SUPER 65
FAÇADE SCAFFOLDING SYSTEM

INSTRUCTIONS FOR
ASSEMBLY AND USE (AVA)
-VN-1.1

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AVA FAÇADE SCAFFOLDING SYSTEM
SUPER 65 | 2020-07-EN

SUPER 65

SUPER 65
INSTRUCTIONS FOR ASSEMBLY AND USE

Scaffold system:	RUX rapid-erection scaffolding SUPER 65 Working and protective scaffold of load class 3 DIN EN 12810 / DIN EN 12811
Manufacturer:	RUX GmbH, Hagen
Approval:	Z-8.1-185.1 dated 3 January 2016
Classification:	Scaffolding EN 12810-3D-SW06/300 -H2-B-LS
Load-bearing capacity:	3.00 kN/m²
Scaffold bay length:	maximum 3.00 m

LIST OF CONTENTS

1 Preliminary remarks

1.1 These Instructions for Assembly and Use are valid for the erection, modification and dismantling of the SUPER 65 scaffolding system and its use is exclusively aimed at professionals.

1.2 The scaffolding system SUPER 65 has general type approval on the basis of the approval No. Z-8.1-185.1 dated 3 January 2016.

1.3 The standard design detailed in these Instructions corresponds to the approval No. Z-8.1-185.1 dated 3 January 2016. It is described in section 9.2 of these Instructions. The approval shall apply in the event of any doubt. Other details can be taken from the approval mentioned above.

1.4 The technical solutions described in these Instructions for Assembly and Use shall not be deemed as excluding any other technically-proven and equally-suitable solutions.

1.5 Besides the rules contained in these Instructions, the general regulations pertaining to the scaffolding trade and to users of the scaffolds are to be observed, for example:
- General type approval No. Z-8.1-185.1 dated 3 January 2016
- DIN EN 12811-1: Temporary Structures for Buildings - Part 1: Working Scaffolds
- DIN 4420-1: Working and Protective Scaffolds - Part 1: Protective Scaffolds
- The Occupational Health and Safety Act (ArbSchG)
- Industrial Safety Regulation (BetrSichV) in its currently valid version
- Accident Prevention Requirement "Construction Work" (BGV C22)
- Technical Rules for Operational Safety (TRBS 1111, 2121)
- Instruction Manual for Handling Working and Protective Scaffolds (DGUV Information 201-011, formerly BGI/GUV-I 663)
- Scaffolding Work (DGUV Information 201-047, formerly BGI 5101)
- Technical Regulations for Scaffolding – Stand Framing as Facade or Modular System out of Prefabricated Components (FRG 1)
- Common Guidelines for the Provision of Working and Protective Scaffolds (Publisher: Union Europäischer Gerüstbaubetriebe e.V.)

1.6 These Instructions only apply in conjunction with the use of original SUPER 65 components that are marked in accordance with approval Z-8.1-185.1 dated 3 January 2016 and which are indicated in the component part list in section 9.1.

1.7 The component parts of SUPER 65 may not be modified.

1.8 Scaffold components have to be adequately and responsibly checked for damage by the scaffolder/scaffold builder prior to erecting. Damaged components may not be used.

1.9 Persons may not access the scaffolding if they have not clearly satisfied the requirements of the medical check-up (G41 – working at heights with a risk of falling).

1.10 The publisher of these Instructions for Assembly and Use is:

RUX GmbH, Neue Straße 7, D-58135 Hagen
Telephone: 02331 - 4709 – 0, Fax: 02331 - 4709 – 202
Email: info@scafom-rux.de

Subject to technical modifications and revision. In the case of any omissions or doubt, the respective provisions valid at any one time are to be consulted.

2 General

2.1 The SUPER 65 scaffolding system is approved as a working and protective scaffold of load class 3 according to DIN EN 12811-1:2004-3.

Table 1: Classification

Classification	Load class	Bay length	Load capacity
Scaffold EN 12810 - 3D - SW06/300 - H2 - B - LS	3	≤ 3.0 m	2.0 kN/m²

2.2 The stability as well as the usability shall be deemed as verified and evidenced for the standard design described in these Instructions on account of the general type approval issued by the DIBt. Any deviations to this standard design are permissible when, in individual cases, the stability and usability are evidenced in writing in line with the technical building requirements and the findings detailed in the approval Z-8.1-185.1 from 3 January 2016.

2.3 The stability may also be evidenced with the help of measurement tables or calculation aids which have been prepared on the basis of the technical building requirements.

2.4 Deviations to these Instructions are possible when, in individual cases, the safety of the erecting processes has been verified in writing (for example: against falling, stability in intermediate states).

2.5 The erecting, modification and dismantling of the system scaffolding may only be carried out under the supervision of a qualified person (supervising official) by suitably qualified staff after having been instructed specifically on the site itself and on the results of the risk assessment.

Qualified staff may be master scaffolders, persons successfully qualified as scaffolders, certified senior scaffold fitters, certified scaffold group leaders, people with comparable expertise and construction trade training as well as adequate practical professional experience in the scaffolding business.

2.6 These Instructions for Assembly and Use and the above-mentioned approval have to be available on the site for the supervising official and the staff throughout the entire erection and disassembly process.

2.7 The erection and disassembly of the scaffolding may only take place below wind force 5. When a higher wind force is experienced, the scaffolding is to be immediately secured and cleared. By way of orientation: there is a noticeable restriction that is felt when simply walking when the wind force is above 6.

2.8 Excerpt from the Industrial Safety Regulation: "The employer shall assess the risk (risk assessment) before using any working equipment and derive any necessary and suitable protective measures from it."

Depending upon the complexity, a plan will need to be prepared for the erection, modification and disassembly work (assembly instructions) by the contractor responsible for the erection and the scaffolding work or have this prepared by a designated qualified person. In this respect these Instructions for Assembly and Use may be supplemented by detailed information pertaining to the respective implementation.

2.9 Unfinished scaffolds or scaffold areas have to be marked with warning signs clearly stating that "Unauthorised access is prohibited". Access to such areas will need to be appropriately blocked off.

2.10 After completion, the scaffolder/scaffold builder has to have the scaffold checked for the correct build and secure function. This inspection has to be carried out by a qualified person and may be conducted by the supervising official.

2.11 After completion and testing, the scaffolding will need to be marked. This marking has to include details about the scaffolder/scaffold builder, the type of scaffolding and the load and width classes and should also contain general safety instructions. Such marking is to be located at a clearly visible position on the scaffold e.g. at the access points to the ascents.

2.12 When the scaffold builder/scaffolding company is convinced of the proper and orderly condition of the scaffold, it may then be passed over to the user. It is recommended that the transfer is carried out together with the user and documented e.g. in an inspection report.

2.13 The results of the inspection are to be documented in an inspection report and kept for a reasonable period – generally 3 months after the scaffold has been disassembled again.

2.14 During the entire period of use of the scaffold, these Instructions for Assembly and Use have to be available on site to the user.

2.15 Please contact the publisher if you have any queries about these Instructions, assembly procedures or the risk assessment:

RUX GmbH, Neue Straße 7, 58135 Hagen
Telephone: 02331 - 4709 - 0 Fax: 02331 - 4709 - 202
Email: info@scafom-rux.de

3 General requirements

Scaffolding components must be visually inspected for damage before fitting. Damaged scaffold components may not be used.

