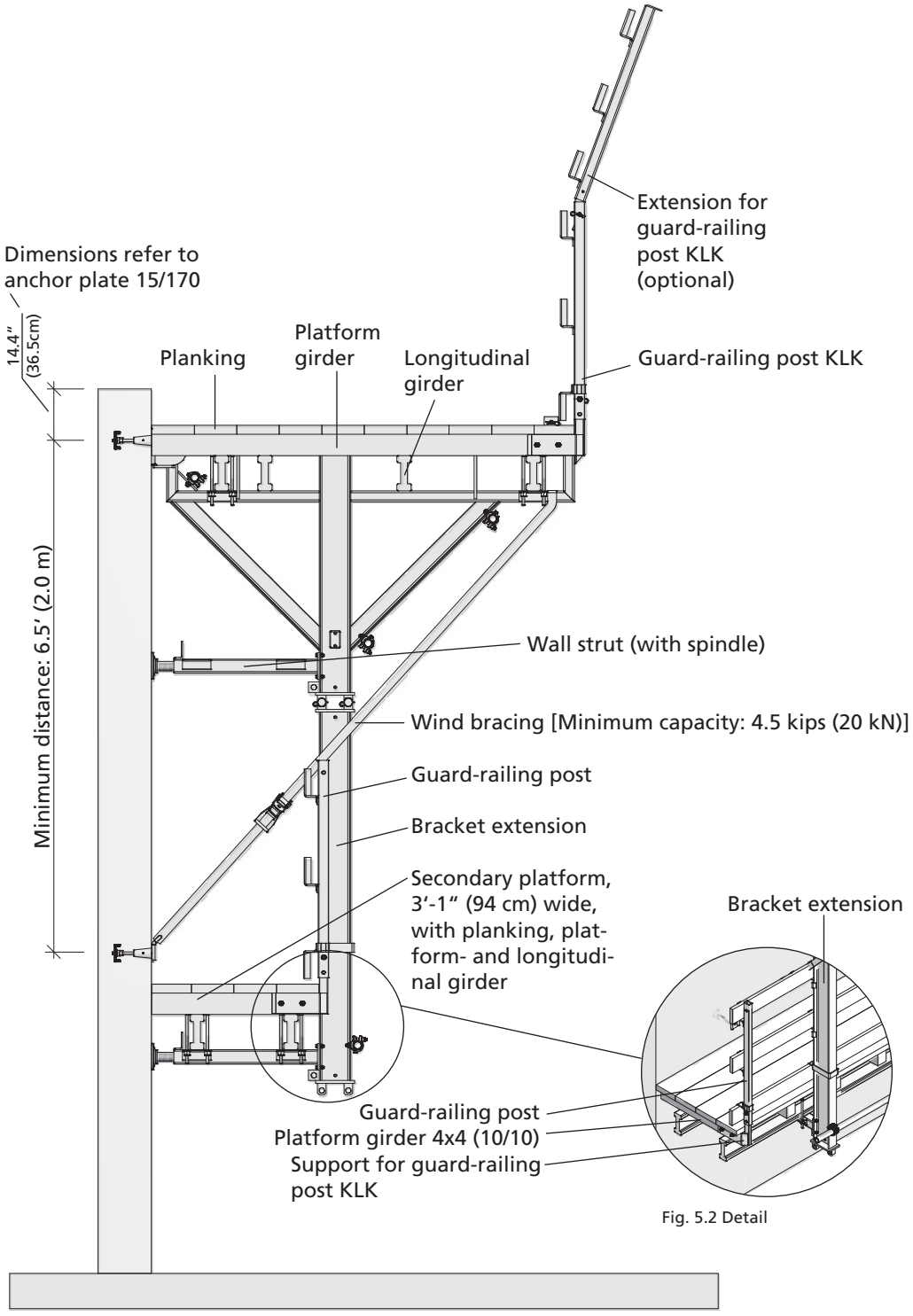

Fig. 5.2 Detail

Fig. 5.1

Description	Ref.-No.
Climbing bracket KLK 230	**29-411-00**
Wall strut (with spindle)	**29-411-30**

Typical applications

Climbing formwork with formwork support KLK

By adding a formwork support KLK and a holding device for push-pull props, the working scaffold KLK can be turned into a 7'-6" (2.30 m) wide scaffold on which wall formwork panels can be placed. The panels are attached to the formwork support KLK with assembly locks (Fig. 6.1).

Imperial panels are attached with two M-assembly locks, MevaLite panels are attached by using two Uni-assembly locks and an adapter ML. StarTec panels are either attached with two Uni-assembly locks or by using an ST adapter and two M-assembly locks (see also page KLK-22).

Note:
The use of the formwork support KLK requires the formwork and the KLK platform to be lifted and transported separately!

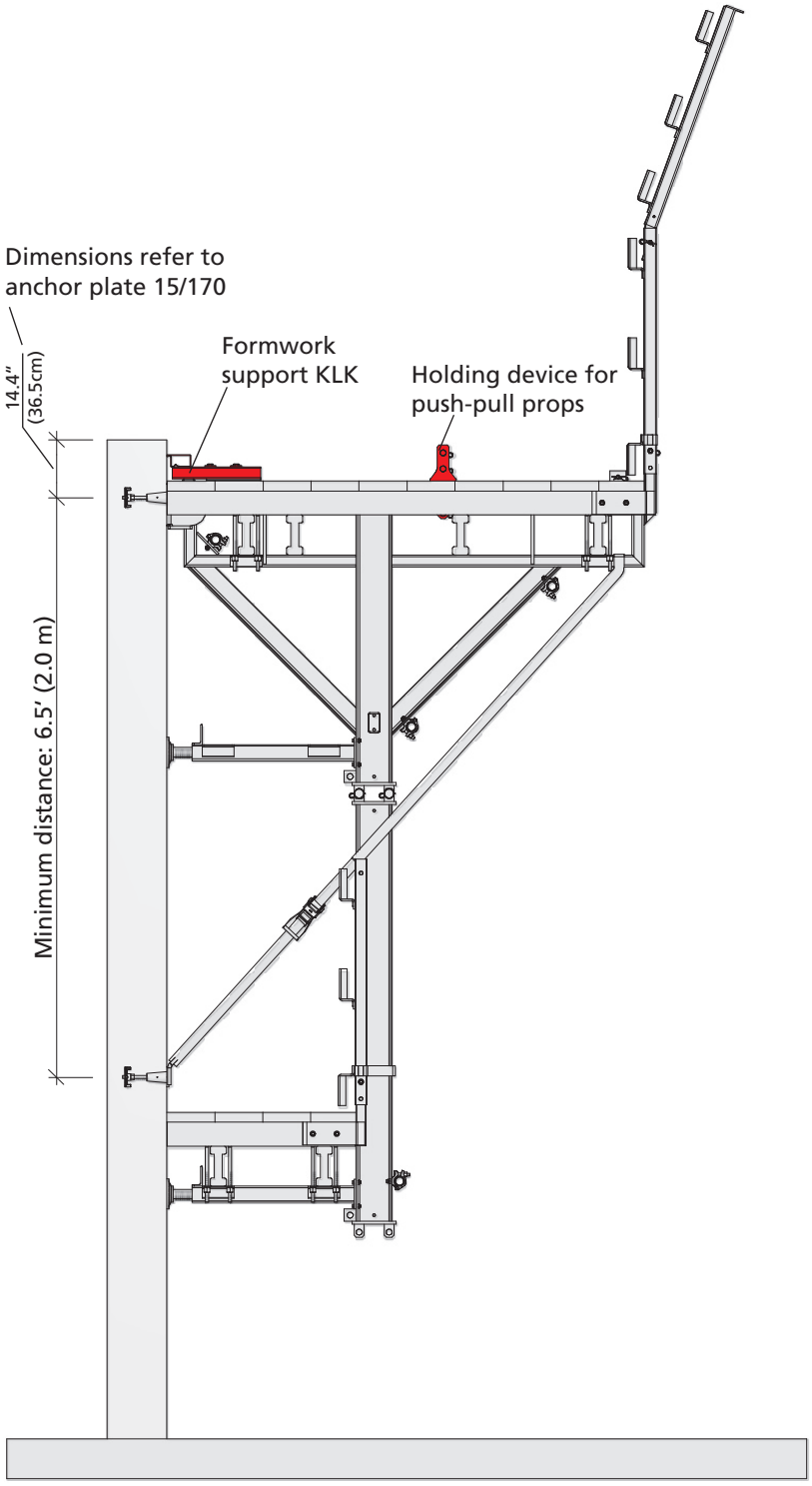

Fig. 6.1

Description	Ref.-No.
Climbing bracket KLK 230	**29-411-00**
Formwork support KLK	**29-411-90**
Formwork adapter AS/ST	**29-411-65**
Formwork adapter AF/ML	**29-411-92**
Holding device for push-pull props	**29-411-25**

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Typical applications

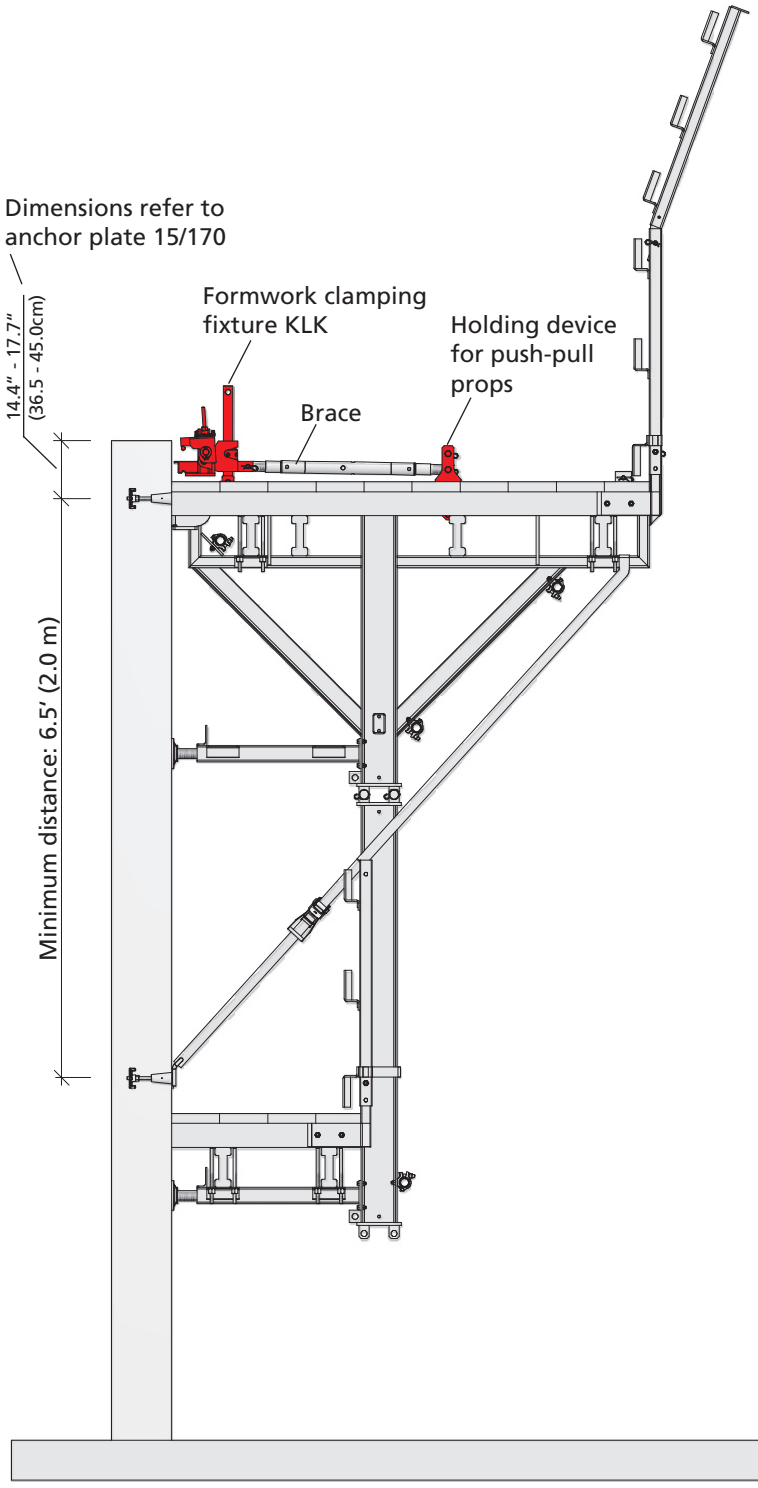

Fig. 7.1

Climbing formwork with formwork clamping fixture KLK

By adding a formwork clamping fixture KLK, a bearing for formwork clamping fixture KLK (see page 18) and a holding device for push-pull props, the working scaffold KLK can be turned into a 7'-6" (2.30 m) wide scaffold on which wall formwork panels can be placed. The panels are attached with the formwork clamping fixture (Fig. 7.1 and pages KLK-23/24).

The formwork clamping fixture allows to tilt back the attached formwork panels.
In addition to that it is possible to adjust the formwork panels in height. Adjustment range 9" (23.0 cm).

Note:
The use of the formwork clamping fixture KLK requires the formwork and the KLK platform to be lifted and transported separately!

Description	Ref.-No.
Climbing bracket KLK 230	**29-411-00**
Formwork clamping fixture KLK	**29-411-60**
Bearing for formwork clamping fixture KLK	**29-411-70**
Holding device for push-pull props KLK	**29-411-25**

Typical applications

Climbing formwork with slide carriage
By adding a formwork clamping fixture KLK and a slide carriage the working scaffold KLK can be turned into a 7'-6" (2.30 m) wide scaffold on which wall formwork panels can be placed. The panels are attached with the formwork clamping fixture (Fig. 8.1).
The slide carriage allows to slide back the formwork panels by 2'-4" (70.0 cm) to provide enough room for cleaning and rebar works.

The formwork clamping fixture allows to tilt back the attached formwork panels.
In addition to that it is possible to adjust the formwork panels in height. Adjustment range 9" (23.0 cm).

To operate the slide carriage two (2) square spanner are required (one (1) square spanner per bracket).

Note:
The use of the formwork clamping fixture KLK and the slide carriage allows to move formwork and platform as one unit!

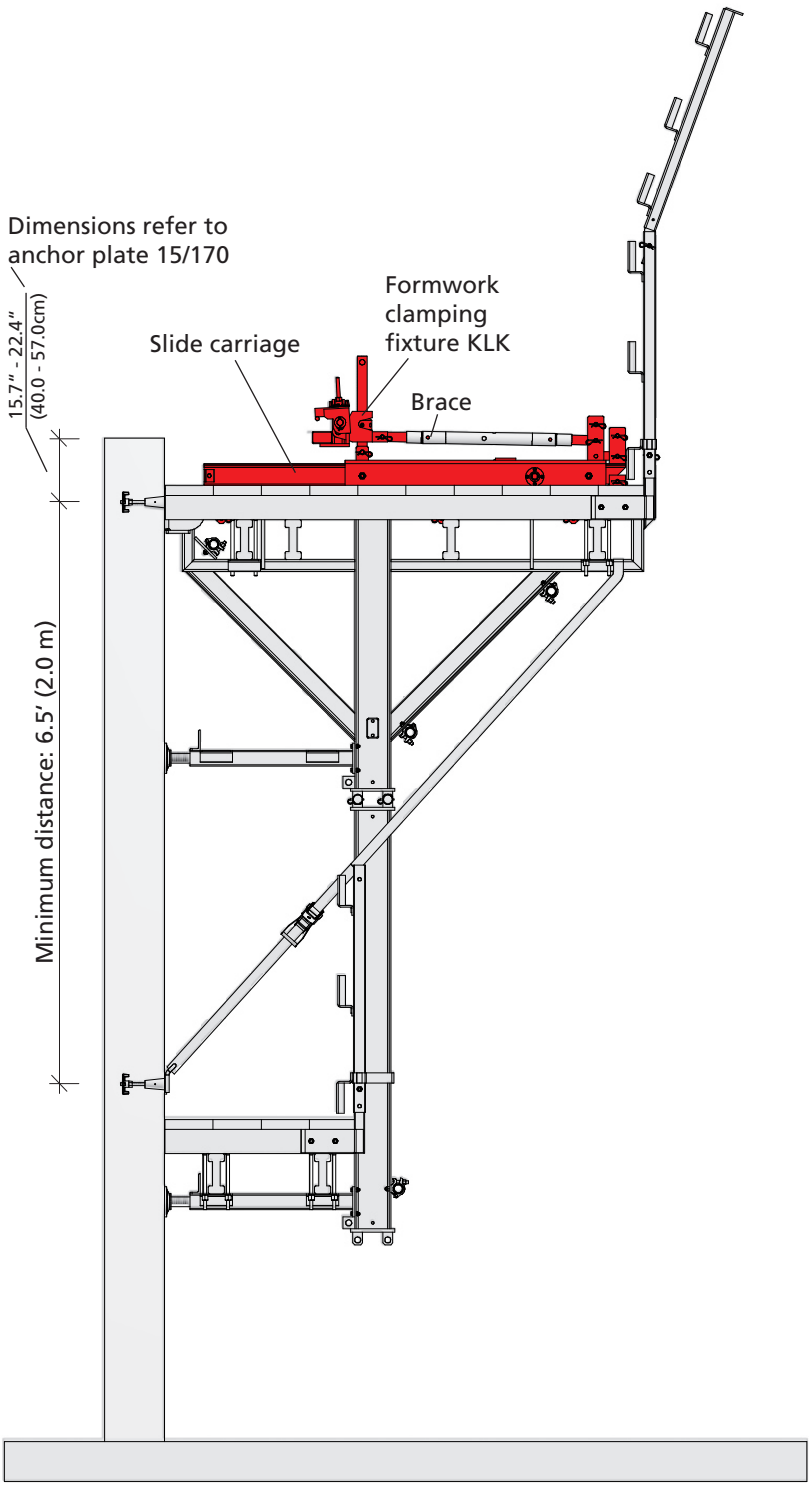

Fig. 8.1

Description	Ref.-No.
Climbing bracket KLK 230	**29-411-00**
Slide carriage	**29-411-50**
Formwork clamping fixture KLK	**29-411-60**
Square spanner	**29-411-45**

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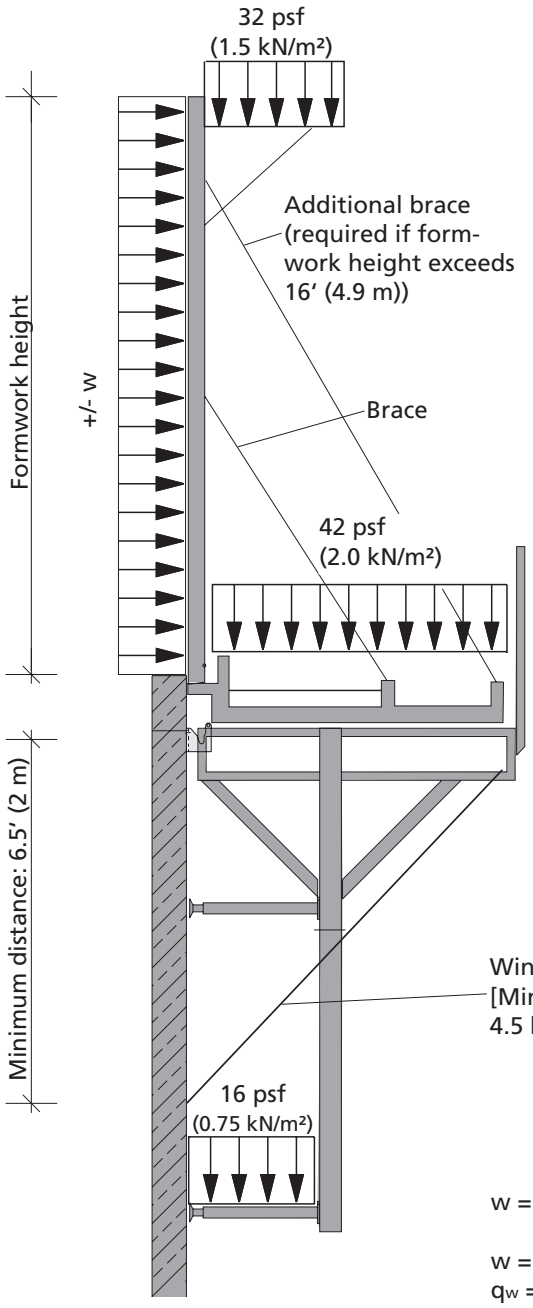
Working with the KLK system is only safe if the wind speed does not exceed 45 mph (20 m/s). If the wind speed is higher than 45 mph do not "fly" the KLK.



$w = c \times q_w$

w = Wind-load
q_w = Impact pressure
c = Aerodynamic coefficient

Fig. 9.1

Attention

■ If the wind speed is higher than 45 mph [20 m/s (72 km/h)] do not "fly" the KLK. Move formwork to the building, set it plumb (not tilted) and secure it.

■ Ice and snow on the climbing scaffold must be removed prior to use.

The structural analysis of the anchoring only includes the local transfer of forces into the concrete. The analysis of the stability of the building has to be checked as well and has to be provided by the structural engineer.