The scaffold is to be erected in the sequence indicated in the following sections.

During erection, the stability of the scaffolding must always be guaranteed - even in intermediate states.

Personal protective equipment must be worn during all assembly work. This includes suitable clothing, safety shoes, gloves and safety helmet with chin strap as per EN 397. Depending on requirements, additional gear such as safety goggles, ear protection, safety vest or other personal protective equipment may need to be used.

See sections 4.4.2 to 4.4.5. for the use of personal protective equipment (PSAgA) against falls from a height.

4 Assembling the scaffolding

4.1 Determining the intended installation points

Before the actual assembly work begins, the intended installation points need to be determined on site in accordance with the site-specific installation plan.

The gap between the decking and the wall to be scaffolded is – depending on the work to be carried out – to be kept as small as possible and may only have a maximum width of 30 cm (see also section 4.4.2). If this gap cannot be maintained locally and the fall height is greater than 2 m, three-part side protection (principal guardrail, intermediate guardrail and toe board) has also to be fitted on the inside of the scaffold.

4.2 Erecting the first scaffold bay

The erection of the scaffold is to commence with a scaffold bay in which vertical diagonals have been envisaged.

In the standard design described here, vertical diagonals may only be installed in scaffold bays that are at least 2.00 m long.

4.2.1 LOAD-DISTRIBUTING BASE STRUCTURE

The scaffolding may only be erected on sufficiently firm ground capable of bearing loads.

The ground is generally seen as capable of load-bearing if a car can be driven over it without leaving tracks: for example, on paved, asphalted or concreted and, generally-speaking, on gravelled areas.

If the ground is not of sufficiently load-bearing nature, load-distributing base structures will need to be used (see Figure 1).

Figure 1: Load-distributing base structure with scaffold planks

On inclined ground, the base structure has to be designed in such a way that it is reliably secured against slippage and that a horizontal support surface for the scaffold is created (for example by installing wedges). For inclinations of more than 5°, local load transmission will need to be verified and, if necessary, suitable measures taken to provide the required degree of safety.

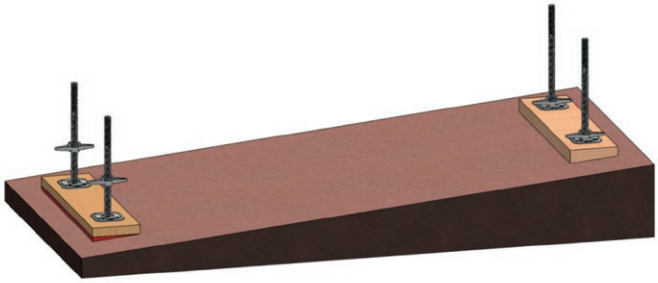


Figure 2: Load-distributing base structure on an inclined surface

An inclination of 5° corresponds to an inclination of 8.5%, which means a difference of 8.5 cm in height over a 100-cm length.

4.2.2 BASE JACKS, BASE TRANSOMS, DECKING TRANSOMS

At the pre-determined positions for the vertical frames, two base jacks are to be placed in pairs at the centre of the base structure (see Figure 1) and screwed out to the desired extension length: Extension length of the base jacks = lower edge of base plate to lower edge of vertical frame.

For the standard design described here, the permissible extension length of the base jacks is:
30.0 cm for scaffolding with passage frame
35.0 cm for all others configurations

For longer extension lengths, the stability of the scaffolding must be verified for each individual case.

Base jacks must always have full-surface contact with the supporting surface. In scaffold bays where vertical diagonals are envisaged, base or decking transoms are to be placed on the spindles (see Figure 3).

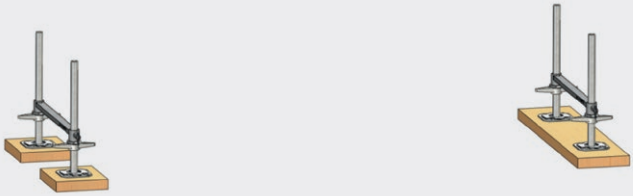


Figure 3: Base jacks with base or decking transoms

When installing a transom, ensure that the gravity pin is in the correct position!

In scaffolding bays where ladder access is envisaged, decking transoms are to be fitted on the spindles (see Figure 4). System decks are then placed on these transoms (see Section 4.2.8).

Figure 4: System decks on decking transoms

These system decks can no longer be fitted after the lowermost vertical frames have been installed in this bay.

4.2.3 HEIGHT COMPENSATION

If the ground has different heights at the various erection points or if certain scaffold level heights are to be reached, compensation frames with a height of 0.50 m, 1.00 m or 1.50 m need to be fitted (see Figure 5).

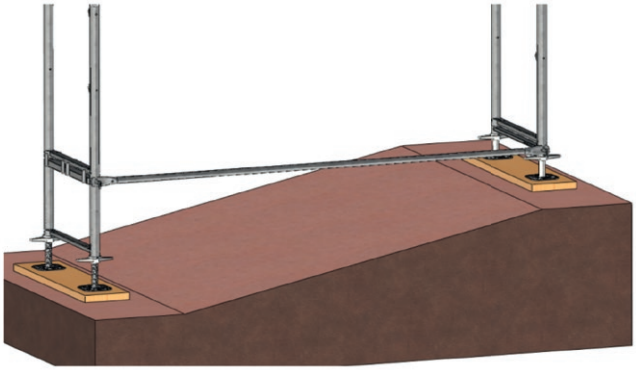


Figure 5: Compensation frame with 0.50 m, 1.00 m or 1.50 m height

Compensation frames may only be fitted directly above the jacks or base transoms.

When vertical diagonals are to be fitted into a bay, a scaffold tube (Ø 48.3 x 3.2) needs to be connected with swivel couplers (see section 5.10) between the compensation frames as a diagonal. In this case, an additional longitudinal ledger needs to be mounted directly above the base jacks (see Figure 5).

4.2.4 VERTICAL FRAMES AND PASSAGE FRAMES

The vertical frames and passage frames are to be placed vertically on the base jacks and secured against toppling over.

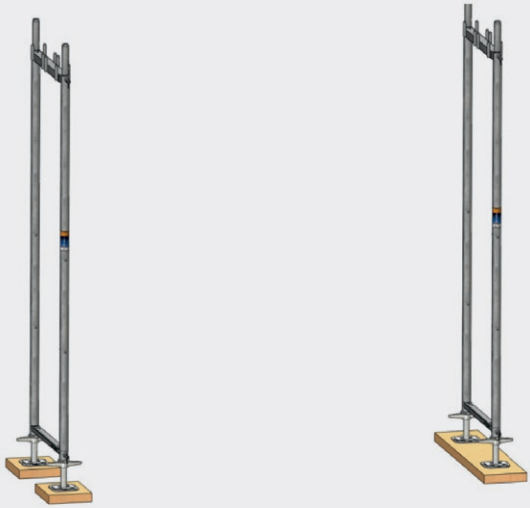


Figure 6: Assembly of the first scaffold bay – vertical frames

4.2.5 LONGITUDINAL LEDGER, PRINCIPAL GUARDRAIL

A longitudinal ledger needs to be fitted on the transoms between the vertical frames (see Figure 7).

Figure 7: Assembly of the first scaffold bay - longitudinal ledger

There are holes at the ends of the longitudinal ledgers, guardrails and diagonals which are pushed over the gravity locks on the vertical frames. The gravity lock pins must then be closed immediately.

Mounting of diagonals:

Figure 8: Open gravity lock

Slide the diagonal over the gravity lock after setting the pin in its horizontal position..

Figure 9: Closed gravity lock

The pin on the gravity lock must hang vertically downwards and the mounted components secured against loosening.

Fitting of gravity lock guardrails:

Figure 10: Open gravity lock

Slide the principal guardrail over the gravity lock after setting the pin in its horizontal position.

Figure 11: Closed gravity lock

The pin on the gravity lock must hang vertically downwards and the mounted components secured against loosening.

Fitting of toggle railings:

Figure 12: Toggle rail insertion and locking *(Figure on right: view from outside)*

Set the locking bolt of the toggle rail in its horizontal position and push through the lug of the guardrail from the decking side and then turn the locking bolt downwards. The locking bolt then has to point downwards in a vertical position and the railing secured against loosening.

Principal and intermediate guardrails have to be fitted so that their flattened ends rest against a vertical scaffolding element for safety purposes when a person is leaning against the principal or intermediate guardrails. Gravity locks are suitable for attaching principal and intermediate guardrails when they point towards the scaffold decking, i.e. the inside of the scaffold. Gravity locks which point towards the outside of the scaffold are not suitable, e.g. diagonal gravity locks. Toggle railings and intermediate guardrails are always to be mounted from the scaffold decking side, i.e. from the inside of the scaffold against the guardrail lugs, not from the outside of the scaffold.

4.2.6 VERTICAL DIAGONALS

A vertical diagonal brace has to be fitted between the vertical frames on the outside of the scaffold (see Figure 13).

There are holes at the ends of the vertical diagonals which fit over the gravity locks of the transoms or vertical frames (see Figures 8 and 9). Diagonals are provided with a double hole at one end. When mounting the diagonals, the outer hole located at the end of the diagonal has to be used. The gravity locks then have to be closed immediately (see section 4.2.5).

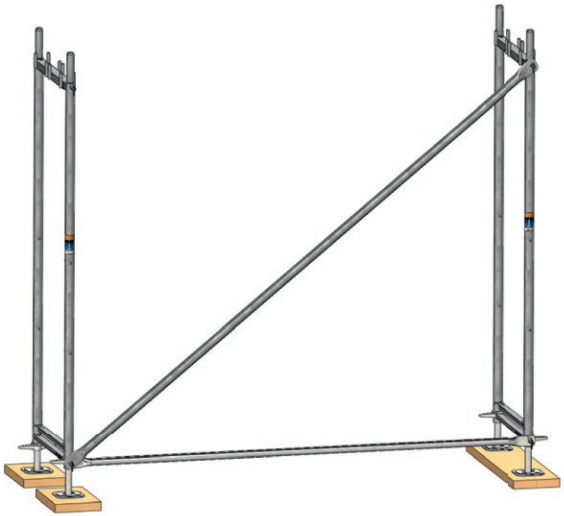


Figure 13: Assembly of the first scaffold bay - vertical diagonal

Some configurations also require vertical diagonal braces on the inside of the scaffold (see section 9.2). In this case, scaffolding tubes (Ø 48.3 x 3.2) are to be used that are connected to the standards of the vertical frames directly at the nodes by means of swivel couplers (see section 5.10).

Triangles are stable - squares for themselves are not!

4.2.7 TRANSVERSE DIAGONALS

Some configurations require transverse diagonals in the lowermost vertical frames (see Figure 14 and section 9.2). In this case, scaffolding tubes (Ø 48.3 x 3.2) are to be used that are connected to the standards of the vertical frames by means of swivel couplers (see section 5.10).

Figure 14: Vertical frame with transverse diagonal

4.2.8 SYSTEM DECKS

Only the system decks mentioned in section 9.1 may be used.

The holes at the ends of the decks are passed over the pins on the decking ledgers of the vertical frames, brackets, transoms or similar and the decks are then fitted.

Figure 15: System decks hooked onto the pins

The number of decks to be fitted in each bay is indicated in the following tables.

Table 2: Decking elements

Decking element	Approval, Annex A, Page	Number per scaffolding bay	Width	Load class		
				≤ 2.0 m	2.5 m	3.0 m
Wooden plank	10	2	0.29 m	≤ 5	≤ 4	≤ 3
Profiled wooden plank	12	2	0.29 m	≤ 5	≤ 5	≤ 4
Aluminium deck	14	2	0.29 m	≤ 6	≤ 6	≤ 5
Aluminium floor panel	15	1	0.59 m	≤ 5	≤ 5	≤ 4
Steel deck	16	2	0.29 m	≤ 6	≤ 5	≤ 4
Aluminium deck	65	2	0.29 m	≤ 6	≤ 6	≤ 5
Solid wood plank, 45 mm	81	2	0.29 m	≤ 4	≤ 3	---
Solid wood plank, 48 mm	82	2	0.29 m	≤ 5	≤ 4	≤ 3
Aluminium deck, 45 mm	83	2	0.29 m	≤ 6	≤ 4	≤ 3

The decking reinforces the scaffolding parallel and at right angles to the facade. Each scaffolding level needs to be fully covered with decking.

In scaffold bays where ladder access is envisaged, the following ladder frames will need to be used:

Table 3: Ladder frames

Decking element	Approval, Annex A, Page	Number per scaffolding bay	Width	Load class		
				≤ 2.0 m	2.5 m	3.0 m
Aluminium ladder frame with aluminium profiled surface	31	1	0.58 m	≤ 4	≤ 4	≤ 3
Aluminium ladder frame with plywood surface	34	1	0.58 m	---	≤ 3	≤ 3
Aluminium ladder frame with integrated ladder and building veneer plywood BFU 100G	72	1	0.57 m	---	≤ 3	≤ 3
Aluminium ladder frame with integrated ladder, entirely out of aluminium	73	1	0.57 m	---	≤ 4	≤ 3

Ladder access frames may only be installed in the level at 2 m height if the bay directly above the base jacks is fitted with system decks on transoms (see section 4.2.2).

4.2.9 ALIGNMENT

The first scaffold bay must be aligned so that

- the vertical frames are vertical,
- the system decks are horizontal and
- the maximum permissible wall distance of 30 cm is not exceeded (see section 4.1).

Figure 16: Fully assembled first scaffold bay

4.3 ERECTING ADDITIONAL SCAFFOLD BAYS AT THE FIRST LEVEL

4.3.1 NORMAL BAYS

Further scaffold bays are erected in the same way as described for the first one in the previous section.

Base or decking transoms are to be fitted onto the base jacks in scaffold bays in which vertical diagonals are envisaged (see Figure 3).

Decking transoms are to be fitted onto the base jacks in scaffolding bays where ladder access is envisaged (see Figure 3).

When installing a transom, ensure that the gravity lock is in its correct position!

- Fit system decks onto the decking transoms (see section 4.2.8).

These system decks can no longer be fitted if the lowermost positioning frames have already been attached in this bay.

- The vertical frames are to be fitted on the base jacks and aligned vertically.
- Decks are to be fitted in each bay across the scaffold's entire width (see section 4.2.8) and aligned horizontally.