Load capacity of KLK 230 (Fig. 9.1)

The following loads can be applied at the same time:
32 psf (1.50 kN/m²) per level on the working platform of the wall formwork (workers only, no material).
16 psf (0.75 kN/m²) at the secondary platform.
42 psf (2.00 kN/m²) at the platform of the climbing scaffold.

Planning

Influence width
The influence width shown in tables 10.1, 10.2 and 10.3 are valid for the climbing cone 15/M24, the anchor plate 15/170 and the suspension screw M24, installation depth 8.25“ (210 mm), based on the maximum edge distance (see page KLK-11) and cracked concrete.

The influence width depends on minimum concrete strength, formwork height, wind speed, impact pressure as well as length of platform.

If the distance from the edge is below the minimum distance required, a separate structural analysis is required.

All concrete building parts must have sufficient reinforcement.

Formwork height in ft (m) at a concrete strength of 3625 psi (25 N/mm²)

Max. influence width per bracket in ft (m)	6.5‘ (2)	8.25‘ (2.5)	10‘ (3)	11.5‘ (3.5)
q = 10.4 psf (0.5 kN/m²)	23‘ (7)	21.25‘ (6.5)	18‘ (5.5)	10‘ (3)
q = 16.7 psf (0.8 kN/m²)	21.25‘ (6.5)	19.75‘ (6)	16.5‘ (5)	10‘ (3)
q = 23.0 psf (1.1 kN/m²)	18‘ (5.5)	16.5‘ (5)	14.75‘ (4.5)	10‘ (3)

Tab. 10.1

Formwork height in ft (m) at a concrete strength of 2900 psi (20 N/mm²)

Max. influence width per bracket in ft (m)	6.5‘ (2)	8.25‘ (2.5)	10‘ (3)	11.5‘ (3.5)
q = 10.4 psf (0.5 kN/m²)	21.25‘ (6.5)	19.75‘ (6)	13.25‘ (4)	8.25‘ (2.5)
q = 16.7 psf (0.8 kN/m²)	19.75‘ (6)	18‘ (5.5)	13.25‘ (4)	6.5‘ (2)
q = 23.0 psf (1.1 kN/m²)	16.5‘ (5)	14.75‘ (4.5)	13.25‘ (4)	-

Tab. 10.2

Formwork height in ft (m) at a concrete strength of 2175 psi (15 N/mm²)

Max. influence width per bracket in ft (m)	6.5‘ (2)	8.25‘ (2.5)	10‘ (3)	11.5‘ (3.5)
q = 10.4 psf (0.5 kN/m²)	19.75‘ (6)	14.75‘ (4.5)	8.25‘ (2.5)	-
q = 16.7 psf (0.8 kN/m²)	19.75‘ (6)	13.25‘ (4)	8.25‘ (2.5)	-
q = 23.0 psf (1.1 kN/m²)	16.5‘ (5)	13.25‘ (4)	8.25‘ (2.5)	-

Tab. 10.3

Max. Wind speed and max. impact pressure

v		q		w	
(mph)	(m/s)	psf	(kN/m²)	psf	(kN/m²)
63.3	28.3	10.4	0.5	13.6	0.65
80.0	35.8	16.7	0.8	21.7	1.04
93.9	42.0	23.0	1.1	29.9	1.43

Tab. 10.4

v = Wind speed mph (m/s)
q = Impact pressure psf (kN/m²)
w = Wind load psf (kN/m²)

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Minimum dimensions and distances for the climbing cone when using the **anchor plate 15/170** and the charts on page KLK-10

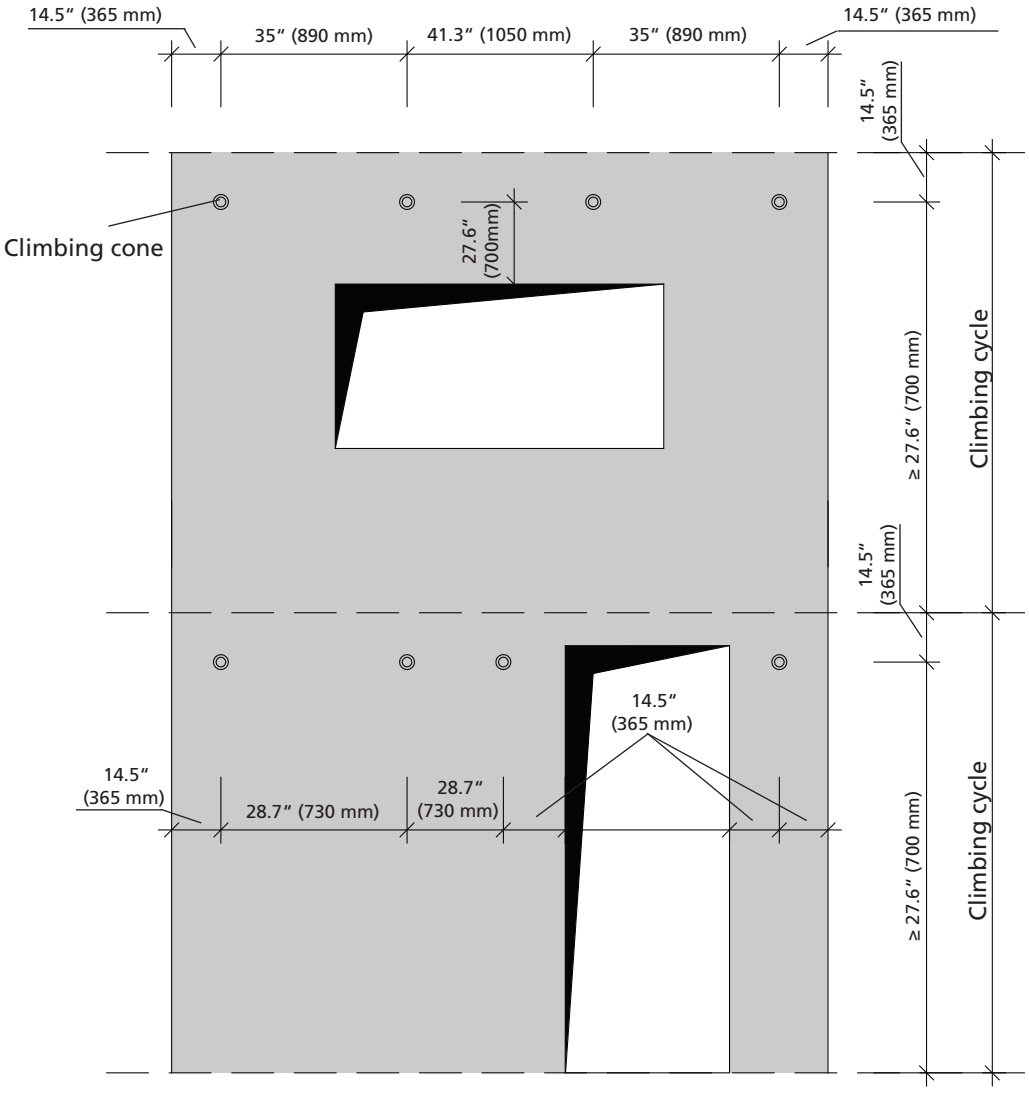

Fig. 11.1 Dimensions and distances for the **anchor plate 15/170** + climbing cone
Installation depth: 8.25" (210 mm) / Wall thickness 10" (250 mm)

Minimum dimensions and distances of climbing cones when using the anchor plate 15/170
When installing climbing cones minimum dimensions and distances have to be observed. Especially above openings and close to edges the dimensions in Fig. 11.1 have to be observed.

The shown dimensions are valid for the use of the KLK 230 climbing bracket, the climbing cone 15/M24, the anchor plate 15/170 and the suspension screw M24 according to the approval (installation depth 8.25" (210mm)). If the load is lower the dimensions can be reduced. In that case a separate structural analysis from the structural engineer is required.

The minimum wall thickness has to be 10" (250 mm).

All concrete building parts must have sufficient reinforcement.

Installing of climbing cones

When casting in the anchor plate and climbing cone a very accurate positioning is mandatory.

Installing of climbing cone by using the positioning disc
(Fig. 12.1 and 12.2)
1. The positioning disc should be nailed (4 nails) to the facing.
2. Before nailing the disc to the facing make sure to fill the Allen key with some silicone or similar material to prevent concrete slurry from entering.
3. Screw climbing cone onto the positioning disc.
4. Slip over conical sleeve to facilitate unscrewing of the climbing cone after stripping.
5. Screw anchor plate into climbing cone (Fig. 12.1).
6. Secure anchor plate to rebar by using a wire or additional rebars (Fig. 12.2).
7. After stripping, remove positioning disc by using an Allen wrench.

Installing of climbing cone by using the suspension screw M 24/80
(Fig. 12.4)
1. Screw in suspension screw into climbing cone (through pre-drilled facing Ø 1 3/8" (35 mm)).
2. Slip over conical sleeve to facilitate unscrewing of the climbing cone after stripping.
3. Screw anchor plate into climbing cone.
4. Before stripping, unscrew suspension screw M 24/80 and remove formwork from concrete.

Alternatively it is possible to use the hex screw M24/80 (instead of the suspension screw) together with the M24 washer to attach the cone. In this case the facing has to be drilled with a diameter of 1" (25 mm).

Attention
The suspension shoe must never be attached with the hex screw. Only the suspension screw M24/80 may be used to attach the suspension shoe!

Installing of suspension shoe
(Fig 12.3) After stripping and removing of positioning disc or suspension screw, screw suspension screw into climbing cone.
Attach suspension shoe and tighten suspension screw. The safety pin of the suspension shoe secures the shoe against unhooking.

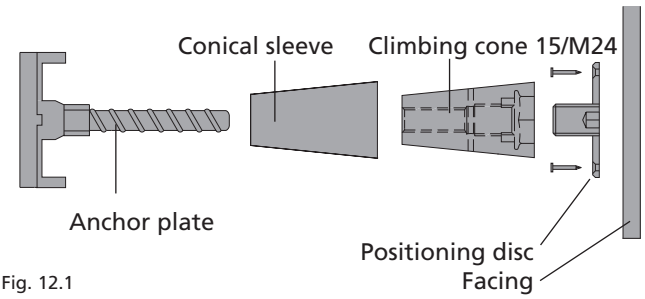

Fig. 12.1

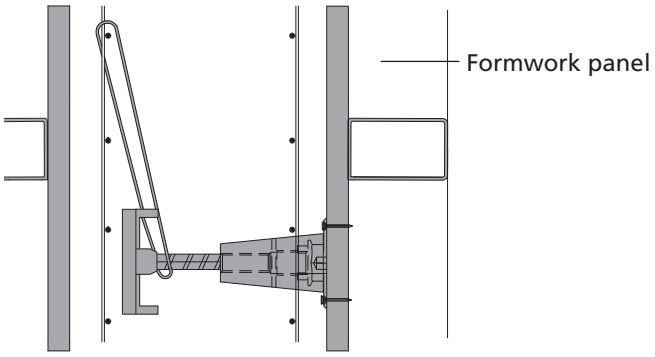

Fig. 12.2

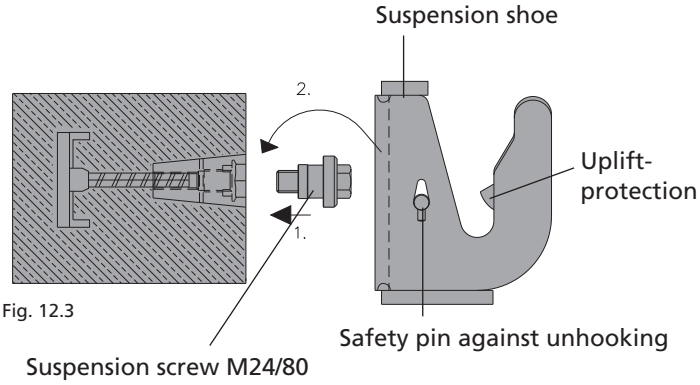

Fig. 12.3

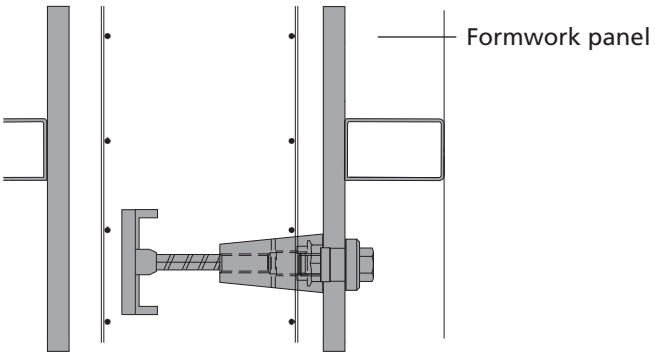

Fig. 12.4

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Installing of climbing cones

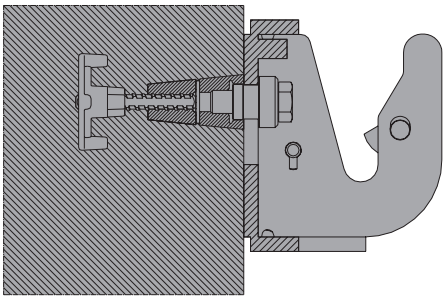

Fig. 13.1 Anchor plate 15/120

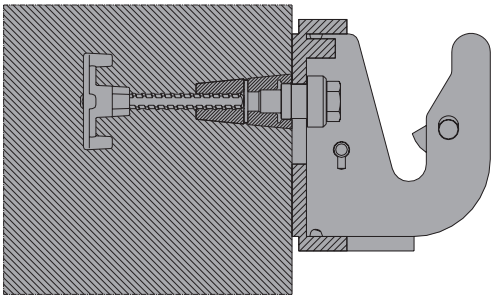

Fig. 13.2 Anchor plate 15/170

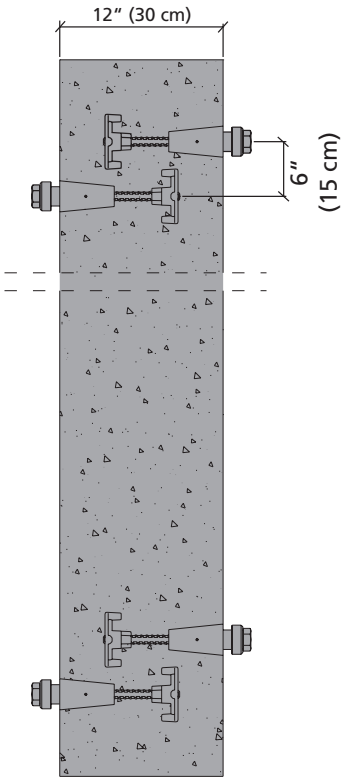

Fig. 13.3 Planview for climbing scaffolds on both sides of the wall

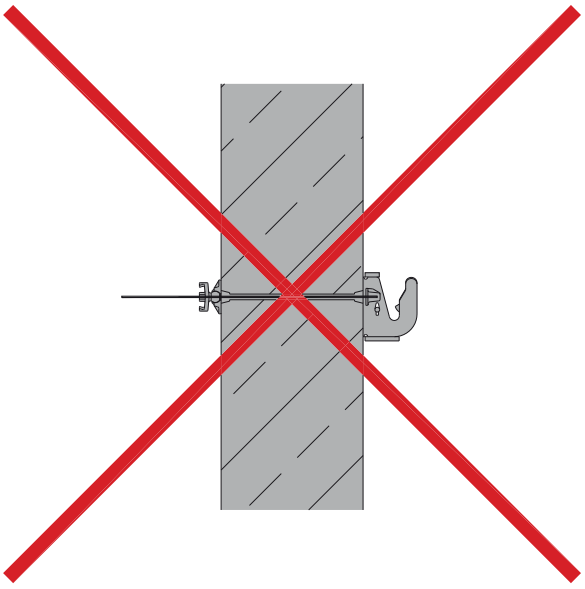

Fig. 13.4

When installing climbing cones, concrete must be set for at least 24 hours. The minimum concrete strength must be 2175 psi (15 N/mm²).
The anchor plate 15/120 is used for wall thicknesses from 8" to 10" (20 - 25 cm) (Fig. 13.1). For walls thicker than 10" (25 cm) the anchor plate 15/170 is used (Fig. 13.2). When the climbing cone is not needed any longer, remove cone from concrete. The anchor plate remains in concrete (not reusable). To patch the remaining hole in the concrete we recommend using prefabricated concrete cones which are glued into the hole.

Note:
When climbing scaffolds are used on both sides of the wall the anchor plates and cones have to be placed at least 6" (15 cm) apart from each other (Fig. 13.3).

Attention
Under no circumstances attach the suspension shoe "through" an existing tie hole to avoid the accidental loosening of the securing nut on the other side of the wall (Fig. 13.4).

Description	Ref.-No.
Climbing cone 15/M24	**29-412-70**
Climbing cone 20/M24	**29-412-75**
Conical sleeve	**29-412-95**
Positioning disc M24	**29-412-85**
Suspension screw M24	**29-412-80**
Anchor plate 15/120	**29-412-30**
Anchor plate 15/170	**29-412-35**
Anchor plate 20/170	**29-412-37**
Combination spanner	**29-411-85**
Concrete cone	**29-412-67**
Concrete glue A + B	**53-210-70**

Assembly

Assembly of basic platform

We recommend to cast in climbing cones in the wall. The distance between these cast-in cones should match the desired width of the climbing platform (Fig. 14.1).
The advantage is the possibility to assemble the platform on the ground (safe and convenient).
The brackets should be fixated by using scaffold tubes Ø 1.9" (48 mm). Horizontal tubes are attached to the couplers which are already mounted to the bracket.
Diagonal tubes are attached to the horizontal tubes by using swivel-joint couplers 48/48 (Fig. 14.2). Swivel-joint couplers have to be ordered separately.
Before all couplers are tightened please make sure that brackets are perpendicular. (Fig. 14.3). After all scaffold tubes have been attached the wall strut has to be mounted to the KLK bracket.
We also recommend to attach bracket extensions before first lift (Fig. 14.4).

For a detailed assembly description please see pages KLK-15 - 21.