Figure 17: Further scaffold bays

When inner extension brackets are envisaged for the first scaffolding level:

- Attach extension brackets on the inside (see section 5.3.1)
- Fit decks on the inner extension brackets and secure them against lifting (see section 4.2.8)

All other scaffolding bays have to be aligned so that

- the vertical frames are vertical,
- the system decks are horizontal and
- the maximum permissible wall distance of 30 cm is not exceeded (see section 4.1).

4.3.2 BRACING

The vertical diagonals are to be installed according to the configuration shown in section 9.2 (see section 4.2.6). The following points have to be observed:

- At least one vertical diagonal brace needs to be installed at each scaffolding level (see section 4.2.6)
- No more than five bays may be assigned to one vertical diagonal
- The direction of inclination of the vertical diagonals may be freely selected
- Longitudinal ledgers always need to be fitted in addition in bays with vertical diagonal braces under the lowest scaffolding level (see section 4.2.5)

Some system configurations require transverse diagonals in the lowest vertical frames (see section 9.2). For this purpose, scaffold tubes (Ø48.3 x 3.2) are used which are connected to the standards of the vertical frames by means of swivel couplers (see section 5.10 and Figure 14).

4.3.3 CORNER STRUCTURES

At the corners of the building, two vertical frames are connected with each other using two swivel couplers. One swivel coupler is fitted directly under the decking transom in the upper part of the frames. The other swivel coupler is attached in the lower area of the vertical frames (see Figure 18 and Figure 19).

Figure 18: Corner structure with two vertical frames

Figure 19: Corner structure with three vertical frames

4.3.4 SYSTEM-INDEPENDENT COMPONENTS IN SCAFFOLDING LEVELS

The scaffolding levels are to be completed with system-independent components if need be.

In this respect the load-bearing capacity of the system-independent components must be taken into account regarding load and the required span width.

A gap between two scaffold decks may not exceed 2.5 cm.

A gap between a main scaffold deck and a deck on an inner bracket may not exceed 8 cm.

A gap between a scaffold deck and an adjacent building or another structure with sufficient load-bearing capacity may not exceed 30 cm.

The decking surfaces of safety scaffolds may not have any gaps.
Decked surfaces on protective roofing must be tightly closed-gap right up to the building.

4.4.1 SECURE AGAINST TOPPLING

There is the danger of a scaffolding toppling over when being erected or dismantled if the scaffold is not adequately anchored. For Instance, in the bay on the first level where vertical transport is carried out. This can be remedied e.g. by temporary supports at the level of the decking at a height of 2 m (see Figure 20).

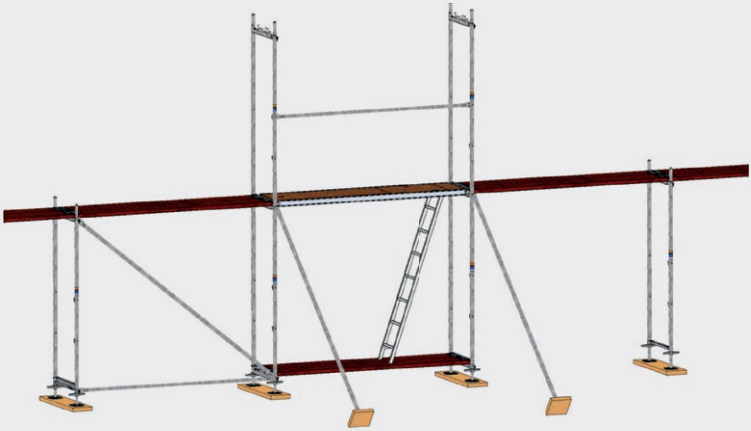


Figure 20: Example of a temporary anti-topple system for the first scaffolding level

4.4.2 PROTECTION AGAINST FALLS

There is a danger of falling when assembling additional scaffolding levels. The erection work has to be carried out in such a way that the danger of falling is prevented as far as possible and that the remaining risk is kept to an absolute minimum. The scaffolder/scaffold builders have to determine suitable measures for averting danger on the basis of their risk assessment from case to case and for the respective job. Possible measures for averting danger could include:

- Use of the SUPER 65 mounting safety guardrail "MSG" (see Figure 30)
- Use of suitable personal protective equipment "PSAgA" (see Figure 35)
- A combination of the above safety measures

As soon as work is carried out with personal protective equipment, a height rescue concept has to be provided at the construction site.

Only components that have been approved for the mounting safety guardrail as per approval Z-8.1-185.1 dated 3 January 2016 may be used for this purpose.

Only systems whose suitability for scaffolding work has been demonstrated may be used as personal protective equipment against falls from a height.

Only the approved areas on the vertical frames and guardrail posts with transoms or protective mesh supports may be used as personal protective equipment anchorage points (see Fig. 21 and Fig. 22). The approved anchorage points for personal protective equipment are marked in **green** in the following illustrations.

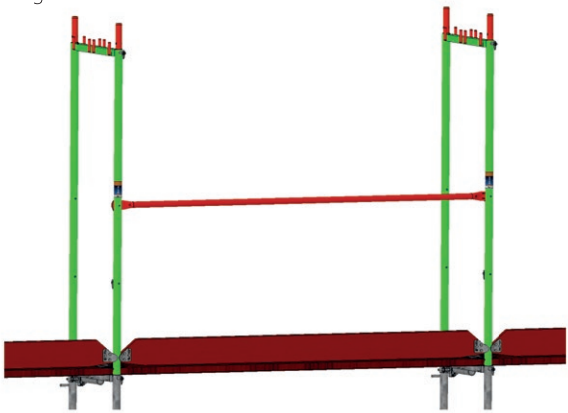


Figure 21: Permissible anchorage points for the personal protective equipment on the vertical frame

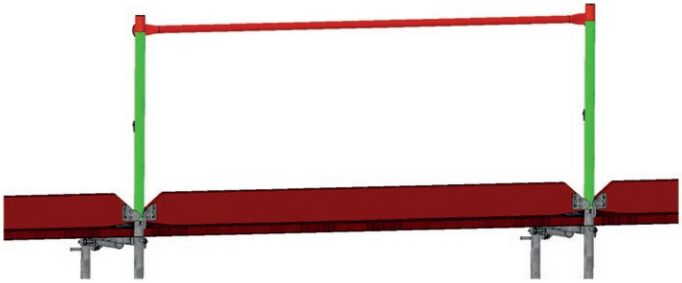


Figure 22: Permissible anchorage points for the personal protective equipment on the guardrail post with transom

- Areas marked in red are **not** permissible as anchorage points for personal protective equipment.
- Only a minimum of two vertical frames or guardrail posts with transom or protective mesh supports that are connected by at least one principal guardrail may be used as anchorage points for personal protective equipment.

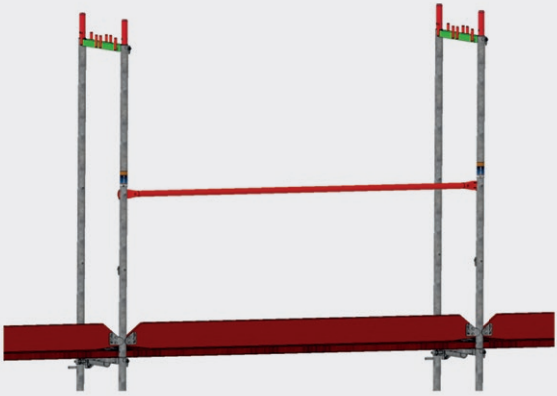


Figure 23: Recommended anchorage points on the vertical frame

The upper decking transom in the vertical frame (marked in green in Figure 23) is recommended as an anchorage point for the personal protective equipment.