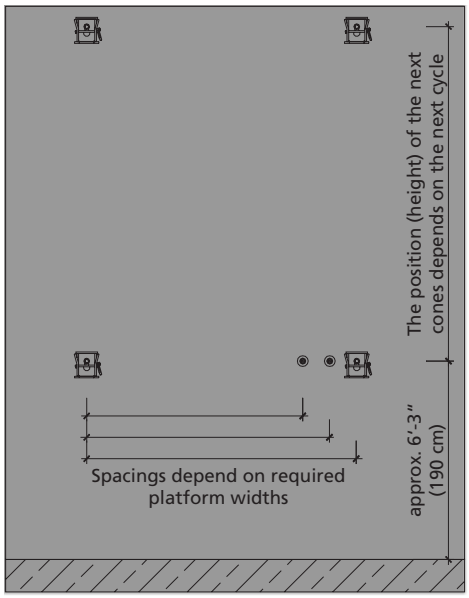

Fig. 14.1

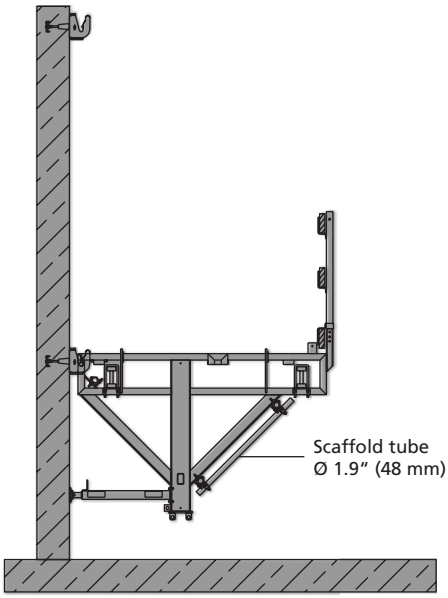

Fig. 14.2

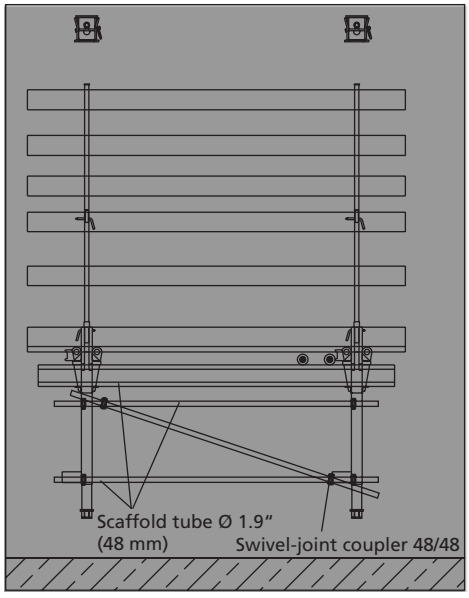

Fig. 14.3

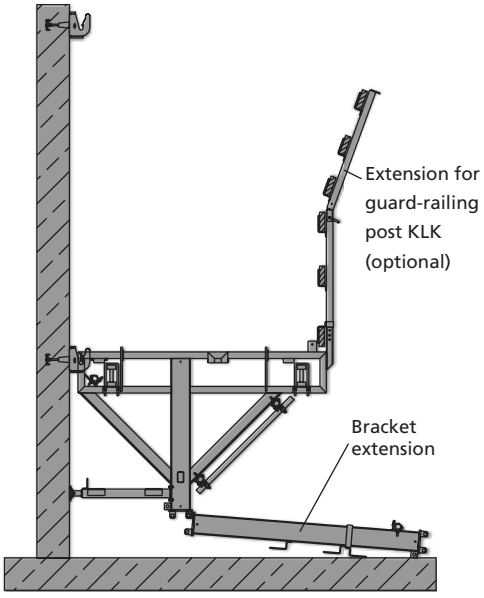

Fig. 14.4

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Assembly

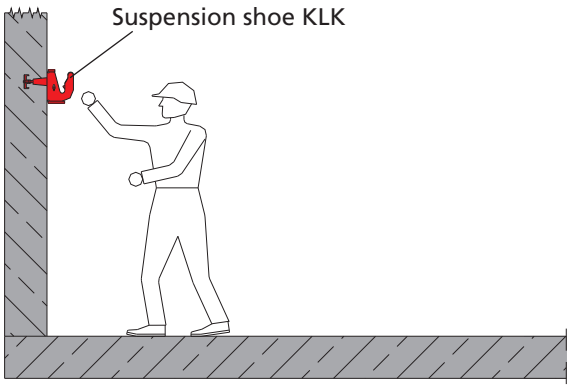

Fig. 15.1

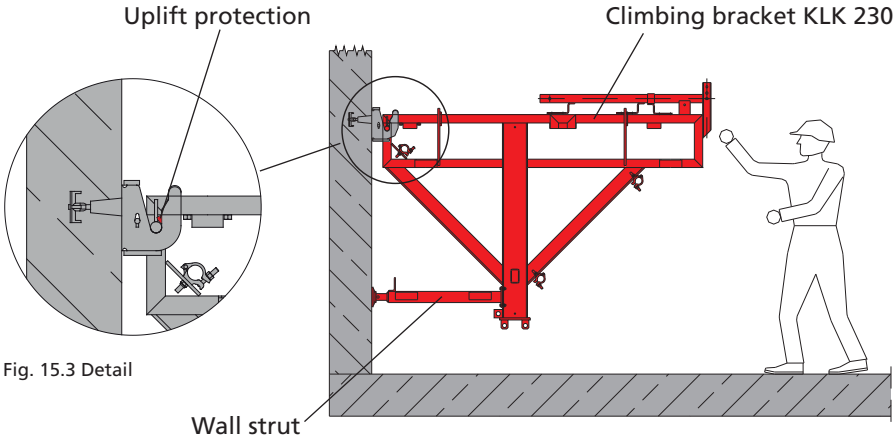

Fig. 15.3 Detail

Fig. 15.2

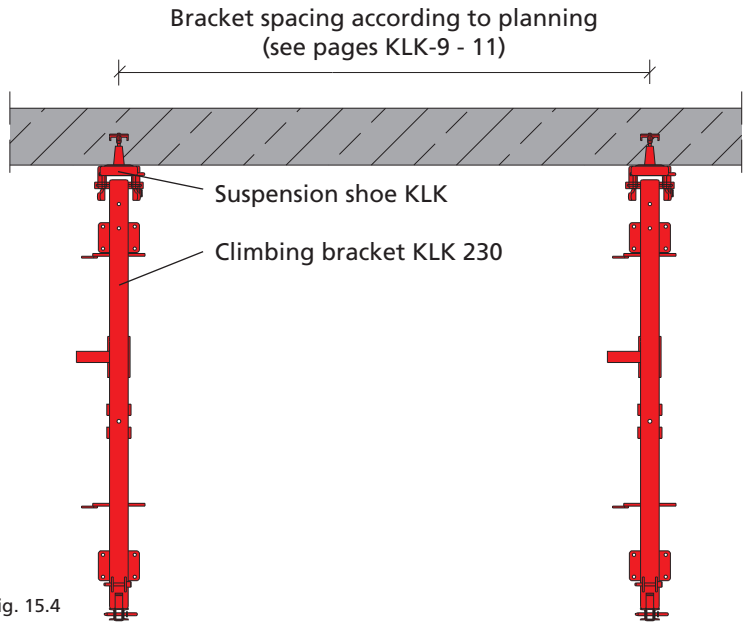

Fig. 15.4

1. Attach suspension shoe to the climbing cone by using the suspension screw M24. Secure shoe with safety pin against unhooking (see pages KLK-12 - 13 and Fig. 15.1).

2. Attach wall strut to the climbing bracket KLK 230 by using four (4) screws M12x35 (in delivery included).

3. Attach climbing bracket to suspension shoe (Fig. 15.2 -15.4). The uplift protection automatically secures the bracket (Fig. 15.3).

4. Make sure that the bracket is in a proper position and the uplift protection is ensured.

Attention
Please observe planning details on pages KLK-9 - 11.

Description	Ref.-No.
Climbing bracket KLK 230	**29-411-00**
Wall strut	**29-411-30**
Suspension shoe KLK	**29-411-05**

Assembly

1. Check distance of brackets (Fig. 16.1).

2. Attach three (3) horizontal scaffold tubes to the bolt on tube couplers of the bracket. Attach one (1) diagonal scaffold tube to the two (2) horizontal scaffold tubes by using swivel-joint couplers 48/48 (Fig. 16.1 and 16.2).

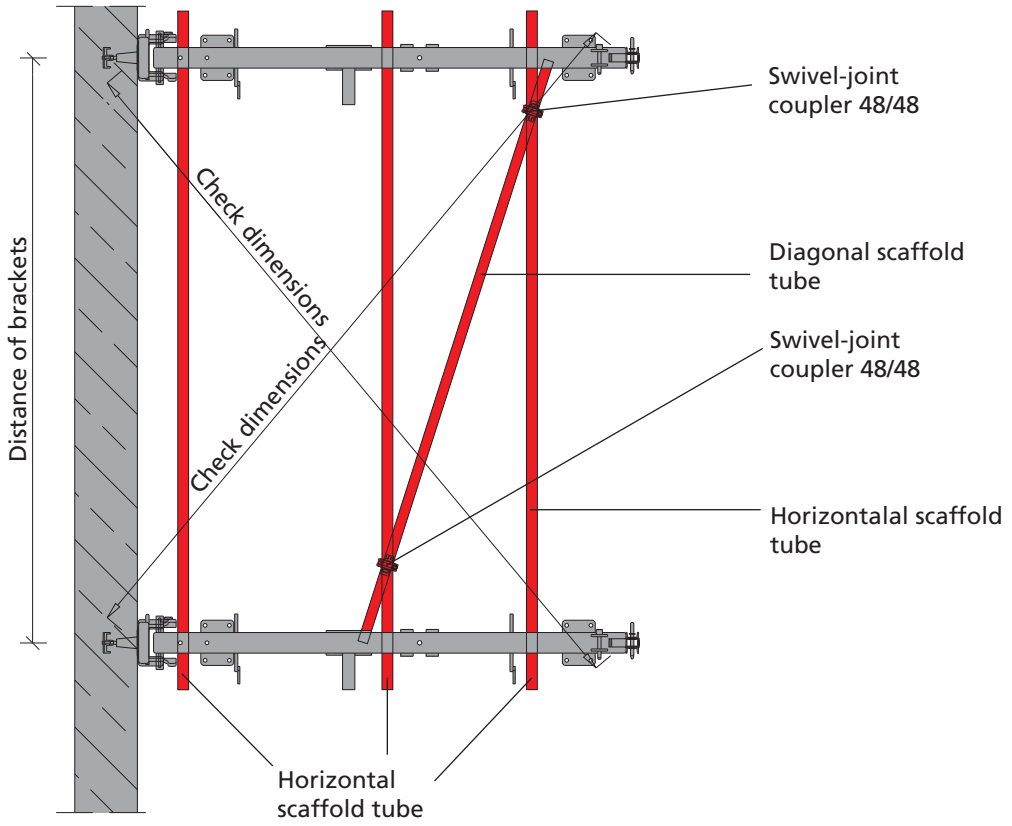

Fig. 16.1

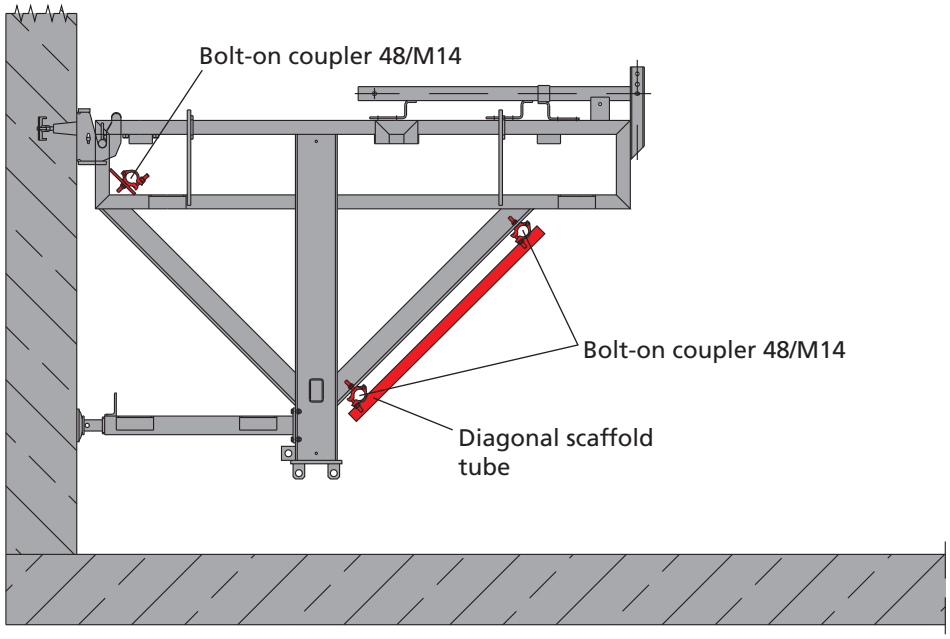

Fig. 16.2

Description	Ref.-No.
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**
Tube per linear meter	**29-412-29**
Bolt-on coupler	
48/M14	**40-080-70**
Swivel-joint	
coupler 48/48	**29-412-52**

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Assembly

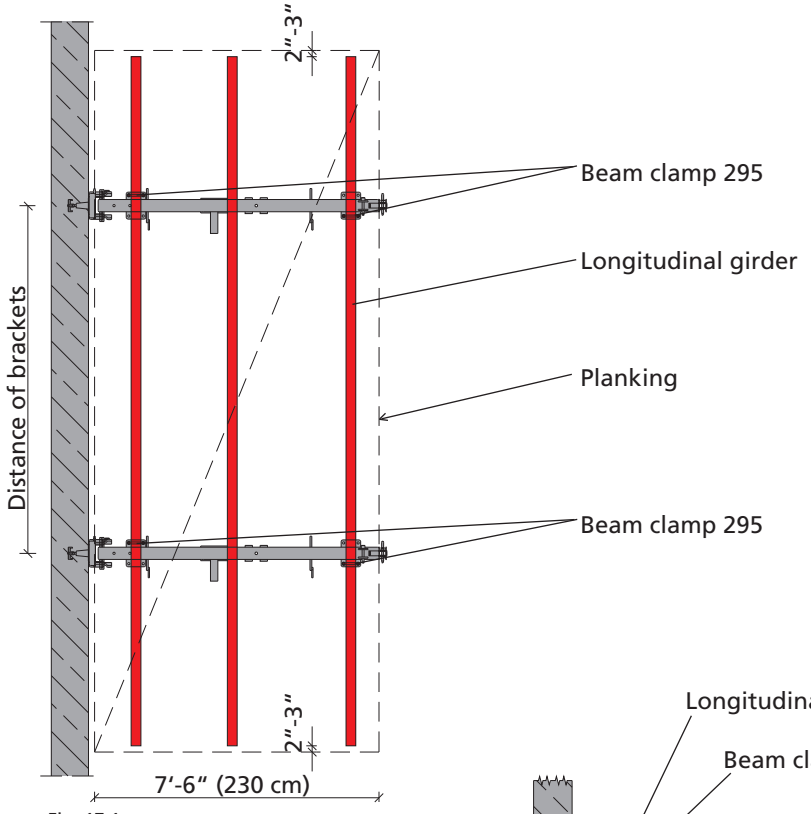

Fig. 17.1

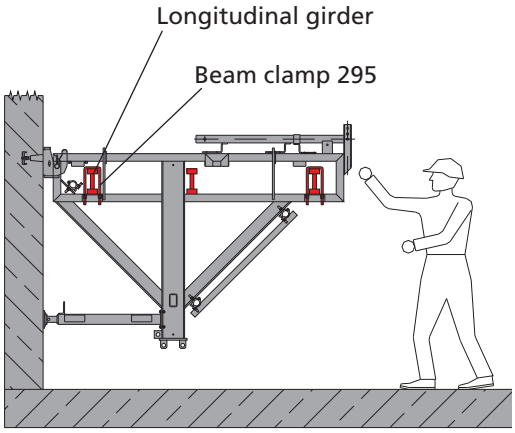

Fig. 17.2

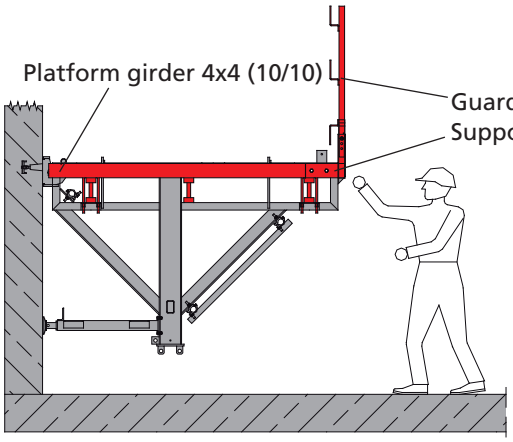

Fig. 17.3

Attach longitudinal girders to the brackets by using two (2) beam clamps 295 per bracket. The longitudinal girders (H20, aluminum or steel) should be 4" - 6" (10 - 15 cm) shorter than the whole platform.
So the plywood can cantilever 2"- 3" (5 - 7.5 cm) on each side (Fig. 17.1 and 17.2).

If the distance between two KLK brackets is wider than 6'-6" (2.00 m) additional platform girders 4x4 (10/10) are required to allow for the attachment of guard-railing posts (Fig. 17.3). The guard railing posts are attached to the platform girders by using the support for guard-railing post KLK which are mounted to the platform girder (Fig 17.3).

Assembly of planking

If the KLK is used as working platform the planking needs to be installed. If additional platform girders are required the planking is nailed to the platform girders parallel to the wall by using wood screws.
If a ladder plus access hatch is required please see page KLK-29 for more details.

Description	Ref.-No.
Beam clamp 295	**29-412-60**
Guard-railing post KLK 230	**29-411-78**
Support for guard-railing post KLK	**29-411-77**

Assembly

KLK with formwork support KLK (page 6)
When using the formwork support KLK wall formwork panels can be attached to the KLK brackets. The formwork panels are attached with assembly locks.
The formwork support KLK is mounted to the KLK bracket by using two (2) bolts M16 x 220, (Fig. 18.1).

KLK with formwork clamping fixture KLK (page 7)
When using the clamping fixture KLK wall formwork panels can be attached to the KLK brackets. The clamping fixture allows to tilt back the attached formwork panels.
The clamping fixture KLK is mounted to the KLK bracket by using two (2) bolts M16 x 220 (Fig. 18.2).

Holding device for push-pull props
When using push-pull props or braces the holding device has to be mouted to the KLK bracket by using the integrated pin.

Attention
The use of the formwork support KLK or the clamping fixture KLK requires the formwork and the KLK platform to be lifted and transported separately!

Description	Ref.-No.
Formwork support KLK	29-411-90
Formwork clamping fixture KLK	29-411-60
Bearing for formwork clamping fixture KLK	29-411-70
Holding device for push-pull props KLK	29-411-25

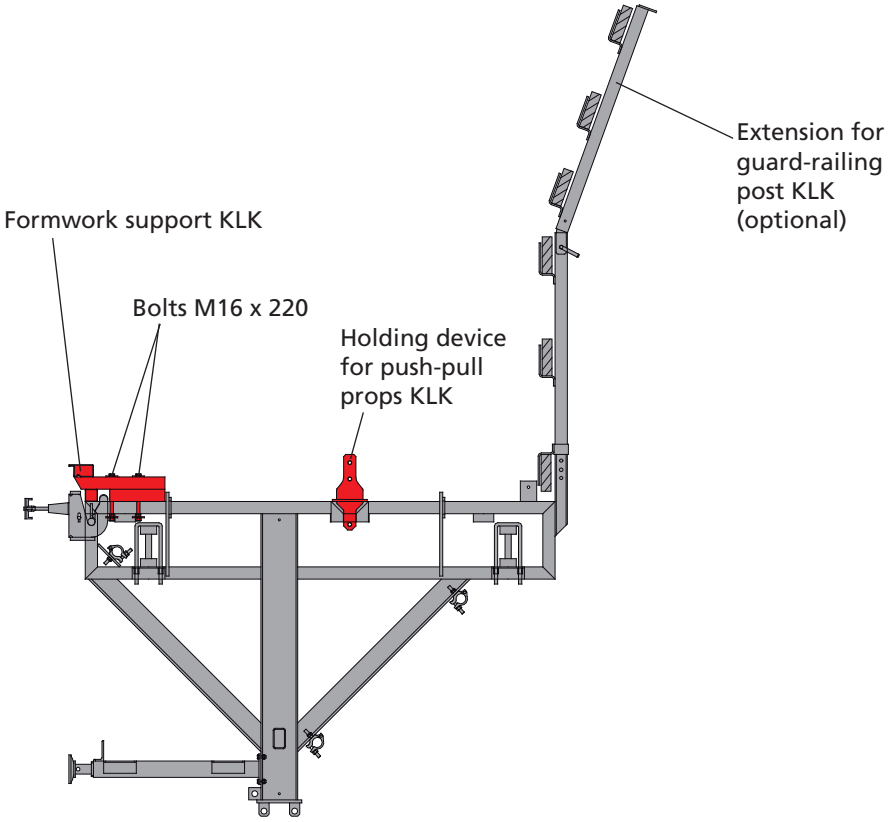

Fig. 18.1

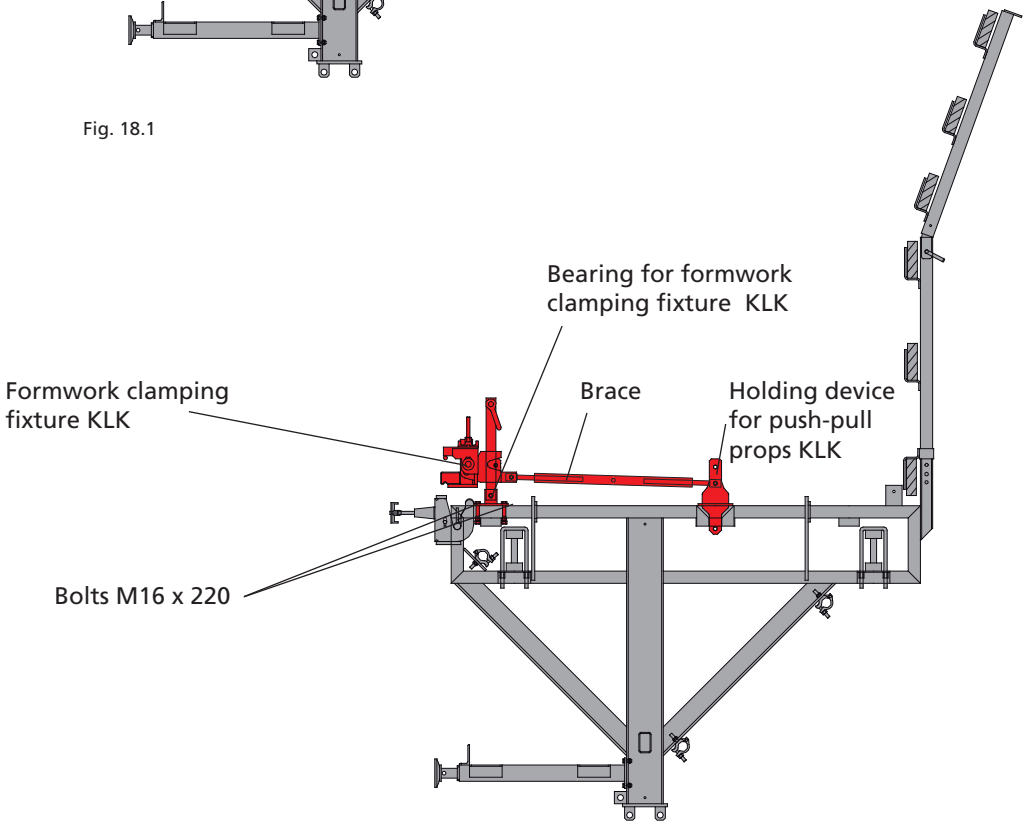

Fig. 18.2

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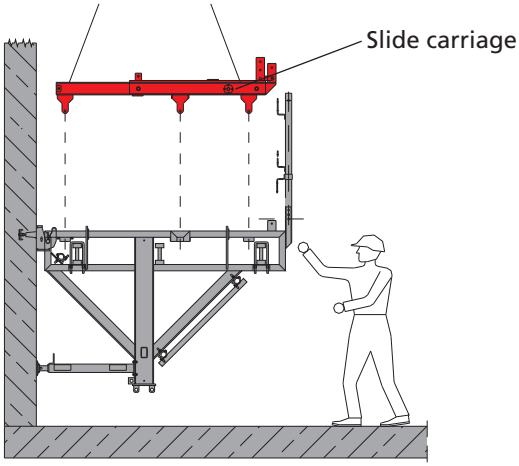

Fig. 19.1

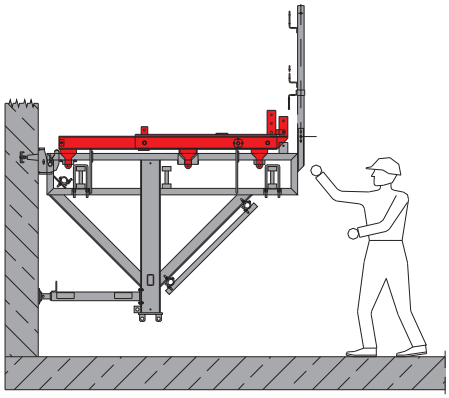

Fig. 19.2

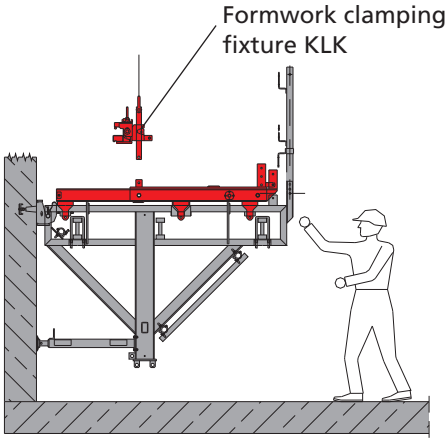

Fig. 19.3

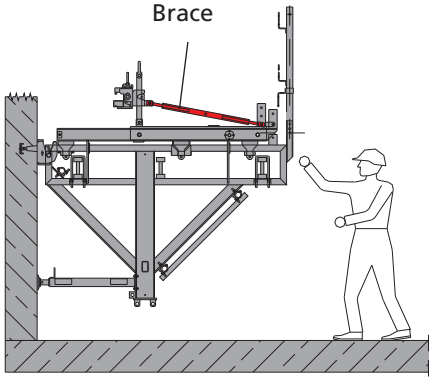

Fig. 19.4

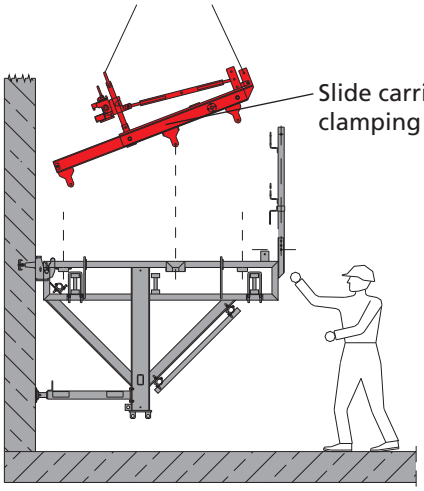

Fig. 19.5

KLK with slide carriage (page 8)
The slide carriage allows to slide back the attached formwork panels by 2'-4" (70.0 cm).
To mount the slide carriage remove the three (3) integrated pins. Place the slide carriage on top of the bracket (Fig. 19.1). After that secure the carriage with the before removed pins (Fig. 19.2).
Then attach the formwork clamping fixture KLK to the slide carriage by using the integrated pin (Fig. 19.3).
Add brace to adjust the incline of the clamping fixture (Fig. 19.4).

Alternatively the formwork clamping fixture can be pre-mounted to the slide carriage on the ground to be flown in as a unit. (Fig. 19.5).

To operate the slide carriage a sqare spanner is required.

Note:
The use of the formwork clamping fixture KLK and the slide carriage allows to move formwork and platform as one unit!

Description	Ref.-No.
Slide carriage	**29-411-50**
Formwork clamping fixture KLK	**29-411-60**
Brace SRL 120	**29-108-80**
Brace RSK 1	**79-401-56**
Square spanner	**29-411-45**

Assembly

Assembly of planking

The planking is usually attached to the platform girders parallel to the wall by using wood screws. The planks should have a thickness of at least 2“ (5 cm).

Please make sure to leave an opening for the crane eyes, slide carriages, suspension shoes and the like (Fig. 20.1). The size of the openings depends on the support structure.

Access hatch

If the KLK unit is equipped with a ladder please observe page KLK-29 for more details.

Side railing

It is possible to mount the support for guard-railing post KLK (for 4x4s) or SDT (for H20-girders) at the end of the longitudinal or platform girders to attach the guard-railing posts (Fig. 20.2). The guard-railing post KLK, 100 or 140 can be used to install the side railing.

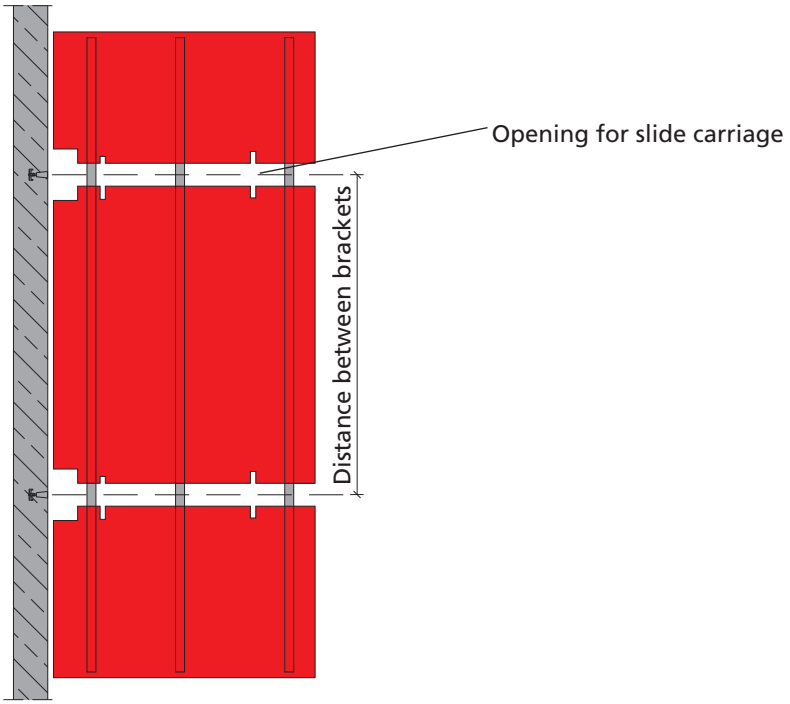

Fig. 20.1

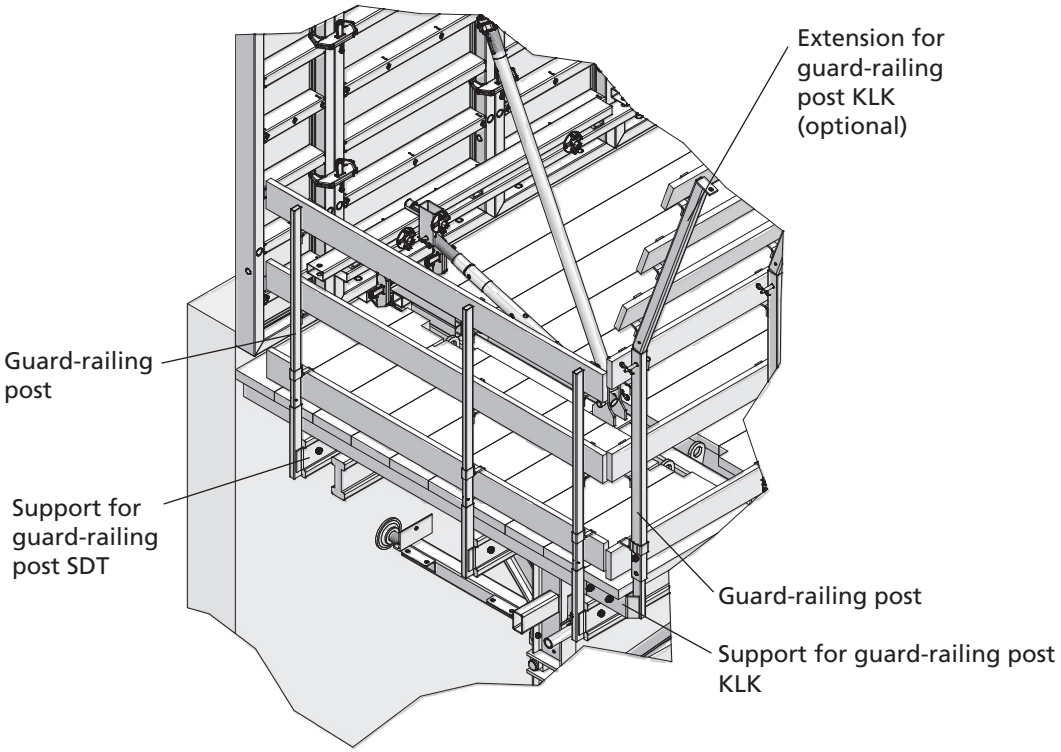

Fig. 20.2

Description	Ref.-No.
Support for guard-railing post KLK	**29-411-77**
Support for guard-railing post SDT	**29-106-90**

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Assembly

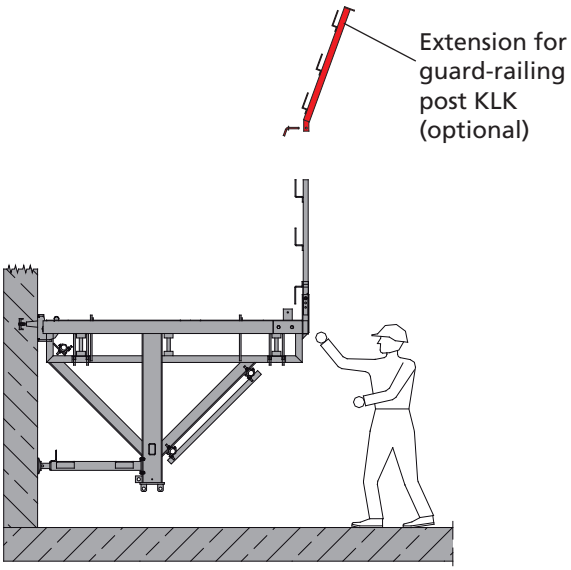

Fig. 21.1

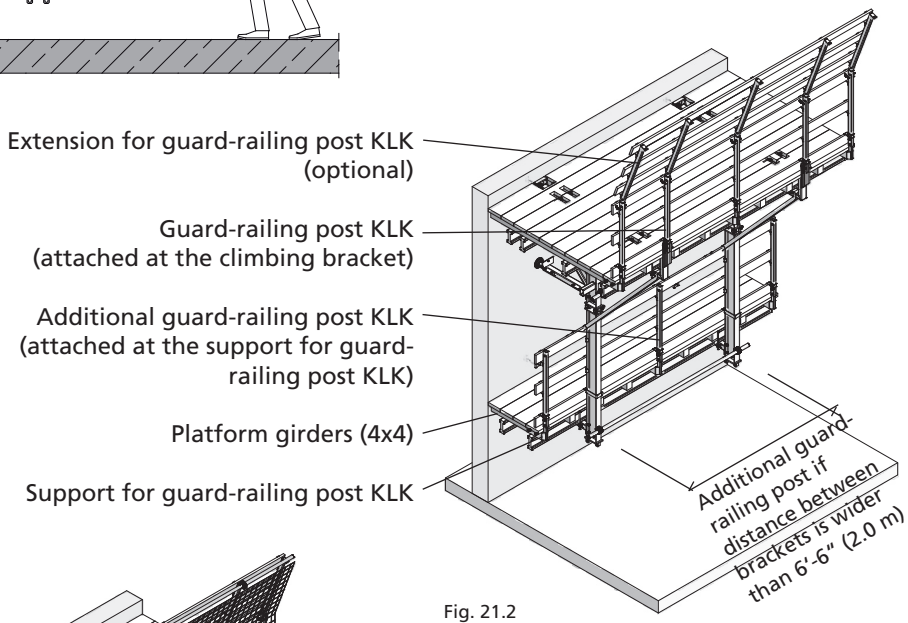

Fig. 21.2

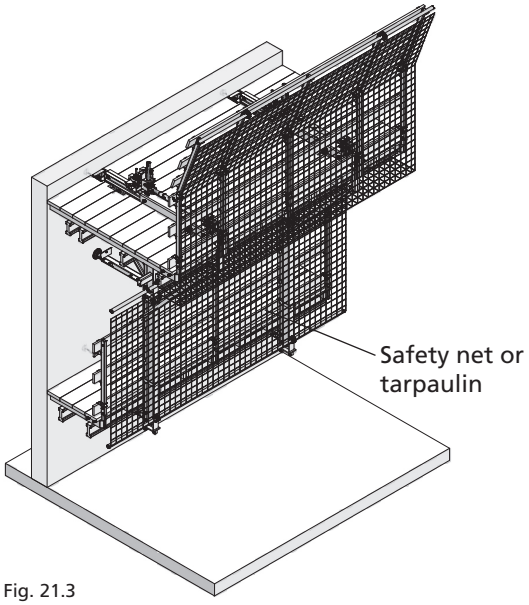

Fig. 21.3

Extension for guard-railing post KLK 230
When using the optional extension for guard-railing post KLK the fall protection and safety is more effective. The height of the railing is about 6'-7" (2.00 m) (Fig. 21.1 and Fig. 21.2).

Additional guard-railing posts
If the distance between two KLK brackets is wider than 6'-6" (2.00 m) additional guard-railing posts are required. The posts are attached to the support for guard-railing post which are mounted to the platform girders (Fig. 21.2).

Safety net
We recommend to use a safety net or tarpaulin with a mesh width of 3/4" (20 mm) to avoid falling down of tools, accessories etc. The net is attached to the scaffold tubes at the top of the guard-railing post and to scaffold tubes at the bottom of the secondary platform. In between it is also attached to scaffold tubes and kept tight by using a belt fastener (Fig. 21.3).

Description	Ref.-No.
Guard-railing post KLK 230	**29-411-78**
Extension for guard-railing post KLK 230	**29-411-75**
Support for guard-railing post KLK	**29-411-77**
Side protection net	**29-108-60**
Quick release belt fastener	**29-108-65**

Attachment of wall formwork – with formwork support KLK

Imperial panels are attached with two (2) M-assembly locks, MevaLite panels are attached by using two Uni-assembly locks or two (2) M-assembly locks and an adapter AF/ML. StarTec panels are either attached with two (2) Uni-assembly locks or by using an AS/ST adapter and two (2) M-assembly locks (Fig. 22.3).

Attachment of braces
Braces are attached to the formwork panels by using formwork-prop connectors and flange screws.

To attach the braces at the bracket, the holding device for push-pull props is needed. It can be attached in the middle of the bracket (Fig. 22.2). It is also possible to attach the braces at the end of the bracket.

Note:
The use of the formwork support KLK requires the formwork and the the KLK platform to be lifted and transported separately (see pages KLK-34 - 35)!

Description	Ref.-No.
Formwork support KLK	**29-411-90**
Adapter AS/ST	**29-411-65**
Adapter AF/ML	**29-411-92**
M-assembly lock	**29-400-71**
Uni-assembly lock 22	**29-400-85**
Formwork prop connector	**29-804-85**
Flange screw 18	**29-401-10**
Flange screw 28	**29-401-12**
Holding device for push-pull props	**29-411-25**