When selecting the actual attachment points, the respective current statutory requirements and the specifications of the relevant professional associations need to be observed.

Anchorage points should be as high as possible, at least 1.00 m above the decking surface on which the work is to be carried out.

Only those areas that are part of a closed frame can be considered for an anchorage point. Open tube ends such as those on tube connectors or any other protruding tube ends from scaffold anchors for example are unsuitable because the personal protective snap hook can slip off.

Only in exceptional cases with a separate risk assessment can lower attachment points be selected if necessary. For example, the standard tubes in the area between the base ledger and the guardrail gravity lock at a height of 1.00 m.

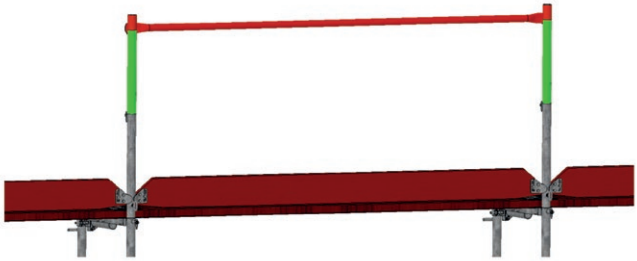


Figure 24: Recommended anchorage points for the upper scaffold finish section

When working on the eaves scaffolding level, there are no vertical frames to serve as anchorage points. In this case, only the vertical tube of the guardrail post with transom or the protective mesh supports are available as an approved anchorage point for personal protective equipment.

The highest possible anchorage point in this situation is thereby the area between the gravity locks on the vertical post tube, marked green in Figure 24.

A separate risk assessment is required for the use of this anchorage point since the minimum height required of 1.00 m above the decking surface is not given.

The area above the upper guardrail gravity lock cannot be used as an anchorage point because the personal protective snap hook can slip off the open end of the tube.

> Personal protective equipment may only be used when the fall height is sufficient to prevent any impact with the ground. A fall height of at least 5.75 m needs to be available. The fall height is measured vertically downwards from the personal protective equipment anchorage point.

The use of a mounting safety guardrail or personal protective equipment may be dispensed with in individual cases when a mounting safety guardrail or personal protective equipment does not offer adequate protection or cannot be used due to structural or scaffolding-specific circumstances and

- the work is to be carried out by technically qualified and physically suitable persons,
- the employer has carried out special training for the verified exceptional case and
- the edge from which a person can fall is clearly visible to the person.

Measures to protect against falling are not required if the working and access areas are no more than 0.30 m away from other load-bearing and sufficiently large surfaces.

4.4.3 VERTICAL TRANSPORT OF SCAFFOLDING COMPONENTS

4.4.3.1 Construction lifts

For scaffolds with a height of more than 8 m scaffold bay height (decking height above ground level), construction site lifts have to be used during assembly and dismantling. Construction site lifts may also include manually operated rope pulley hoists.

Construction lifts may be dispensed with if the scaffold bay height does not exceed 14 m and the width of the scaffold does not exceed 10 m.

Observe the instructions for assembly and use relating to the construction site lift used!

4.4.4 MANUAL TRANSPORT

In scaffolding bays where vertical transport is to be carried out by hand, principal and intermediate guardrails must be fitted at the lower levels. The principal guardrail is sufficient at the topmost scaffolding level. At least one person must stand on each scaffolding level during manual transport (see Figure 25 and Figure 35).

Figure 25: Example of vertical transport by hand

4.4.5 ERECTING THE SCAFFOLDING

As part of the risk assessment, the scaffolder/scaffold builder determines the fall protection measures to be applied (see section 4.4.2). The following possible measures are intended as fall protection during scaffold assembly.

4.4.5.1 Result of the risk assessment: mounting safety guardrail

A) Installation of the mounting safety guardrail from the secured level.

The mounting safety guardrail must be attached to all sides of the scaffold where there is a risk of falling:

- Fit the first mounting safety guardrail post onto the standard (see Figure 26).

Figure 26: Assembly of the first mounting safety guardrail post

- Hook the mounting safety guardrail onto the first post and connect the second post to the free end of the guardrail (see Figure 27).

Figure 27: Hooking in the mounting safety guardrail and connecting the second mounting safety guardrail post

• Mounting safety guardrail: fit second mounting safety guardrail post (see Figure 28).

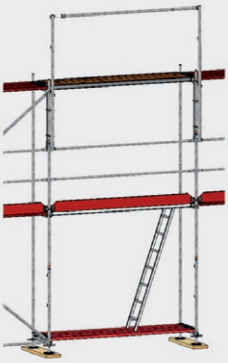


Figure 28: Fitting the second mounting safety guardrail post

• Fit additional mounting safety guardrail units along the entire length of the scaffolding (see Figure 29).

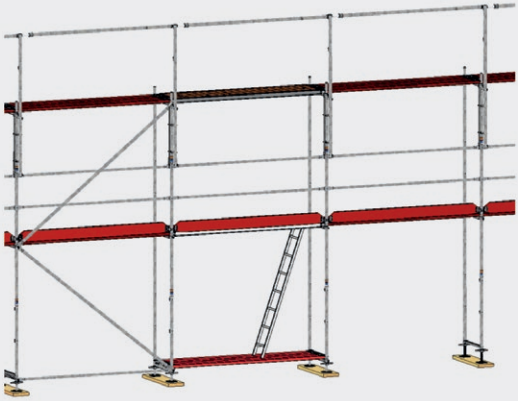


Figure 29: Fitting of additional mounting safety guardrail units

B) Assembly of the next scaffolding level in the protection of the mounting safety guardrail.

Figure 30: Assembly of the scaffolding level in the protection of the mounting safety guardrail

- Enter the top level via the planned ascent and close the hatch of the ladder frame immediately after climbing through.
- Fit the vertical frames onto the lower vertical frames in the ascent bay (see Figure 31).

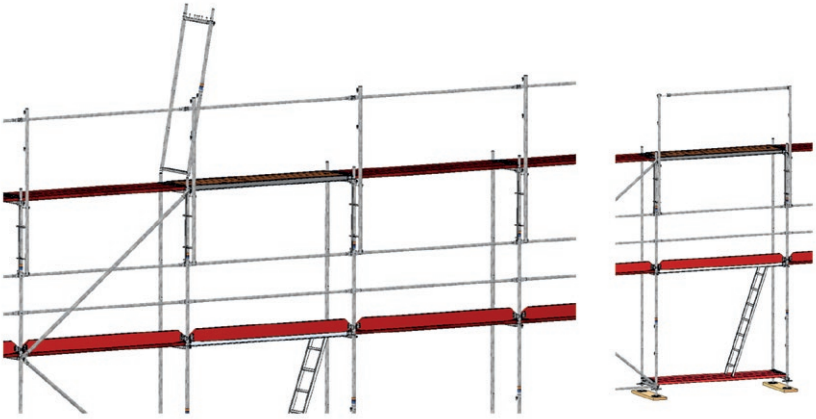


Figure 31: Attaching a vertical frame

- Fit the second vertical frame onto the lower vertical frames in the access bay.
- Fit the guardrails in the ascent bay (see section 4.2.5).