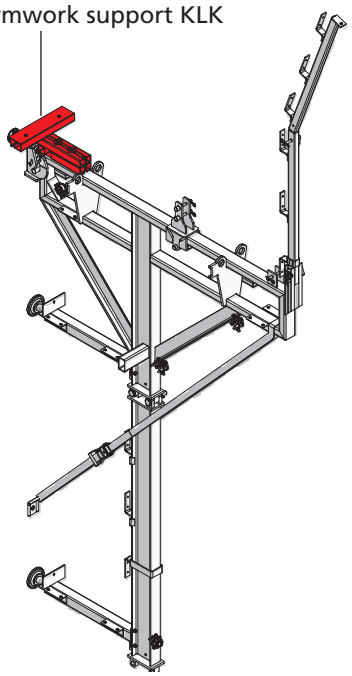

Fig. 22.1

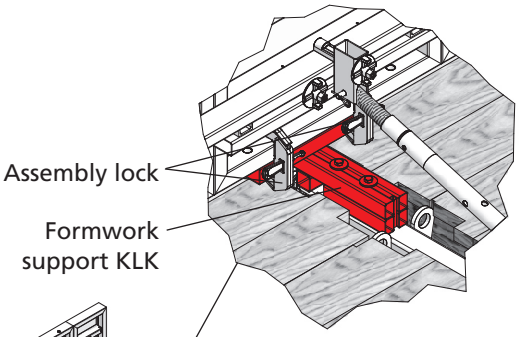

Fig. 22.3 Detail

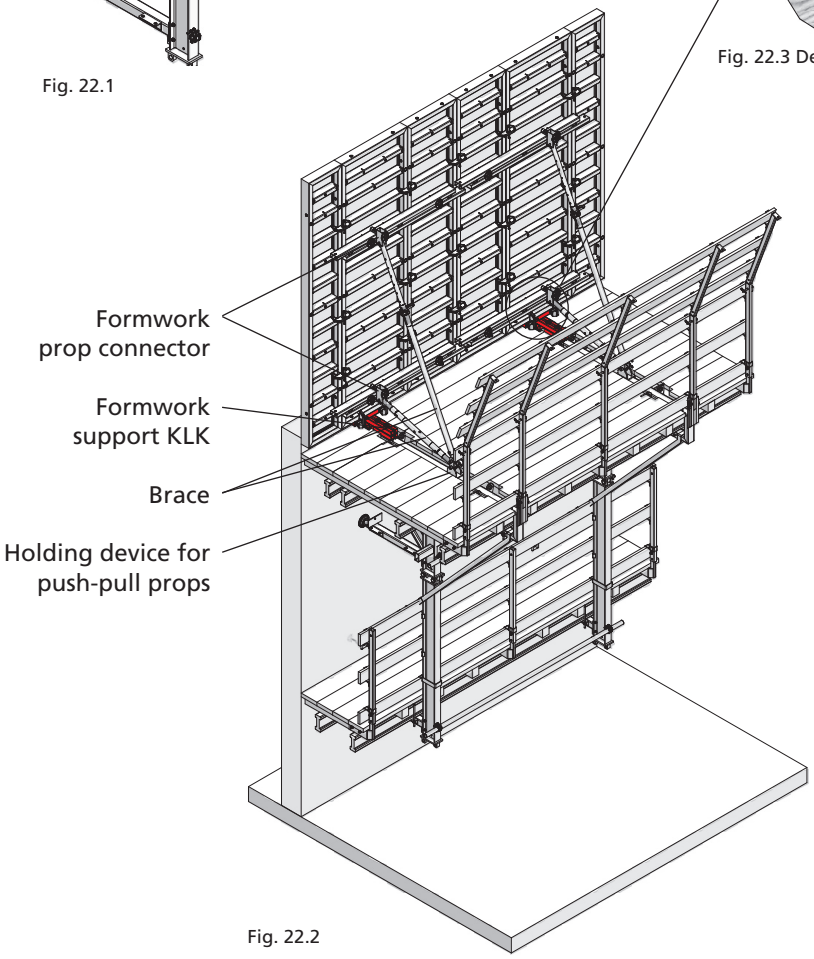

Fig. 22.2

Attachment of wall formwork – with formwork clamping fixture KLK

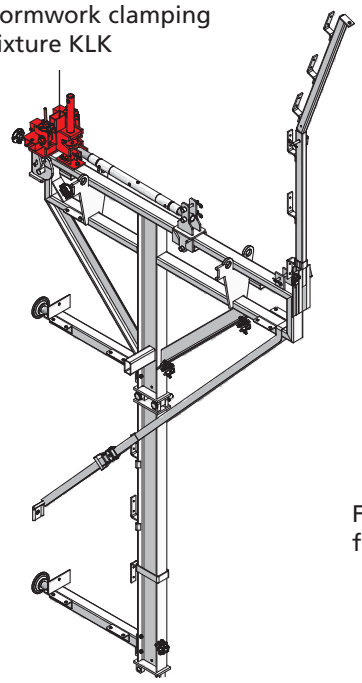

Fig. 23.1

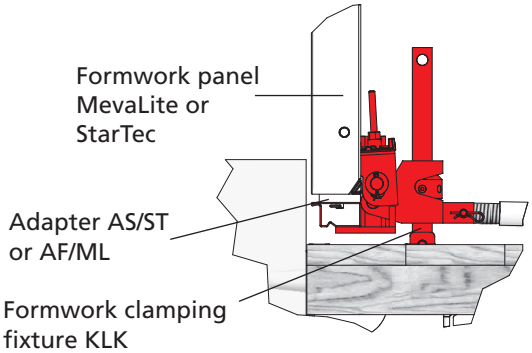

Fig. 23.3

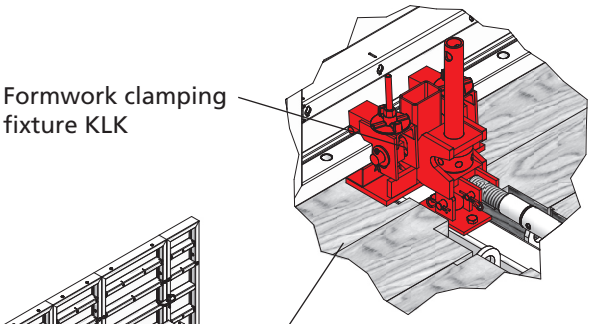

Fig. 23.4 Detail

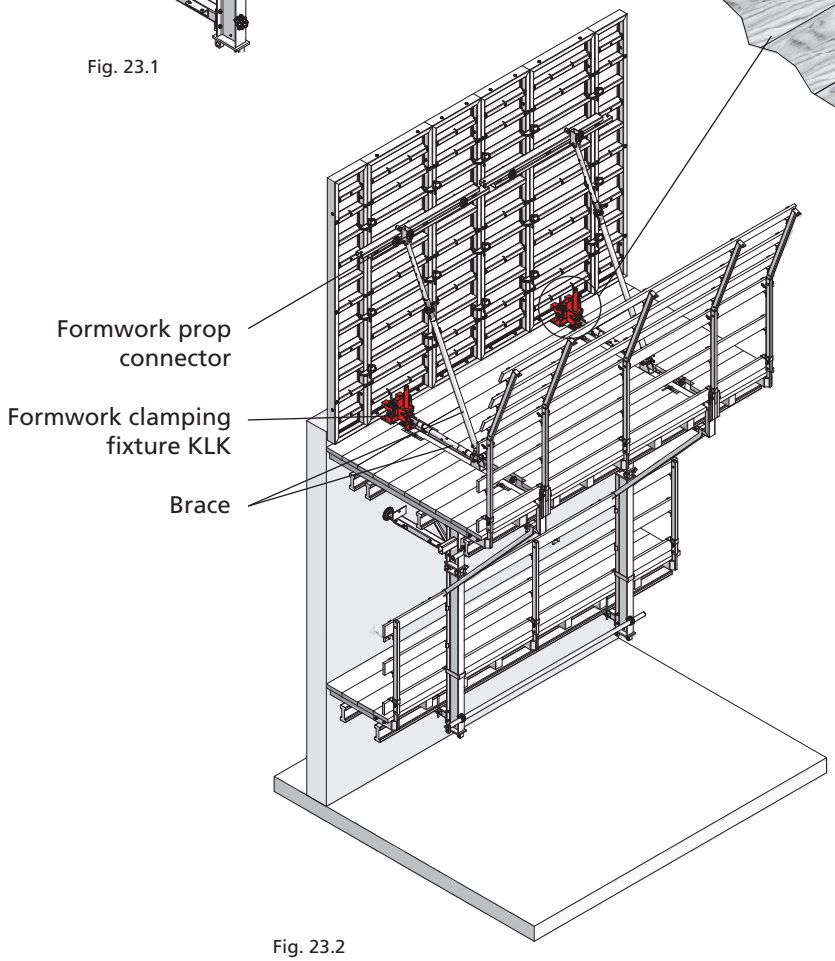

Fig. 23.2

Without slide carriage
Imperial wall formwork panels are directly attached to the formwork clamping fixture KLK (Fig. 23.4). MevaLite and StarTec require an adapter (Fig. 23.3).

The formwork clamping fixture allows the attached formwork panels to tilt back.
In addition, it is possible to adjust the formwork panels in height. Adjustment range 9“ (23.0 cm).

Attachment of braces
Braces are attached to the formwork panels by using formwork-prop connectors and flange screws.
To attach the braces at the bracket the holding device for push-pull props is needed which can be attached in the middle of the bracket (Fig. 23.2). It is also possible to attach the braces at the end of the bracket.
Note:
The use of the formwork clamping fixture KLK requires the formwork and the KLK platform to be lifted and transported separately (see also pages KLK-34 -35)!

Description	Ref.-No.
Formwork clamping fixture KLK	**29-411-60**
Bearing for formwork clamping fixture KLK	**29-411-70**
Adapter AS/ST	**29-411-65**
Adapter AF/ML	**29-411-92**
Formwork prop connector	**29-804-85**
Flage screw 18	**29-401-10**
Flange screw 28	**29-401-12**
Holding device for push-pull props	**29-411-25**

Attachment of wall formwork – with slide carriage

Imperial wall formwork panels are directly attached to the formwork clamping fixture KLK (Fig. 24.3). MevaLite and StarTec require an adapter (Fig. 23.3).

The formwork clamping fixture allows to tilt back the attached formwork panels. In addition to that it is possible to adjust the formwork panels in height. Adjustment range 9“ (23.0 cm).

Attachment of braces

Braces are attached to the formwork panels by using formwork-prop connectors and flange screws. To attach the braces at the bracket the holding device for push-pull props is needed which can be attached in the middle of the bracket (Fig. 24.2). It is also possible to attach the braces at the end of the bracket.

The wall formwork can be moved to the edge of the concrete and secured by the wedge of the slide carriage. Make sure to set formwork plumb by using braces and push-pull props.

Description	Ref.-No.
Slide carriage	**29-411-50**
Formwork clamping fixture KLK	**29-411-60**
Adapter AS/ST	**29-411-65**
Adapter AF/ML	**29-411-92**
Formwork prop connector	**29-804-85**
Flange screw 18	**29-401-10**
Flange screw 28	**29-401-12**

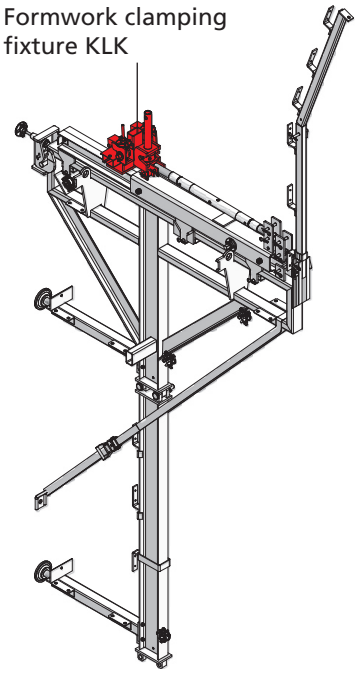

Fig. 24.1

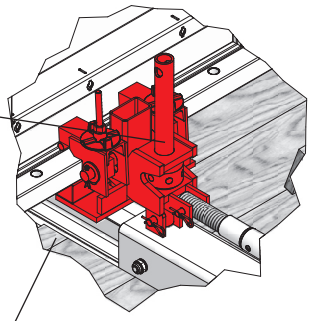

Fig. 24.3 Detail

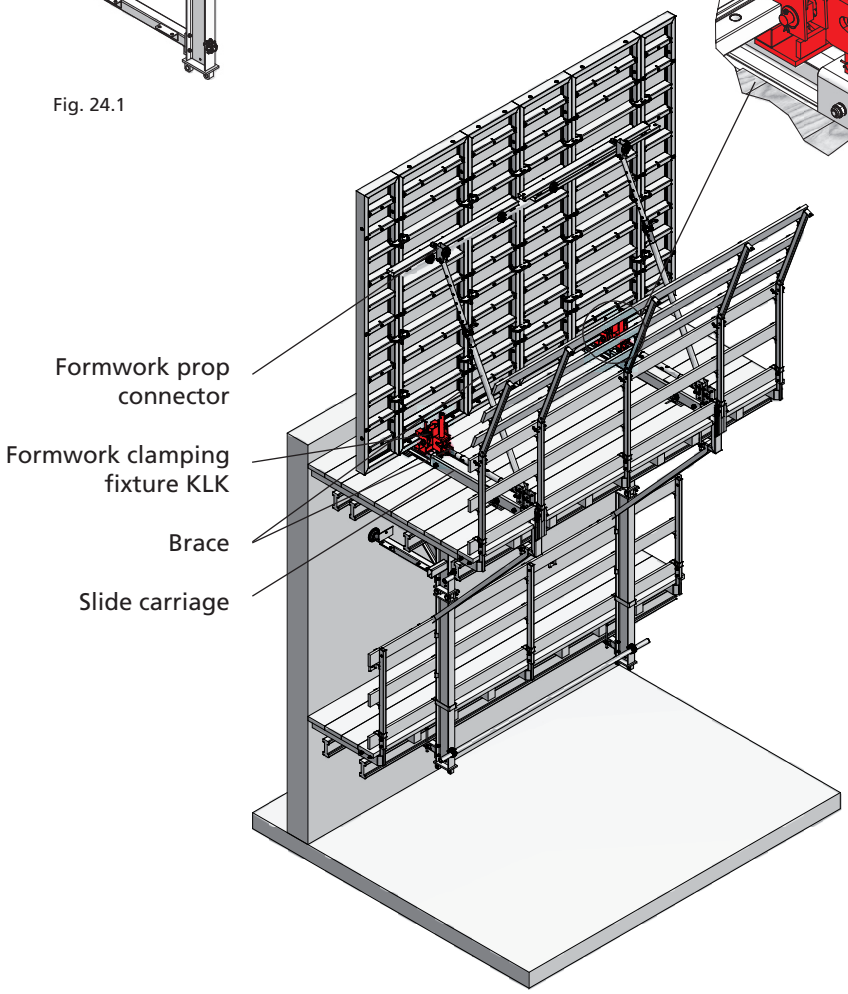

Fig. 24.2

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Bracing

Description	Ref.-No	Adjustment range ft (m)	Adm. pressure lbf(kN)	Adm. tensile force lbf(kN)	Weight lbs(kg)	Recommended area of application
Braces SRL						
SRL 120	29-108-80	3′ to 4′ - 11″ (0.90m–1.50m)	4,495 lbf (20.0kN)	6,745 lbf (30.0kN)	13.2 lbs (8.3kg)	Horizontal and vertical alignment; can be used in combination with push-pull props
SRL 170	29-108-90	3′ - 11″ to 7′ - 3″ (1.20m–2.20m)	5,620 lbf (25.0kN)	11,240 lbf (40.0kN)	23.2 lbs (10.5kg)	Horizontal and vertical alignment; can be used in combination with push-pull props
Braces RSK						
RSK 1	79-401-56	3′ to 4′ - 11″ (0.90m–1.50m)	11,240 lbf (40.0kN)	11,240 lbf (40.0kN)	24.3 lbs (11.0kg)	Horizontal and vertical alignment; can be used in combination with push-pull props
RSK 170	79-401-95	3′ - 11″ to 7′ - 3″ (1.20m–2.20m)	11,240 lbf -4,495 lbf (40.0kN-20.0kN)	11,240 lbf (40.0kN)	26.5 lbs (12.0kg)	Horizontal and vertical alignment; can be used in combination with push-pull props
Push-pull props R						
R 160	29-109-40	4′ - 6″ to 6′ - 6″ (1.35m–2.00m)	5,620 lbf (25.0kN)	5,620 lbf (25.0kN)	24.3 lbs (11.0kg)	Horizontal and vertical alignment; for wall heights up to 8′
R 250	29-109-60	6′ - 3″ to 10′ - 5″ (1.90m–3.20m)	5,620 lbf (25.0kN)	6,745 lbf (30.0kN)	40.8 lbs (18.5kg)	Horizontal and vertical alignment; for wall heights up to 14′
R 460	29-109-80	11′ - 2″ to 17′ (3.40m–5.20m)	4,495 lbf (20.0kN)	6,745 lbf (30.0kN)	78.9 lbs (35.8kg)	Horizontal and vertical alignment; for wall heights up to 20′
R 630	29-109-85	16′ - 9″ to 24′ - 11″ (5.10m–7.60m)	2,100 lbf (9.5kN)	5,620 lbf (25.0kN)	149.9 lbs (68.0kg)	Horizontal and vertical alignment; for wall heights up to 30′

Tab. 25.1

The attachment of the braces depends on the type of application of the KLK (Fig. 25.2 - 25.5 / see also pages KLK-22 - 24).

Braces must be attached to every KLK bracket.

Formwork height and length of braces should be identical. The angle between short and long brace should be less than 60°.
If the formwork height exceeds 16′ (4.9 m) an addidtional brace/push-pull prop should be used (Fig. 25.5).

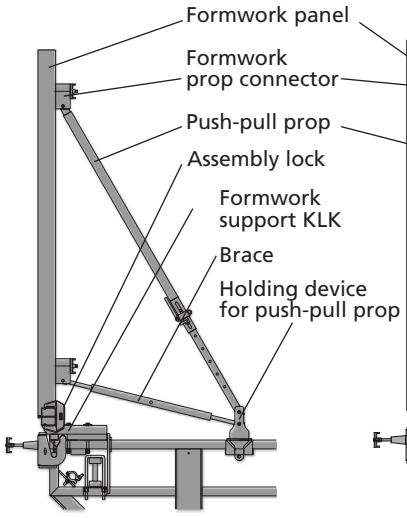

Fig. 25.2 With formwork support KLK

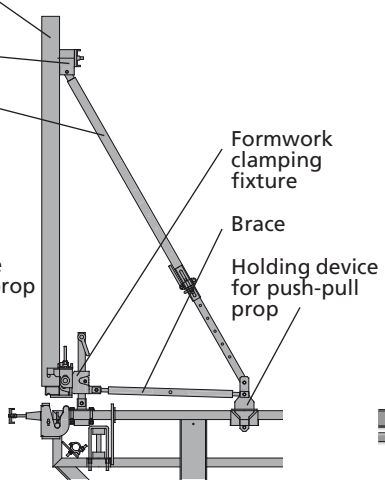

Fig. 25.3 With formwork clamping fixture KLK

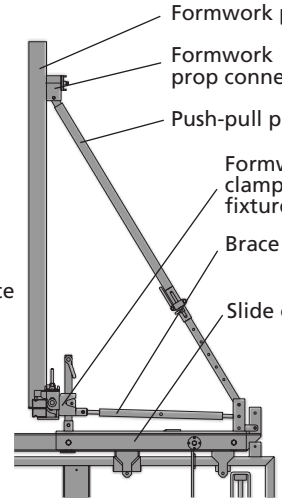

Fig. 25.4 With slide carriage

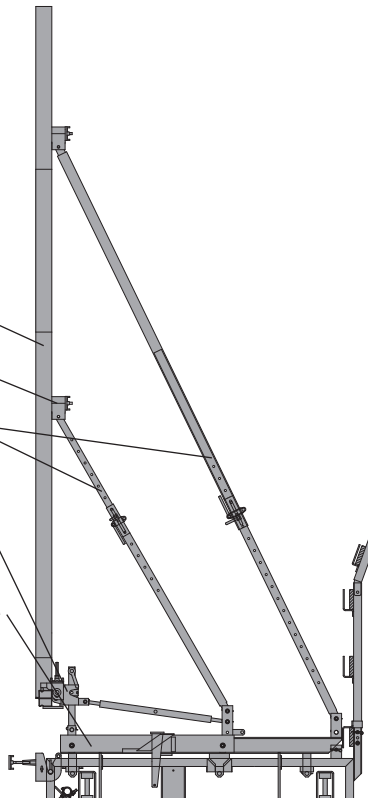

Fig. 25.5 With slide carriage and additional push-pull prop

Assembly of secondary platform

The secondary platform is needed:
- to do concrete cosmetics
- to remove suspension shoes and climbing cones of the previous pour
- to install and remove the wind bracing.

The bracket extensions (Fig. 26.1) should be attached to the KLK bracket on ground by using the safety pin (d = 30 mm). The safety pin must be secured with a cotter pin (Fig. 26.2).

Different pour heights can be achieved by using the bracket extensions in different combinations.

For the required length and number of bracket extensions please see table Tab. 32.1 on page KLK-32.

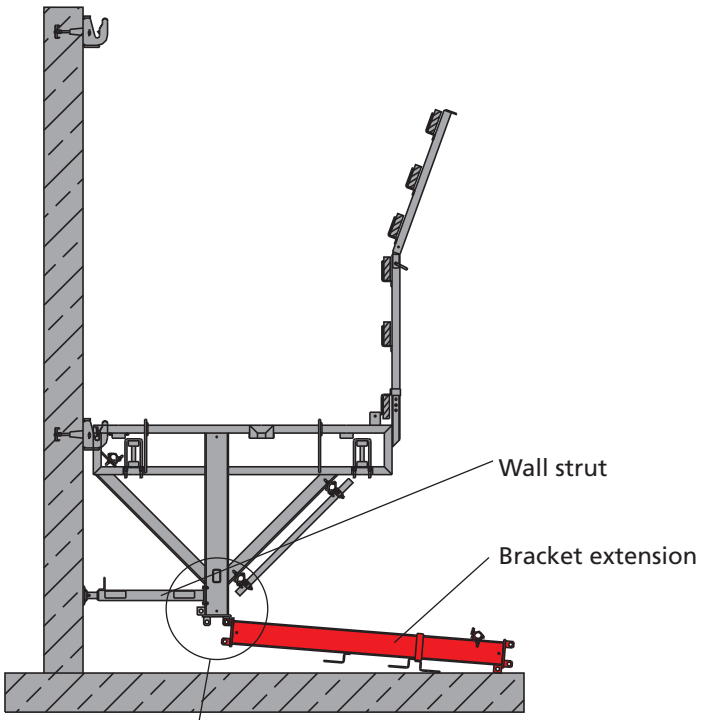

Fig. 26.1

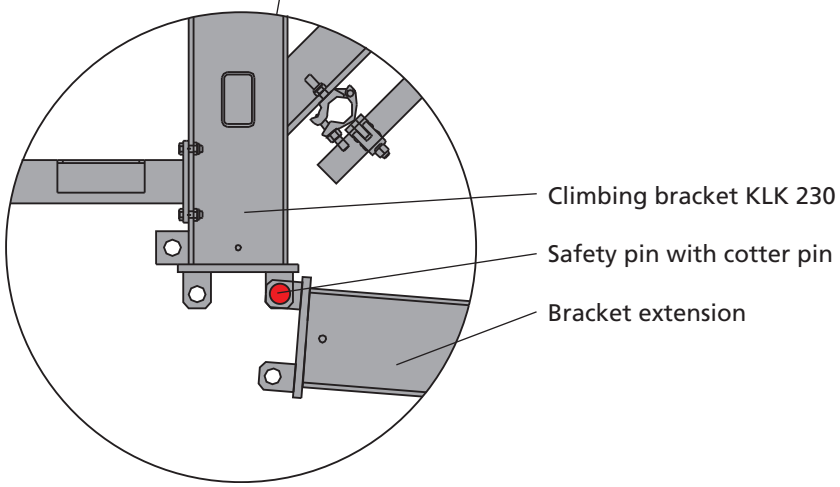

Fig. 26.2 Detail

Description	Ref.-No.
Bracket extension	
220	**29-411-20**
120	**29-411-22**
40	**29-416-40**

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Assembly of secondary platform

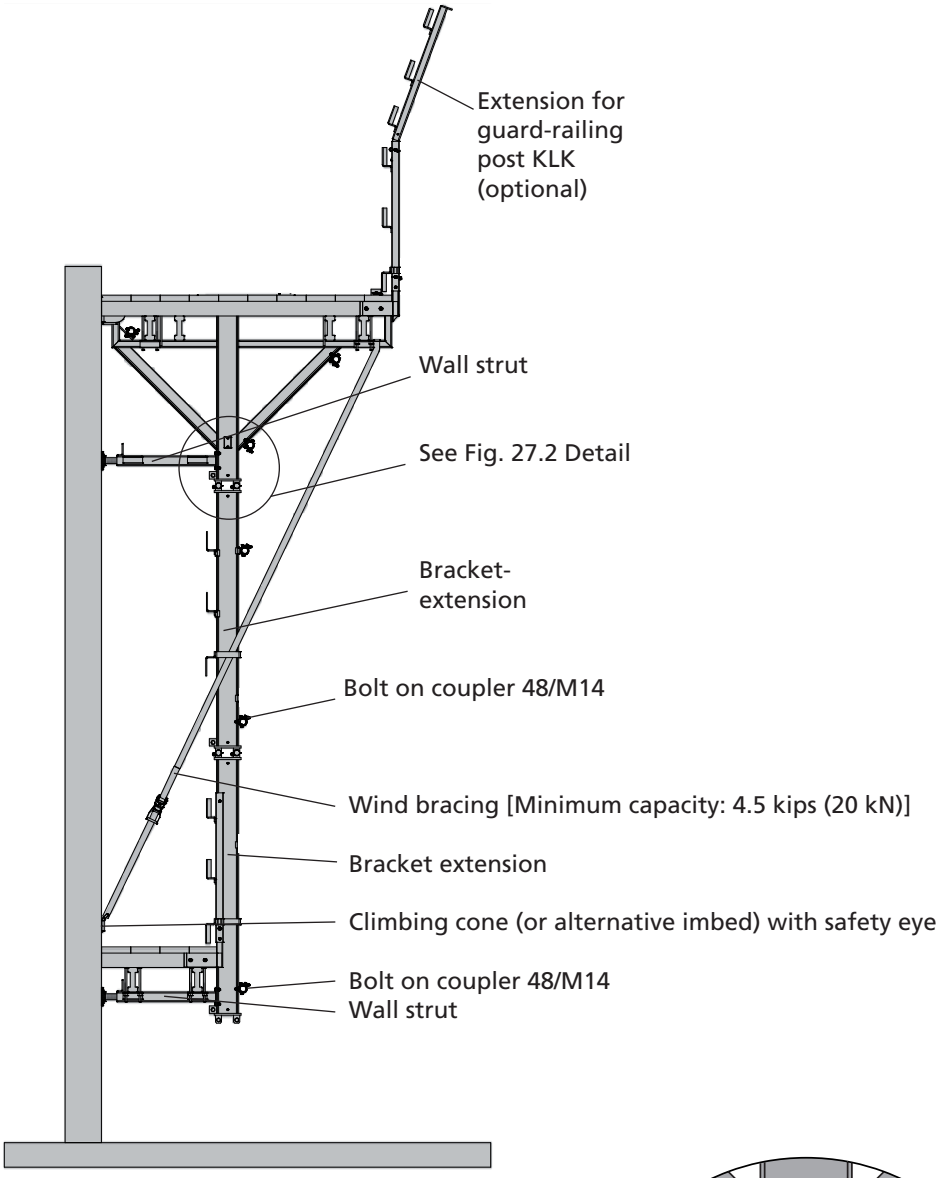

Fig. 27.1

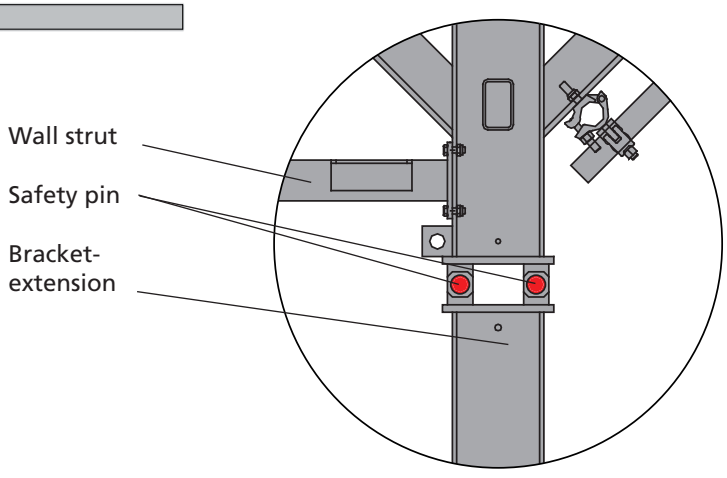

Fig. 27.2 Detail

When suspended, the secondary platform must be secured with two safety pins (d = 30 mm) plus cotter pins (Fig. 27.2).

The wall strut can be attached to all bracket extensions (220, 120 and 40) by using four (4) bolts M12 plus locking nuts (in delivery included).

The planking of the secondary platform is attached (wood screws) to longitudinal girders or 4x4s which are mounted to the wall strut by using the beam clamp 295.

If the distance between two KLK brackets is wider than 6'-6" (2.00 m) additional guard-railing posts are required. The posts are attached to the support for guard-railing post which are mounted to the platform girders (see page KLK-21). For bracing of the secondary platform scaffold tubes Ø 1.9" (48.3 mm) are used. They are attached to the bolt on couplers 48/M 14 of the bracket extensions.

The wind bracing is attached to the KLK bracket and to the safety eye which is mounted to the cone of the previous pour or an alternative imbed (Fig. 27.1).

Different pour heights can be achieved by using the bracket extensions in different combinations. For the required length and number of bracket extensions please see table Tab. 32.1 on page KLK-32.

Assembly of wind bracing

The safety eye is attached to the climbing cone by using the bolt M 24 x 80 and two (2) washers M24 (Ref.-No. 62-030-50) (Fig. 28.1).

Attention:
Under no circumstances attach the safety eye "through" an existing tie hole to avoid the accidental loosening of the securing nut on the other side of the wall (Fig. 28.2).

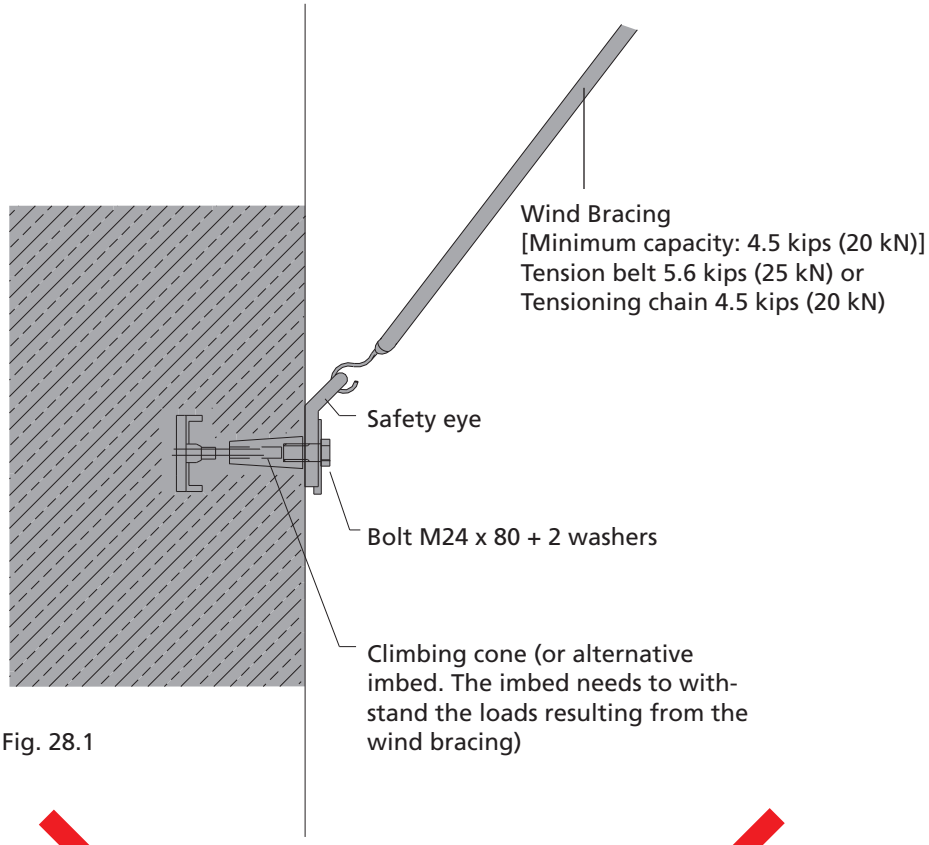

Fig. 28.1

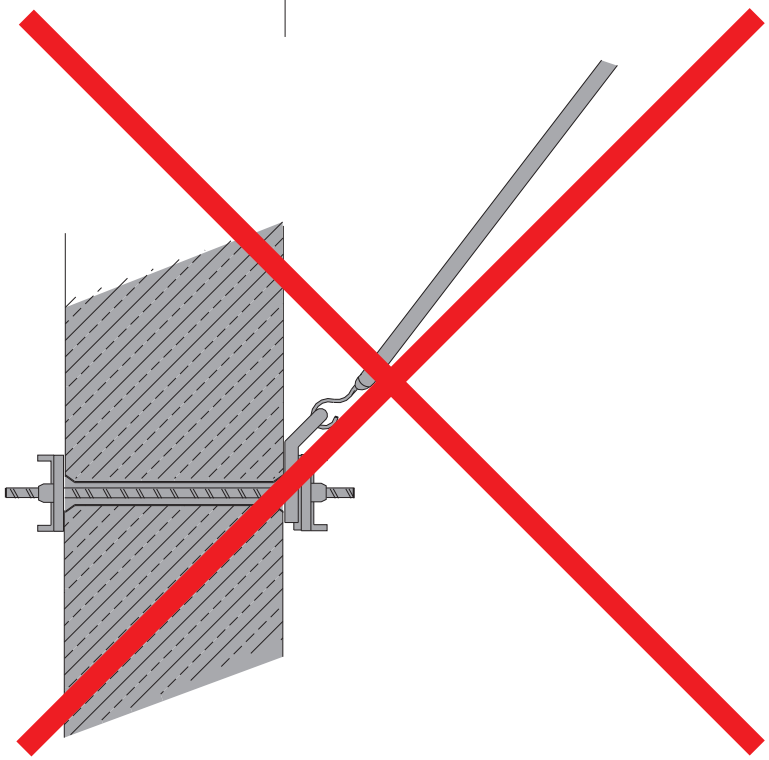

Fig. 28.2

Description	Ref.-No.
Safety eye	**29-412-40**
Tension belt	**29-930-10**
Tensioning chain 20kN	**29-412-10**
Hex bolt M 24 x 80	**63-119-53**
Washer M 24	**62-030-50**
Climbing cone	**29-412-70**

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Assembly of ladder access

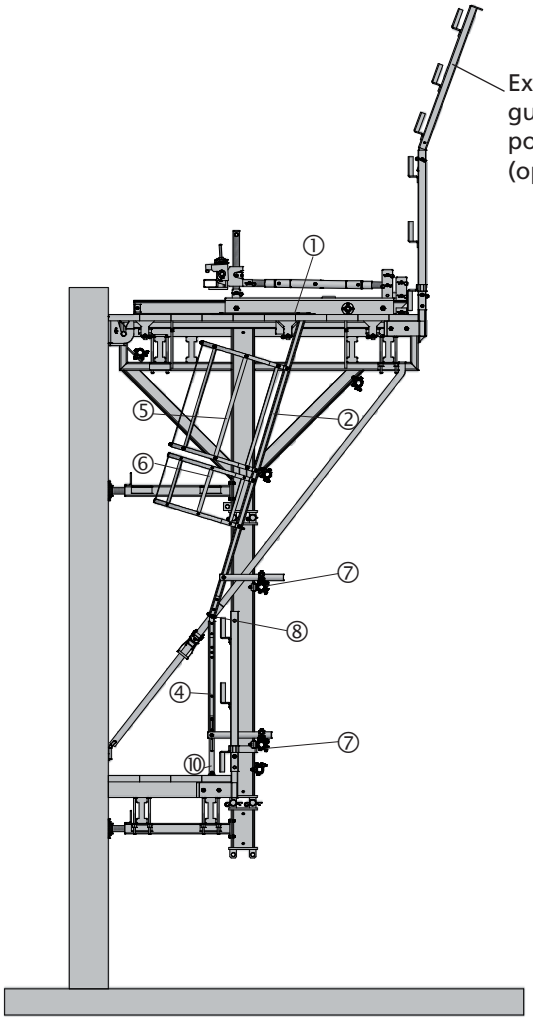

Fig. 29.1

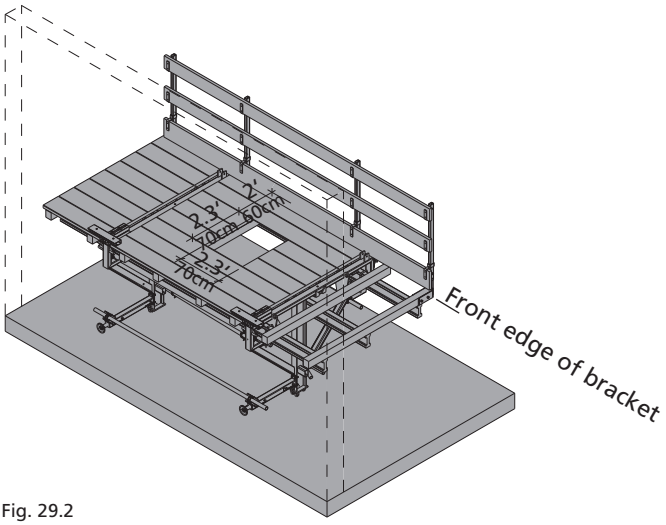

Fig. 29.2

Ladder access KLK, Pour height 9'-6" (2.90 m)

①	Access hatch KLK	29-416-05
②	Ladder 243	29-416-50
④	Extension ladder 90	29-416-60
⑤	Safety cage 85	29-414-90
⑥	Safety cage 40	29-416-90
⑦	Ladder fixture KLK	29-416-65
⑧	Ladder link set KLK	29-416-72
⑩	Ladder base KLK	29-416-70

The ladder access provides a safe access to the secondary platform. We recommend to provide at least two (2) ladder access' per job-site e.g. at the first and at the last platform.

The access hatch is nailed to the planking [2' (60cm) away from the front edge; Fig. 29.2]. Make sure that the planking is tight and there is no gap between planks and frame of access hatch. Also consider that the position of the access hatch does not interfere with the slide carriage.

The ladder is suspended into the hatch frame from below and secured with pins and cotter pins.

If required the ladder can be extended with the ladder link set and extension ladders. The incline of the ladder and the distance to the extension ladder is adjusted by using the ladder fixture.

The safety cages are mounted to the ladders. The required amount of cages depends on the required height.

The extension ladder has to be attached to the scaffold tubes by using the ladder fixture.

To hold the ladder in place the ladder base is screwed to the planking of the secondary platform if it is not possible to attach the ladder fixture in that area. The distance between end of ladder and planking must not exceed 16" (40 cm).

Being on the secondary platform it is easy to remove the suspension shoe and install the wind bracing at this (now available) climbing cone.

For safety reasons we recommend to install a protection net around the ladder access by using quick release belt fasteners.

The access hatch can also be used when the slide carrige and the formwork are slid back.

Tab. 32.1 on page KLK-32 shows all parts required for the ladder access.

Ladder access – Example

Ladder acces KLK, Pour height 15’-5” (4.70 m)

① Access hatch KLK.....29-416-05
② Ladder 243.....29-416-50
③ Extension ladder 210 29-414-60
④ Extension ladder 90 29-416-60
⑤ Safety cage 85 29-414-90
⑥ Safety cage 40 29-416-90
⑦ Ladder fixture KLK.....29-416-65
⑧ Ladder link set KLK 29-416-72
⑩ Ladder base KLK.....29-416-70

To adapt the length of the ladder access to different pour heights the extension ladders can be hooked in the ladders above at any step (Fig. 30.2).

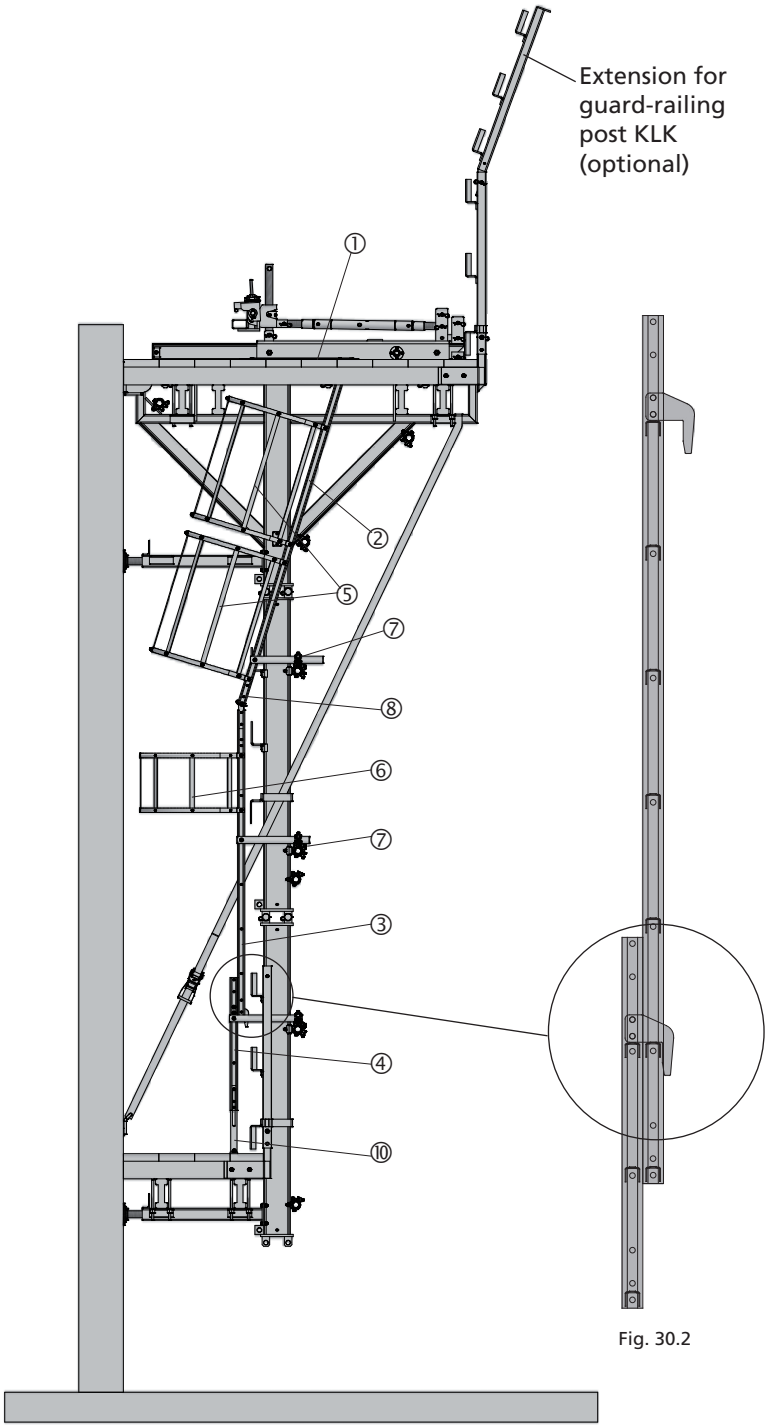

Fig. 30.1

Fig. 30.2

Ladder access – Example

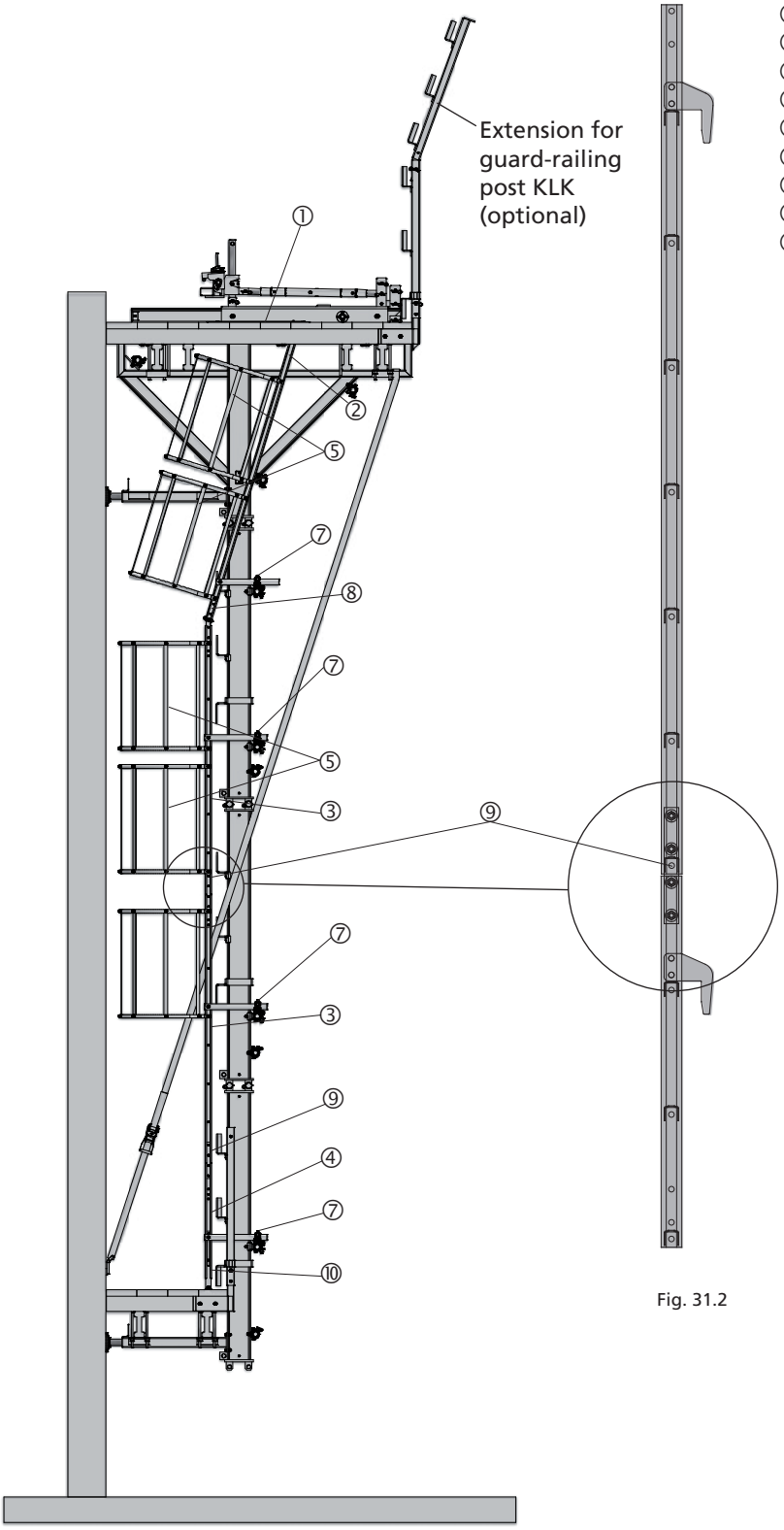

Fig. 31.1

Fig. 31.2

Ladder access KLK, Pour height 22'-8" (6.90 m)

① Access hatch KLK.....29-416-05
② Ladder 243.....29-416-50
③ Extension ladder 210 29-414-60
④ Extension ladder 90 29-416-60
⑤ Safety cage 85 29-414-90
⑦ Ladder fixture KLK.....29-416-65
⑧ Ladder link set KLK 29-416-72
⑨ Ladder connector.....29-414-70
⑩ Ladder base KLK.....29-416-70

Alternatively it is possible to connect extension ladders by using the ladder connector (Fig. 31.2).