- If it is intended to make the upright standard joints resistant to tensile forces, fit the locking pin (shown in green in Figure 32).
  See section 9 and Appendix B of the approval Z-8.1-185.1 regarding requirements for locking pins.

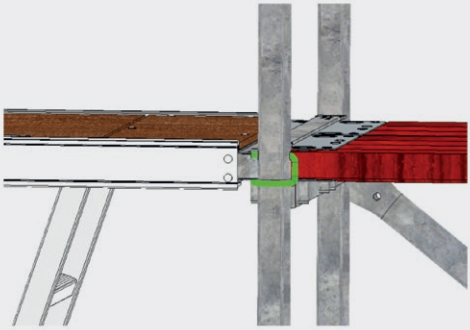


Figure 32: Inserted locking pin

- Starting from the ascent bay:
  - Fit the next vertical frame (see Figure 30)
  - Install the next principal guardrail (see section 4.2.5)
  - If it is intended to make the upright standard joints resistant to tensile forces, fit the locking pin (see Figure 32)
- When a scaffold end is reached, fit a front guardrail.

Figure 33: Installed front guardrail: open tube end mounted on a gravity lock

- Fit system decks on the vertical frames (see section 4.2.8).

- When inner extension brackets are envisaged for this scaffolding level:
  - Attach extension brackets on the inside (see section 5.3.1)
  - Fit system decks on the inner extension brackets and secure them against lifting (see section 4.2.8)

- When anchorage is envisaged for this scaffolding level, fit the anchors (see section 4.4.7).

- When front ascent is envisaged, assemble the ascent (see section 5.2).

4.4.5.2 RESULT OF THE RISK ASSESSMENT: MOUNTING SAFETY GURADRAIL IN THE ASCENT BAY / PERSONAL PROTECTIVE EQUIPMENT

A) Installation of the mounting safety guardrail in the ascent bay from the secured level (see section 4.4.5.1).

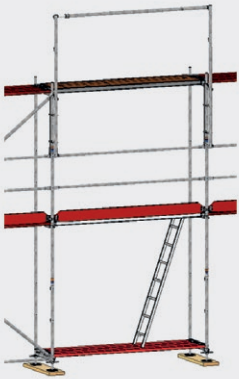


Figure 34: Mounting safety guardrail installed in the ascent bay only

- Assemble the next scaffolding level in the ascent bay in the protection of the mounting safety guardrail (see section 4.4.5.1).
- Enter the top level via the planned ascent and close the hatch of the ladder frame immediately after climbing through.
- Fit the vertical frame onto the lower vertical frames in the ascent bay (see Figure 31).
- Fit the second vertical frame onto the lower vertical frames in the accent bay.
- Fit the guardrails in the ascent bay (see section 4.2.5).
- If it is intended to make the upright standard joints resistant to tensile forces, fit the locking pin (see Figure 32).

B) Further assembly of the scaffolding level with personal protective equipment.

Figure 35: Assembly with personal protective equipment on the topmost scaffolding level

- Starting from the ascent bay:
  - Before leaving the area which is secured, attach personal protective equipment to a designated anchorage point with the snap hook (see section 4.4.2)
  - Fit the next vertical frame (see Figure 35)
  - Insert the next guardrail (see section 4.2.5)
  - If it is intended to make the upright standard joints resistant to tensile forces, fit the locking pin (see Figure 32)
- When a scaffold end is reached, fit the front guardrail (see Figure 33).
- Fit system decks on the vertical frames (see section 4.2.8).
- When inner extension brackets are envisaged for this scaffolding level:
  - Attach extension brackets on the inside (see section 5.3.1)
  - Fit system decks on the inner extension brackets and secure them against lifting (see section 4.2.8)
- When anchorage is envisaged for this scaffolding level, fit the anchors (see section 4.4.7).
- When front ascent is envisaged, assemble the ascent (see section 5.2).

If personal protective equipment is used, correct anchorage of the scaffolding level on which work is being carried out is required (see section 9.2).

4.4.6 BRACING

Vertical diagonals are used for bracing the scaffold on the outer side and in some cases also on the inner side (see Section 9.2).

As a rule, vertical diagonal braces are to be installed in every fifth scaffold bay, but for some configurations additional vertical diagonals are also required (see section 9.2).

The fitting of the vertical diagonals is described in section 4.2.6. The points mentioned in section 4.3.2 need to be observed.

4.4.7 ANCHORAGE

4.4.7.1 Anchor arrangement and anchor forces

The anchor arrangement, any additional anchorage as well as the corresponding anchorage forces for the relevant system configuration can be taken from the general type approval Z-8.1-185.1 dated 3 January 2016 and they are also described in section 9.2. Where something is unexplained or in any cases of doubt, the general type approval shall apply, in particular its Appendices B and C. The anchor forces specified therein constitute working loads.

Anchors are to be installed continuously during erection of the scaffolding structure. Screws/Bolts of at least 12 mm diameter or equivalent structures are to be used for fixing.
When determining the levels at which the anchors are to be affixed, it should be noted that the vertical frames with heights of 0.50 m, 1.0 m and 1.50 m are to be regarded as full scaffolding levels.

4.4.7.2 Short tie bars

A short tie bar is to be attached to the inner standard directly underneath the scaffold decking using a standard coupler (see Figure 36 and Figure 37).

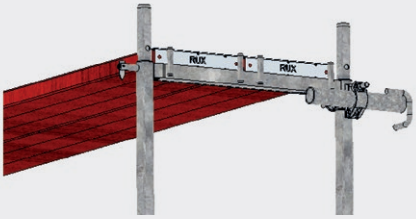


Figure 36: Short tie bar, version without bracket

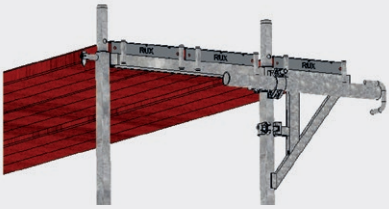


Figure 37: Short tie bar, version with inner extension brackets

Short tie bars are suitable for distributing forces acting at right angles to the façade.

4.4.7.3 V-shaped tie bars

V-shaped tie bars are arranged in a V-shape and are attached to an inner standard tube with standard couplers. The anchors are arranged at an angle of 90° to each other and approx. 45° to the anchorage surface (see Figures 38 - 40).

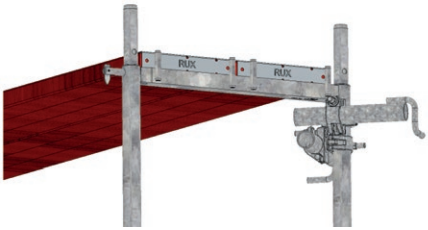


Figure 38: V-shaped tie bar, basic configuration

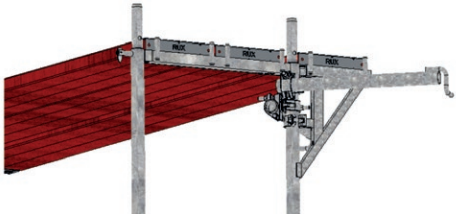


Figure 39: V-shaped tie bar, configuration with inner brackets

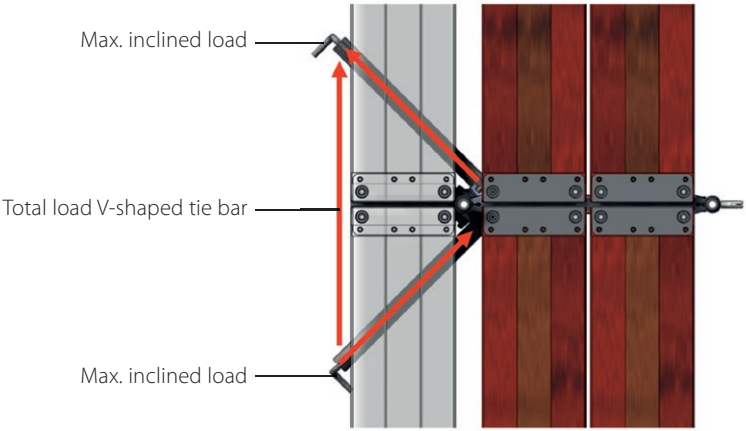


Figure 40: Forces on the V-shaped tie bar

V-shaped tie bars are suitable for distributing forces acting at right angles and forces acting parallel to the façade.