Material list

Please see Tab. 32.1 for all required parts to assemble a scaffolding unit which includes secondary platform and ladder access. The chart considers different pour heights from 8' (2.44 m) to 22'-8" (6.90 m).

Material list – Climbing unit (consisting of two (2) brackets) plus secondary platform and ladder access KLK

Ref.-No.	Description	Pour height ft (m)							
		8' (2.44)	up to 9'-6" (2.90)	up to 12'-2" (3.70)	up to 13'-6" (4.10)	up to 15'-5" (4.70)	up to 16'-9" (5.10)	up to 19'-4" (5.90)	up to 22'-8" (6.90)
Climbing unit (consisting of two (2) brackets)									
29-411-00	Climbing bracket KLK 230	2	2	2	2	2	2	2	2
29-411-30	Wall strut	4	4	4	4	4	4	4	4
29-412-23	Scaffold tube 48/200 [1]	4	4	4	4	4	4	4	4
29-412-26	Scaffold tube 48/300 [1]								
29-412-27	Scaffold tube 48/400 [1]								
29-412-52	Swivel-joint coupler 48/48	2	2	2	2	2	2	2	2
29-411-20	Bracket extension 220	2	2	2	2	4	4	4	6
29-411-22	Bracket extension 120	0	0	2	2	0	0	2	0
29-416-40	Bracket extension 40	0	2	0	2	0	2	0	0
Ladder access (per projekt at least two (2) ladder access' are recommended)									
29-416-05	Access hatch KLK	1	1	1	1	1	1	1	1
29-416-50	Ladder 243	1	1	1	1	1	1	1	1
29-416-62	Extension ladder 60	1	0	0	0	0	0	0	0
29-416-60	Extension ladder 90	0	1	2	0	1	0	1	0
29-414-60	Extension ladder 210	0	0	0	1	1	2	2	3
29-416-72	Ladder link set KLK	1	1	1	1	1	1	1	1
29-414-70	Ladder connector	0	0	2	0	0	0	0	0
29-416-70	Ladder base KLK	0	1	1	0	0	1	0	0
29-416-65	Ladder fixture KLK	2	2	2	3	3	3	4	4
29-412-48	Swivel-tube coupler 48	4	4	4	6	8	8	8	8
29-412-23	Scaffold tube 48/200 [1]	2	2	2	3	4	4	4	4
29-412-26	Scaffold tube 48/300 [1]								
29-412-27	Scaffold tube 48/400 [1]								
29-414-90	Safety cage 85	1	1	2	2	2	3	4	5
29-416-90	Safety cage 40	1	1	0	0	1	1	0	0

Tab. 32.1

[1] Length of scaffold tubes depends on distance between brackets

In the material list **not** included:

- Configuration depending on type of application (slide carriage, formwork clamping fixture KLK, formwork support KLK) (see pages KLK-6 - 8)
- Longitudinal girder, platform girder (if required) and planking (see pages KLK-17 - 20)
- Extension for guard-railing post (if required), formwork and formwork accessories (see pages KLK-21 - 24)
- Additional guard-railing posts, required if the distance between two brackets is wider than 6'-6" (2.0 m) (see page KLK-21)
- Anchoring (anchor plate, climbing cone, conical sleeve, positioning disc, suspension screw, washer, suspension shoe) (see pages KLK-12 - 13)
- Wind-Bracing

Transport spreader KLK

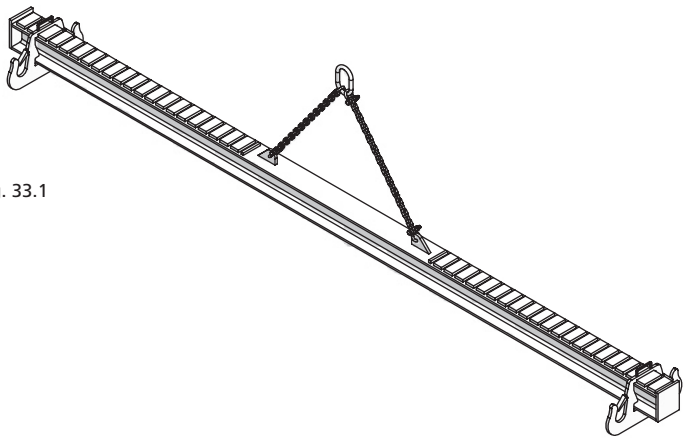

Fig. 33.1

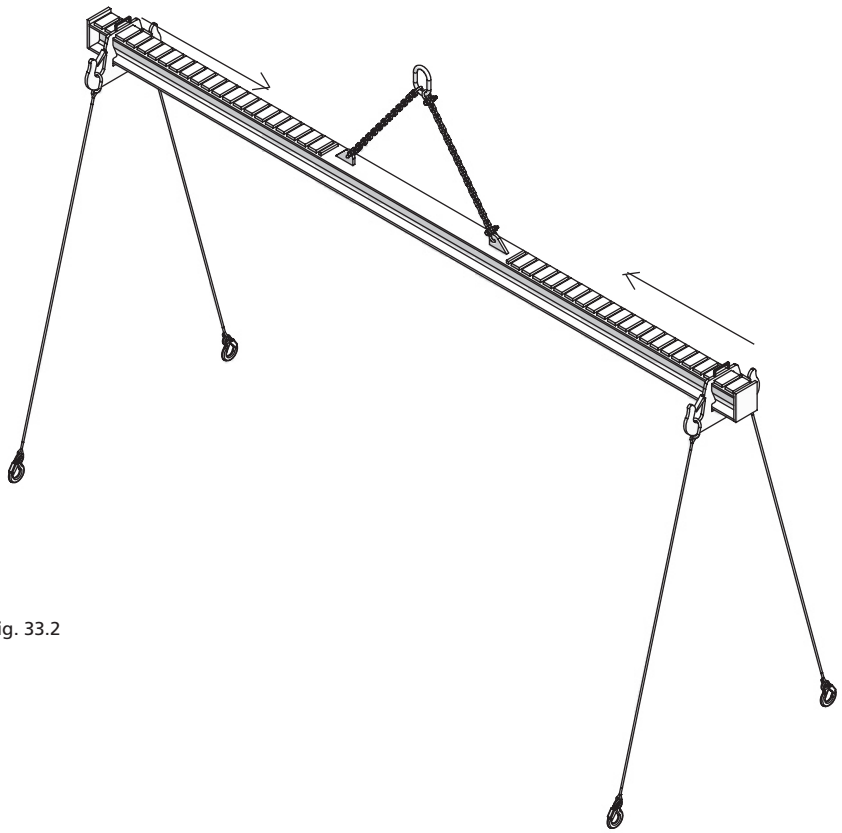

Fig. 33.2

The transport spreader (Fig. 33.1) is recommended when KLK units with slide carriage are used. To avoid interfering of crane slings with the formwork panel, tilt back formwork by using the formwork clamping fixture. Make sure that the working platform of the wall formwork has an opening to be able to pass through the crane rope (see also pages KLK-36 and KLK-37).

Attention:
Position suspension points of transport spreader KLK perpendicular above pick points of the KLK brackets.
The adjustment range of the spreader:
7'-8 1/2" to 19'-8 1/4" (235 cm to 600 cm) (Fig. 33.2).

Capacities:

Beam of transport spreader: 11,000 lbs
Safety factor 4:1

Chain (length = 23'): 8,800 lbs
Safety factor 4:1

Description	Ref.-No.
Transport-spreader KLK.....	**29-412-45**
Chain for transport-spreader KLK.....	**29-412-42**

Moving of KLK units – without slide carriage

Pages KLK-34 and -35 describe the moving of KLK units when the formwork support KLK or the formwork clamping fixture is used.

Attention
The use of the formwork support KLK or the formwork clamping fixture requires the formwork and the KLK platform to be lifted and transported separately!

- The person who attaches the crane sling to the KLK unit must be secured to the building (lifeline, lanyard or the like, personal protective equipment).
- When using our products the federal, state and local codes and regulations must be observed.
- All personnel must be OFF the platform when moving units by crane. Make sure to remove all loose objects (such as concrete remnants, tools, materials, etc.).

Moving of formwork
1. Attach crane hooks (always two (2) per gang) to wall formwork panels.
Make sure not to exceed the max. load capacity of the crane hooks.
Please observe **T**echnical **I**nstruction **M**anual of wall formwork system that is used

2. After formwork panels are secured by the crane hooks and crane slings, loose assembly locks, when using the formwork support or open the claws of the formwork clamping fixture and detach braces.

3. Crane gang formwork (Fig. 34.1)

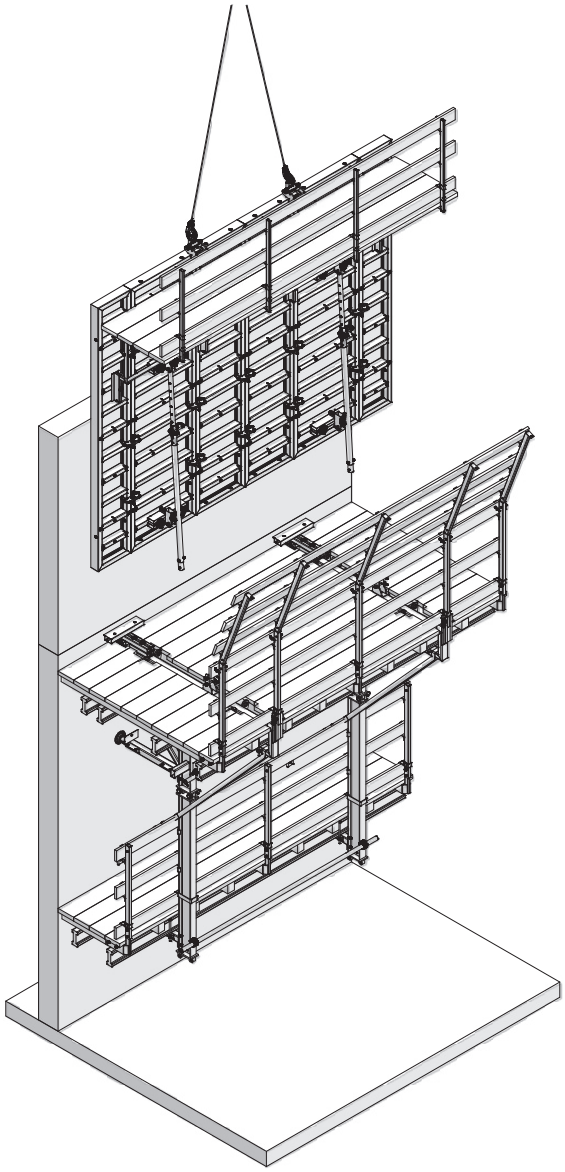

Fig. 34.1 with formwork support KLK

Moving of KLK units – without slide carriage

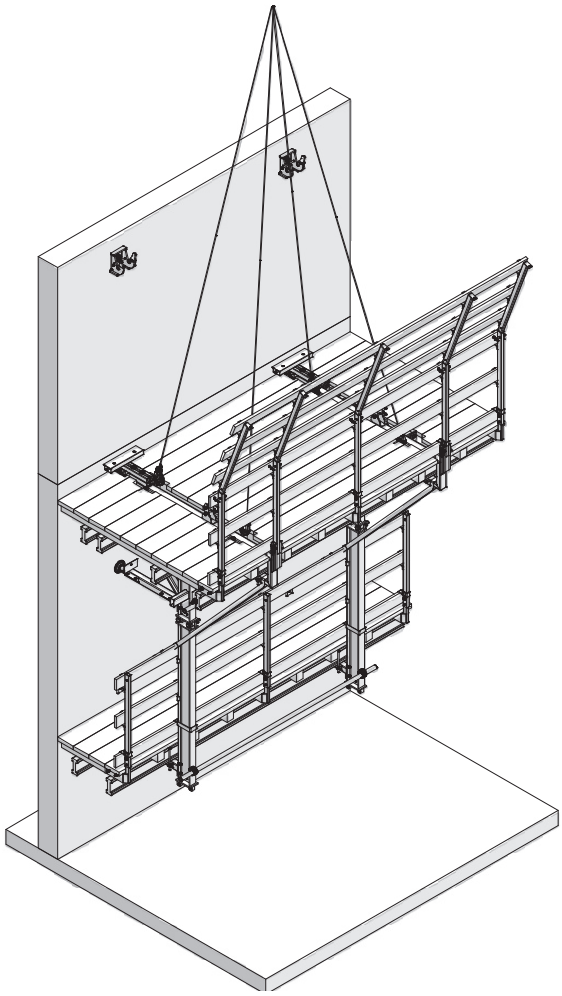

Fig. 35.1 with formwork support KLK

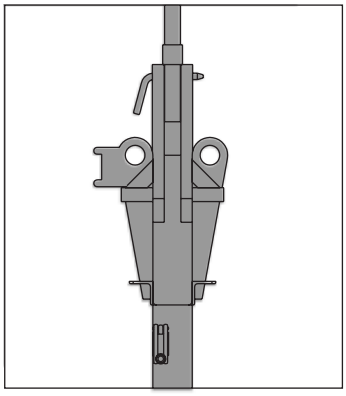

Fig. 35.2 KLK crane eyes

Moving of KLK units when using the formwork support KLK or the formwork clamping fixture

1. Attach crane slings to the crane eyes of the KLK climbing brackets (Fig. 35.1 and 35.2).

2. Detach wind bracing.

3. Detach safety pin of suspension shoe

4. Move platform unit to the next cycle.

5. Secure platform unit with safety pin at the suspension shoe of the next cycle.

6. Attach safety eye to the climbing cone of the previous pour. Thighten wind bracing (tension belt).

7. Unhook crane slings.

8. Continue with other KLK units.

9. Attach formwork and braces at KLK brackets.

Important
Free standing climbing scaffolds have to be equipped with a side railing at their sides.

Moving of KLK units – with slide carriage

The use of the formwork clamping fixture KLK and the slide carriage allows to move formwork and platform as one unit.

- The person who attaches the crane sling to the KLK unit must be secured to the building (lifeline, lanyard or the like, personal protective equipment).
- When using our products the federal, state and local codes and regulations must be observed.
- All personnel must be OFF the platform when moving units by crane. Make sure to remove all loose objects (such as concrete remnants, tools, materials, etc.).

Make sure that the working platform of the wall formwork has an opening to be able to pass through the crane rope (Fig. 36.2).

The suspension shoes for the next pour have to be istalled before the unit is moved.
When moving the unit the slide carriage has to be slid back and secured by the wedge which is located at the side of the carriage. We recommend to tilt back the formwork to avoid the crane rope interfering with the formwork facing.

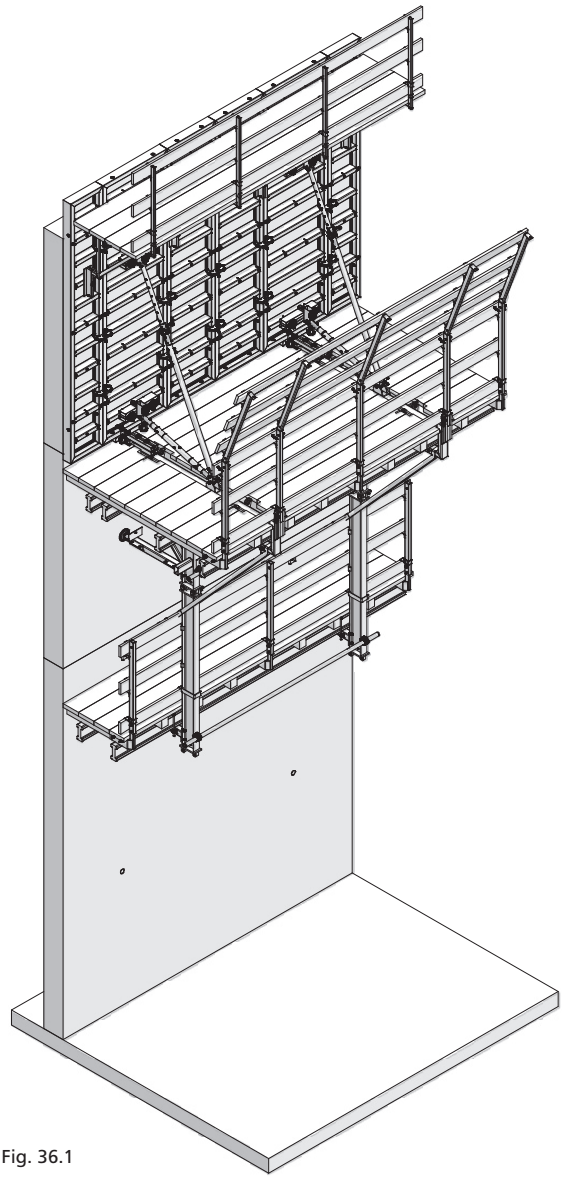

Fig. 36.1

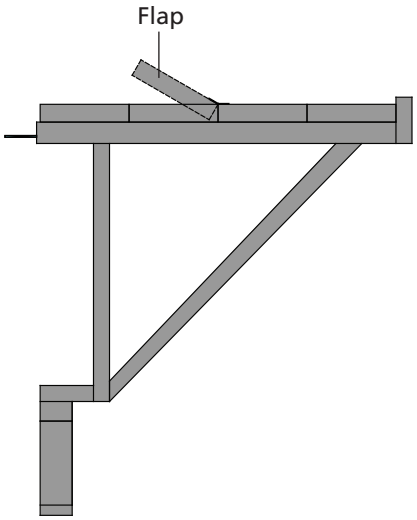

Fig. 36.2

Moving of KLK units – with slide carriage

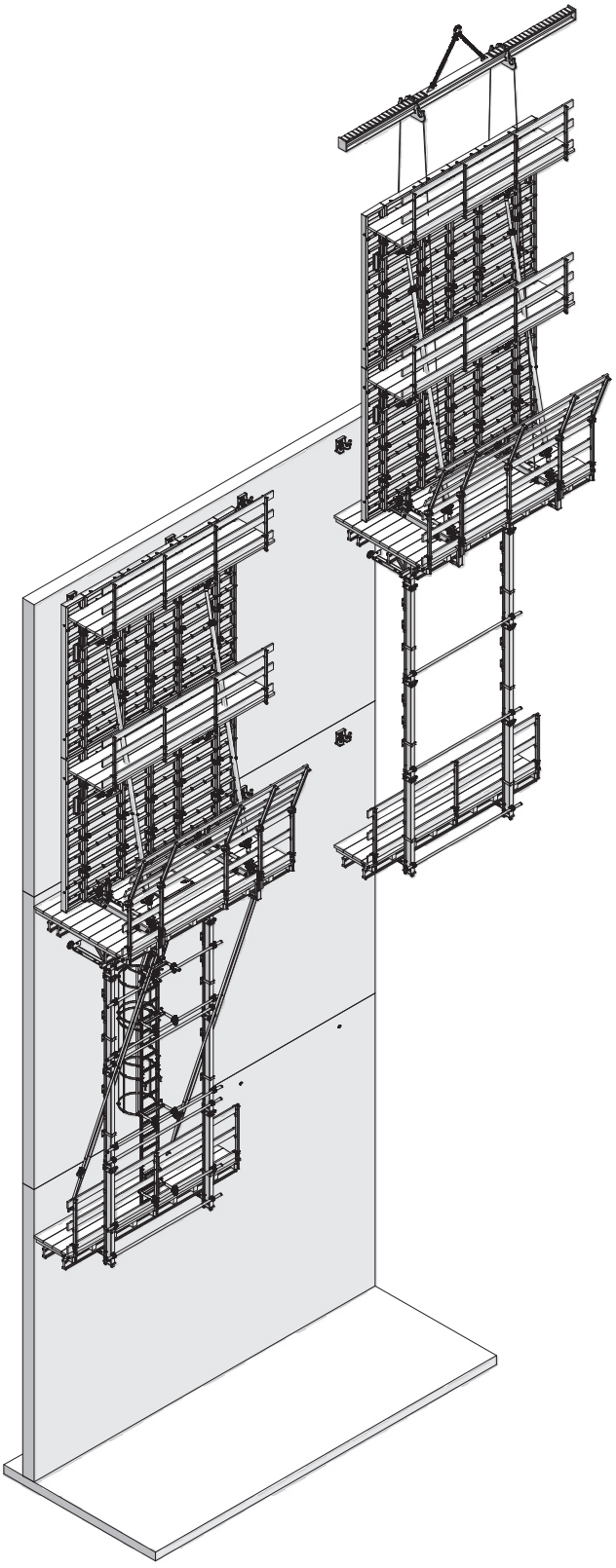

Fig. 37.1

Moving of KLK units

1. Attach crane slings at the crane eyes of the KLK bracket (Fig. 37.1).
We recommend the use of the transport spreader (see page KLK-33). The crane ropes have to be as long as it is required to have the transport spreader in the center of gravity of the KLK unit and to have two strings in front of the formwork and two behind it.

2. Detach wind bracing.

3. Detach safety pin of suspension shoe

4. Move platform unit to the next cycle.

5. Secure platform unit with safety pin at the suspension shoe of the next cycle.

6. Attach safety eye to the climbing cone of the previous pour. Thighten wind bracing (tension belt).

7. Unhook crane slings.

8. Continue with other KLK units.

Important
Free standing climbing scaffolds have to be equipped with a side railing at their sides.

Single-sided climbing

The KLK can also be used for single sided applications (Fig. 38.1).

For a detailed solution please contact our experts of the technical department.

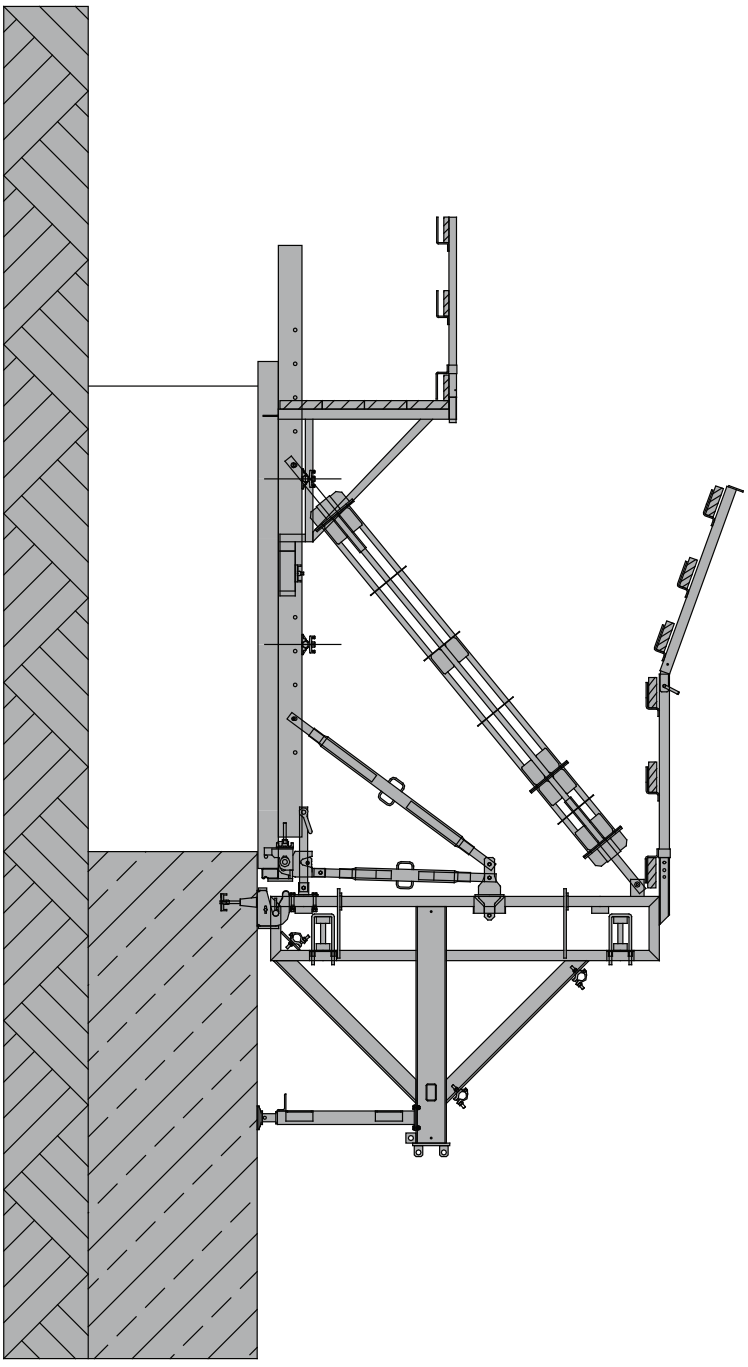

Fig. 38.1

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Shaft platform

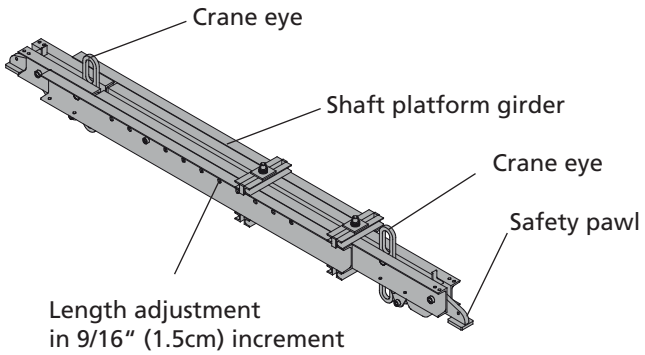

Fig. 39.1

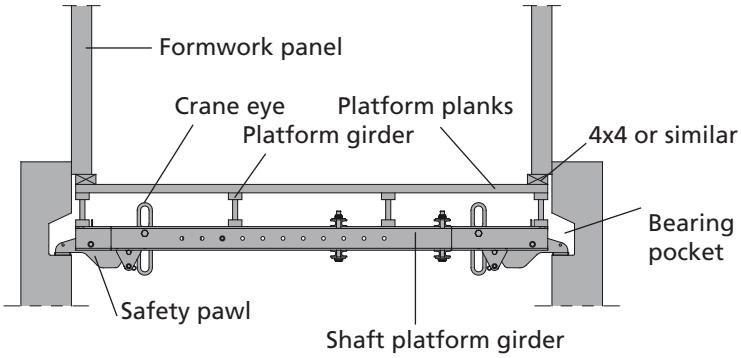

Fig. 39.2

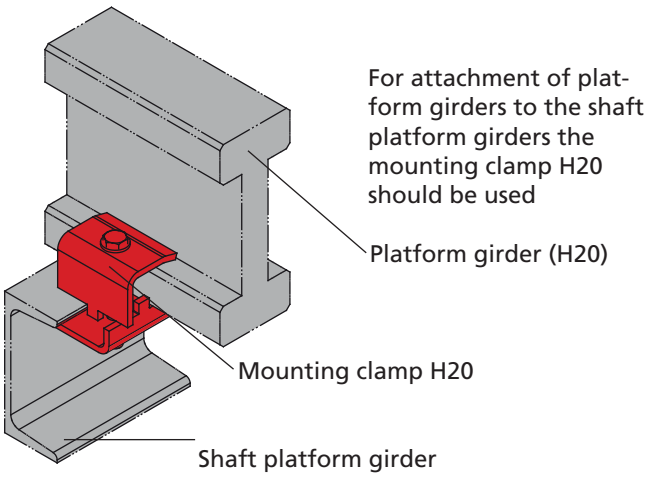

Fig. 39.3

Shaft platforms are used in elevator shafts, stairways or other shaft structures where little to no room exists for conventional shoring.

There are six (6) different shaft platform girders available. The minimum shaft length is 4'-7" (1.41 m), the maximum is 19' (5.78 m).

The shaft platform girders (Fig. 39.1) are adjustable in increments of 9/16" (1.5 cm).

A shaft platform needs at least two (2) shaft platform girders, platform girders (wood, aluminum or steel) and a platform [made of planks at least 2" (5 cm) thick].

The wall formwork is placed on top of the platform (Fig. 39.2).

The shaft platform girder is placed in the bearing pocket (Fig. 39.2) which is cast in place during the wall pour.

Description	Ref.-No.
Shaft platform girder 4840-5830 15'-10" to 19'-2"	**29-150-70**
3850 - 4840 12'-7" to 15'-10"	**29-150-60**
2850 - 3840 9'-4" to 12'-7"	**29-150-50**
2390 - 2860 7'-10" to 9'-4"	**29-150-40**
1930 - 2400 6'-4" to 7'-10 1/2"	**29-150-30**
1460 - 1930 4'-9 1/2" to 6'-4"	**29-150-20**
Bearing pocket	**29-151-80**
Mounting clamp H20	**29-411-62**

Shaft platform

The installation dimensions of the bearing pocket (Fig. 40.2) depend on the height of the chosen platform girder (here a wooden girder H20), on the thickness of the planks and the thickness of the square timber (Fig. 40.1).

If other platform girders (aluminum or steel) are used the installation dimensions might change.

The minimum concrete strength must be 2175 psi (15 N/mm²) .

The platform girders should not be placed in the swing range of the safety pawl (see Fig. KLK-41.3).

Make sure that the safety pawl has a minimum bearing of 3" (7.5 cm).

When lifting the platform the safety pawl swings up and automatically resets itself at the next bearing pocket.

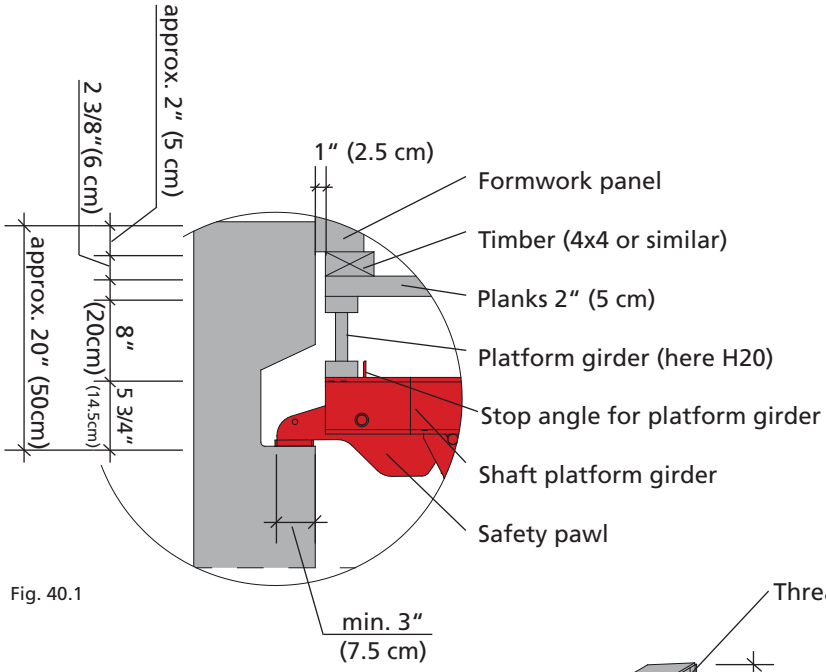

Fig. 40.1

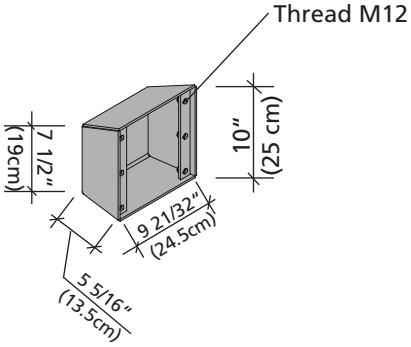

Fig. 40.2 Bearing pocket

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Shaft platform

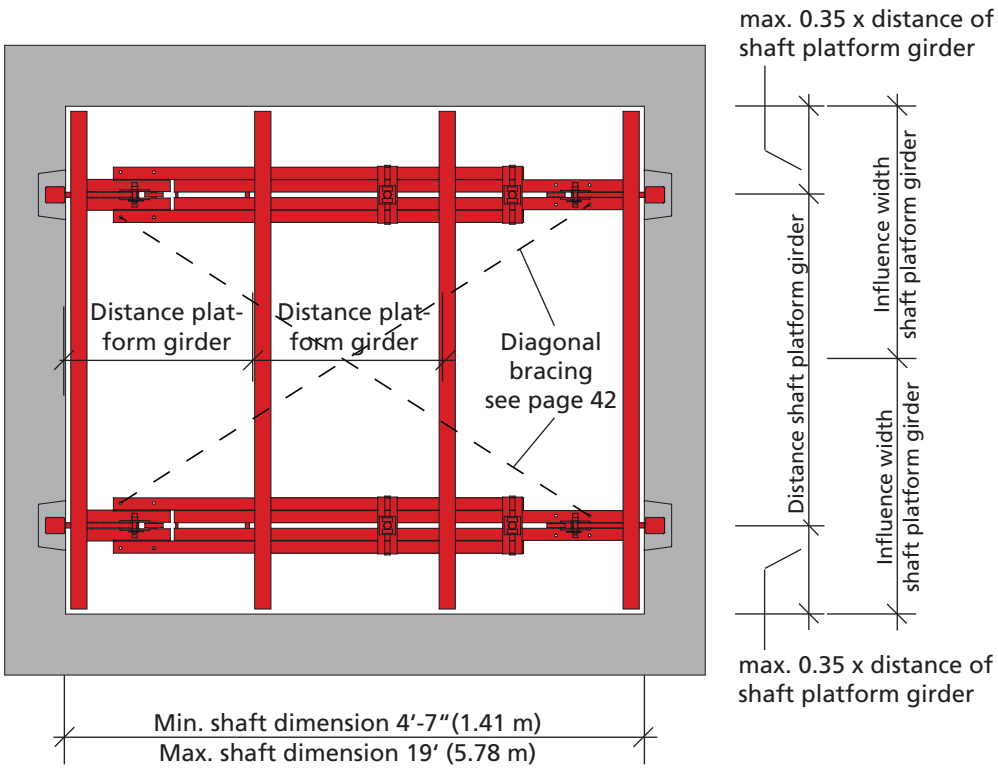

Fig. 41.1

Ref.-No.	Pour height 14' (4.25 m) Shaft platform girder (SPG)	Influence width ft (m)
29-150-20	SPG 1460 - 1930 (4'-9 1/2" to 6'-4")	10' (3.00m)
29-150-30	SPG 1930 - 2400 (6'-4" to 7'-10 1/2")	10' (3.00m)
29-150-40	SPG 2390 - 2860 (7'-10" to 9'-4")	10' (3.00m)
29-150-50	SPG 2850 - 3840 (9'-4" to 12'-7")	10' (3.00m)
29-150-60	SPG 3850 - 4840 (12'-7" to 15'-10")	5'-9" (1.75m)
29-150-70	SPG 4840 - 5830 (15'-10" to 19'-2")	5' (1.50m)

Tab. 41.2

For pour heights other than 14' (4.25 m) please contact the experts in our technical department.

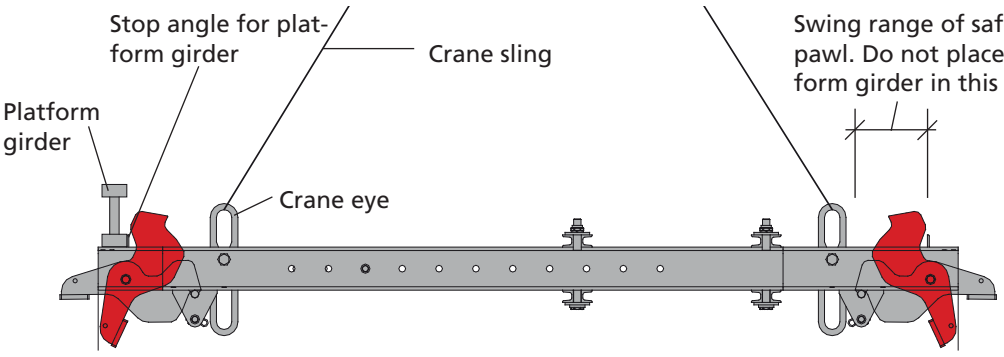

Fig. 41.3

Six (6) different shaft platform girders are available to handle shafts with a min. dimension of 4'-7" (1.41 m) and a max. dimension of 19' (5.78 m) (Fig. 41.1).

For the max. influence width per shaft platform girder at a pour height of 14' (4.25 m) please see table 41.2. The influence widths are based on a symmetrical platform layout and a max. working load of 42.0 psf (2.0 kN/m²).

The distance between the platform girders depends on the kind of girder (wood, steel or aluminum) and the planking. Additional structural analysis may be required.

The minimum concrete strength must be 2175 psi (15 N/mm²).

A crane sling must be attached at each crane eye of each shaft platform girder when moving the platform (Fig. 41.1).

Make sure to leave an opening in the planking to have access to crane eyes.

When lifting the platform the safety pawl swings up and automatically resets itself at the next bearing pocket.
Do not place a platform girder in the swing range of the safety pawl (Fig. 41.3).

Shaft platform

There are two possibilities to brace the shaft platform girders.

Option 1: Bracing with scaffold tubes (Fig. 42.1, 42.2 and 42.5).
The length of the vertical scaffold tubes has to match the distance between the shaft plaform girders. The scaffold tubes are attached to the flange of the shaft platform girder by using bolt-on couplers (two (2) per scaffold tube). The vertical scaffold tubes are connected with a diagonal scaffold tube by using two (2) swivel joint couplers.

Option 2: Bracing with threaded rods (Fig. 42.3, 42.4 and 42.6).
Two (2) L-shaped steel angles are necessary to attach the threaded rods and to assure the distance between the shaft platform girders. For the diagonal bracing two (2) threaded rods LH, two (2) threaded rods RH as well as two (2) turnbuckle nuts are required.

Description	Ref.-No.
Scaffold tubes	
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**
Rohr je lfm	**29-412-29**
Threaded rods	
60 LH	**29-009-10**
70 LH	**29-009-15**
80 LH	**29-009-20**
130 RH	**29-009-40**
180 RH	**29-009-50**
230 RH	**29-009-60**
280 RH	**29-009-70**
Bolt-on coupler	
48/M14	**40-080-70**
Swivel joint coupler	
48/48	**29-412-52**
Turnbuckle nut	**29-009-95**
Washer (wedge) 18	**62-030-43**

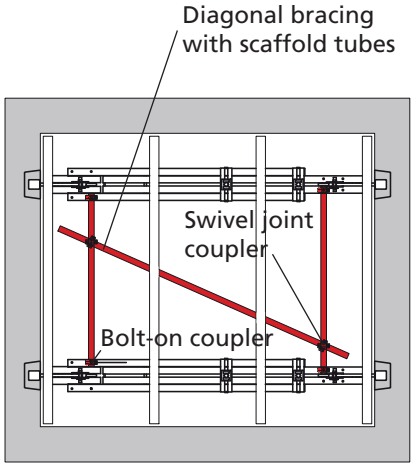

Fig. 42.1

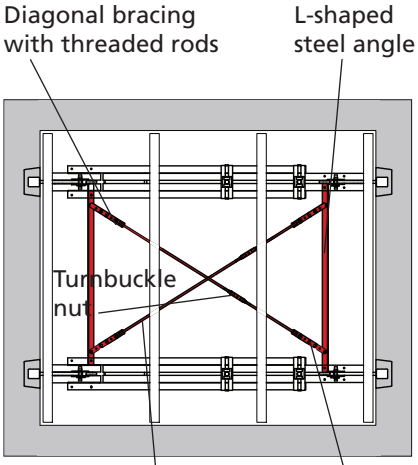

Fig. 42.3

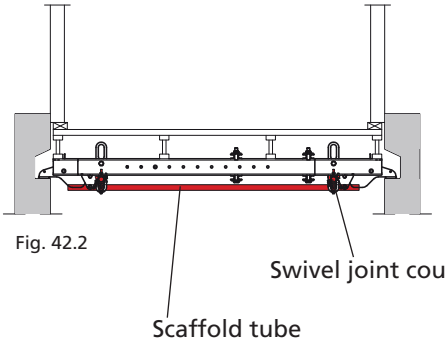

Fig. 42.2

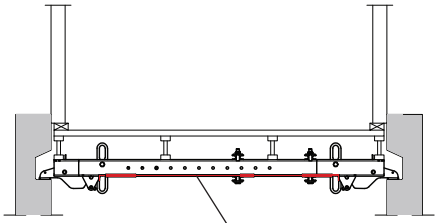

Fig. 42.4

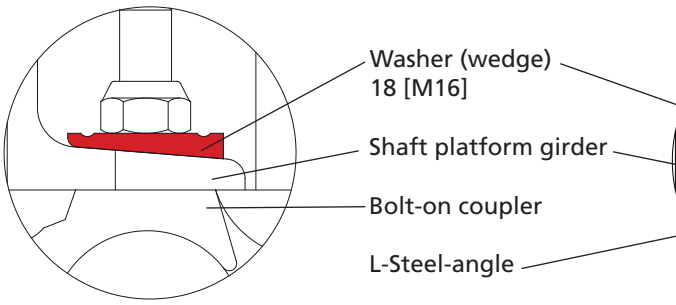

Fig. 42.5 Detail / Attachment of bolt-on coupler

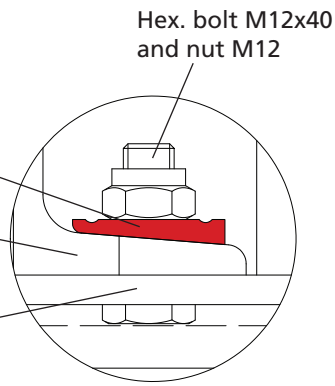

Fig. 42.6 Detail / Attachment of L-shaped steel-angle

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Notes

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