4.4.7.4 Anchorage at corners

Additional anchorage is required in the area of scaffolded corners.

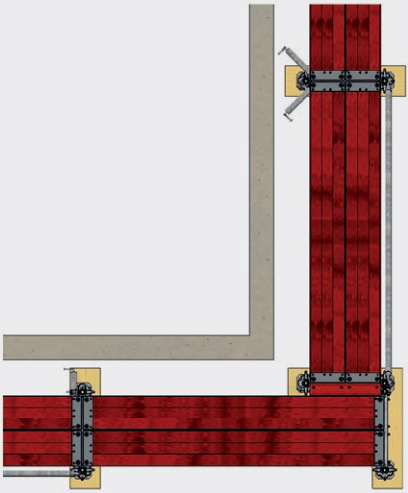


Figure 41: Anchorage at corners, structure with two vertical frames

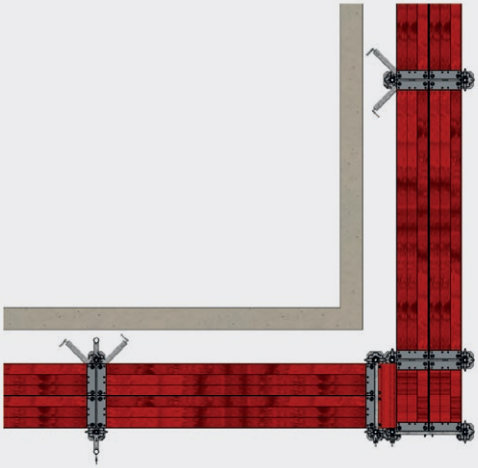


Figure 42: Anchorage at corners, structure with three vertical frames

4.4.7.5 Deviation from the intended position of the tie bars

If there is no load-bearing material base at the intended anchorage height, the tie bars may be fitted within the anchorage level at a vertical distance from the node of no more than 30 cm.

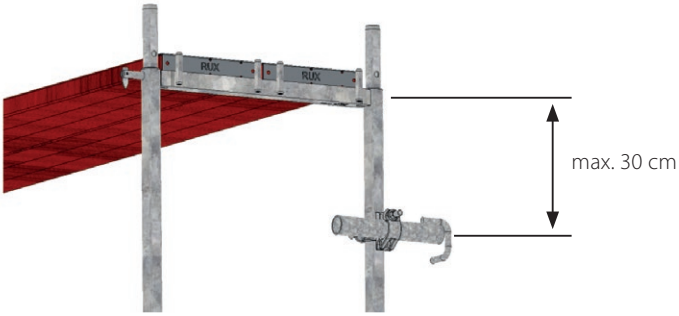


Figure 43: Anchorage with deviating tie position

When the position of the tie bars deviates from the intended position (see Figure 36 to Figure 39), additional measures are required for some configurations, see section 9.2.

The overall structural stability of the scaffold has to be verified when the tie bar positions deviate from the planned node positions at more than one anchorage level or when the maximum permissible degree of deviation is exceeded.

4.4.7.6 Diversion of anchor forces into the anchor base material

- The anchor forces as per section 9.2 have to be diverted by means of tie bars and other suitable fittings into a sufficiently load-bearing anchor base material (e.g. the structure to be scaffolded).

- Suitable fittings, for example, are the anchorage installations for facades described in DIN 4426 "Safety Equipment for Maintenance of Buildings, Fall Protection".

- Unsuitable fittings, for example, are steel wires and ropes. The use of such materials is **not** permitted.

- Sufficiently load-bearing anchor base materials are e.g. reinforced concrete slabs, walls and pillars and load-bearing masonry as per DIN 1053 "Masonry".

- Inadequate load-bearing anchor base materials are e.g. snow guards, lightning rods, drainage pipes, window frames. It is **not** permitted to connect the fittings to such elements.

- The load-bearing capacity of the fittings between the tie bar and the anchor base material has to be verified for the anchor forces involved.

- The load-bearing capacity of the fittings can be verified, for example,
  - in the type approval from the Institut für Bautechnik, Berlin,
  - static calculation or
  - load tests in accordance with section 4.4.7.7.

- If fittings with type approval are used for anchorage, the requirements contained therein have to be complied with. These include for example:
  - Verification of the anchor base material
  - Required component dimensions and edge distances
  - Special installation instructions

4.4.7.7 Load tests

If loads tests are required, these have to be carried out at the actual site.

Suitable test equipment will need to be used to perform the tests.

Anchorage points at which test loads are to be applied have to be determined (number and location) by a qualified person.

The load tests are to be carried out in accordance with the following criteria:

- The test load shall be 1.2 times the required anchorage force as per section 9.2
- The extent of the test has to comprise of
  - at least 10 % of all fittings used when the anchor base material is concrete and
  - at least 30 % for all other building materials,

  and at least 5 separate load tests.

- If one or more of the fittings fail the load test, the qualified person shall
  - determine the causes of this,
  - find a replacement fitting and
  - increase the scope of the tests if necessary.

Test results must be recorded in writing and kept at least for the duration of the standing time of the scaffolding.

Examples of anchorage protocols can be found in section 10, as well as in the DGUV Information 201- 011, formerly BGI/GUV-I 663.

4.5 TOPMOST LEVEL OF THE SCAFFOLDING

Above the topmost scaffolding level, guardrail posts with transoms are attached and secured there by means of the ring bolts on the guardrail post. Principal and secondary guardrails are mounted on the gravity lock pins on the guardrail posts (see Figure 44 and section 4.2.5).

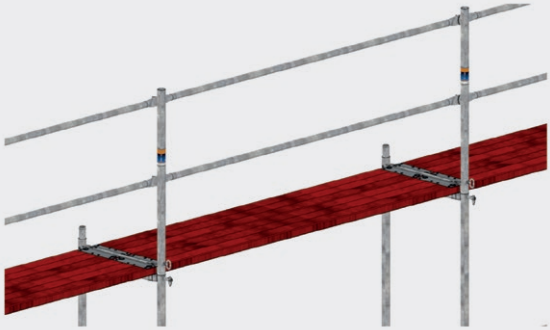


Fig. 44: Upper finish section with guardrail posts with transoms

Alternatively, guardrail posts and separate deck retainers may be used (see Figure 45).

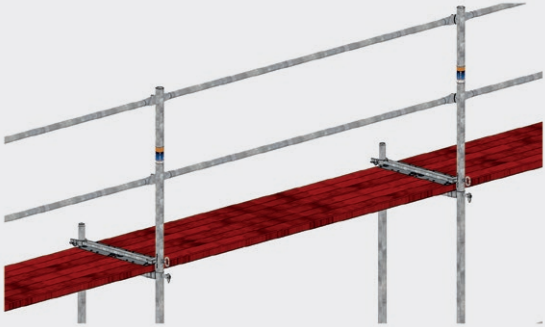


Fig. 45: Upper finish section with guardrail posts and deck retainers

Fitting is carried out in the same way as described in section 4.4.5. Protection against falling - depending on the result of the risk assessment (see section 4.4.2) by the scaffolder/scaffold builder - to be in accordance with sections 4.4.5.1 or 4.4.5.2.

4.6 COMPLETION OF THE SIDE PROTECTION

A complete side protection consists of a principal and secondary guardrail as well as a toe board.

Any missing toe boards or other missing parts of the side protection shall be installed at all scaffolding levels which are going to be needed by the user after erection, approval and handover have taken place.

The toe boards with their end fittings are to be positioned between the standards in such a way that their upper edges form one continuous level throughout (see Figure 46).

Figure 46: Complete side protection

Scaffolding levels with incomplete side protection have to be secured by appropriate barriers. They may not be accessed by the user.

4.7 SYSTEM-INDEPENDENT COMPONENTS AS SIDE PROTECTION

If necessary, the side protection is to be supplemented with system-independent components. The side protection is to be designed in such a way that the principal guardrail is 100 cm above the decking surface and a ball with a diameter of 47 cm cannot fit between the guardrail sections and cannot exit the decked surface at any point up to a height of 1.00 m.
Scaffold tubes in connection with scaffold couplers are particularly suitable as guardrail components. Toe boards need to have a height of at least 15 cm.

5 ALTERNATIVE DESIGNS AND FITTING OF SUPPLEMENTARY COMPONENTS

5.1 GENERAL

When installing supplementary components, there may be an increased risk of falling. Scaffolding work must be carried out in such a way that the risk of falling is excluded or kept to an absolute minimum. The safety instructions for the erection, modification and dismantling of the scaffold described in section 2 have to be observed.

5.2 ACCESS TO WORKPLACES ON SCAFFOLDS

Before starting work on the first scaffolding level, an access has to be installed. Suitable for this are:

- front stairway ascents
- front ladder ascents
- inner ladder ascents

5.2.1 FRONT STAIRWAY ASCENT

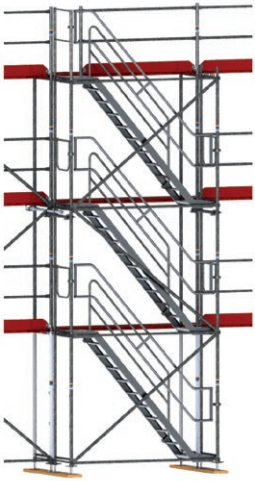


Figure 47: Front stairway ascent

The stairway has to be erected in front of the scaffold in a 2.50 m long scaffold bay (see Figure 47). Components with a system width of 650 mm are used for the stairway.
The stairway has to be connected to the scaffold every 4 m by means of scaffold tubes and couplers. The scaffold has to be tied at these points, even if no anchors are envisaged for the scaffold itself (see section 9.2 and Appendix C of approval Z-8.1-185.1 dated 3 January 2016).
The stairway ascent can be implemented with one vertical frame on each side of the stairway bay at each scaffolding level. Subsequently referred to as: construction with vertical frames.
Alternatively, the stairway ascent can be created with a lead-off adapter for stairway standards at the two base points of the stairway tower and with one stairway standard on each side of the stairway bay at each scaffolding level. Subsequently referred to as: construction with stairway standards.

Construction of the lowermost level:

- At the intended installation points
  - Establish the load-distributing base structure in accordance with section 4.2.1
  - Arrange base jacks as per section 4.2.2
- Construction with vertical frames:
  - Attach a decking transom to a pair of base jacks (see section 4.2.2)
  - Attach a base transom to the other pair of base jacks (see section 4.2.2)

- Construction with stairway standards:
  - Fit a lead-off adapter for stairway standards on each side of the stairway bay
- Fit a longitudinal ledger between the transoms or lead-off adapters for stairway standards (see section 4.2.5)
- Construction with vertical frames:
  Attach the first vertical frame onto the base jacks with the base transom and secure against toppling over (see section 4.2.4)
- Construction with stairway standards:
  Attach the stairway standards to the base jacks and couple with the vertical frame
- Position the platform stairway on the decking transom or lead-off adapter and the vertical frame or stairway standard
- Fit the second vertical frame or stairway standard above the decking transom or lead-off adapter and secure against toppling over or connect with coupler
- Attach the vertical diagonal brace (see section 4.2.6)
- Fit the principal guardrail between the diagonal gravity locks on the vertical frames or stairway standards (see section 4.2.5)
- Align the stairway ascent:
  - Position vertical frames in the levels of the vertical frames of the scaffolding and align them vertically and horizontally
  - Establish the distance to the scaffold (see Figure and section 4.1): this is not necessary in the construction with stairway standards

Construction of the other levels:

There is an increased risk of falling when installing the stairway. Scaffolding work must be carried out in such a way that the risk of falling is excluded or kept to an absolute minimum. The safety instructions for the erection, modification and dismantling of the scaffold described in section 2 have to be observed.

- Fit the vertical frame or stairway standards above the top platform of the now existing stairway and, if necessary, connect to the scaffold using scaffold tubes and standard couplers (see section 5.10)
- Place the stairway on the ledgers of the vertical frames or stairway standards
- Position the second vertical frame or stairway standards and, if necessary, connect to the scaffold using scaffold tubes and standard couplers
- Fit front guardrails in both vertical frames or stairway standards (see Figure 33)
- Connect the double handrail for the aluminium platform stairway on the outside to the vertical frames or stairway standards with the pre-fitted semi-couplers (see section 5.10)
- Mount the vertical diagonal brace and principal guardrail
- If necessary, add more anchorage to the scaffolding

Upper scaffold finish section:

- Construction with vertical frames:
  Fit the front guardrail frame above the top platform of the existing stairway

- Construction with stairway standards:
  Connect the front guardrail frame above the top platform of the existing stairway to the outer standards of the vertical frame and the stairway standard: to do this, first remove from the scaffolding at this point the side protection, the deck retainers and the guardrail post or guardrail post with transom – before subsequently restoring the side protection of the scaffolding at this point (see section 4.7)

- Connect the double handrail for the aluminium platform stairway on the outside to the vertical frame or stairway standards with the pre-fitted semi-couplers (see section 5.10)

- Fit guardrail holder for decks with guardrail posts, two guardrails of 2.00 m and a toe board of 2.00 m to the scaffold decking next to the topmost aluminium platform stairway (see Figure 47)

Inner guardrail

- If desired, additional interior railings can be mounted for aluminium platform stairways

SUPER 65

5.2.2 FRONT LADDER ASCENT

Figure 48: Front ladder ascent

The ladder ascent has to be connected to the scaffold every 4 m by means of scaffold tubes and couplers. The scaffold has to be tied at these points, even if no anchors are envisaged for the scaffold itself (see section 9.2 and Appendix C of approval Z-8.1-185.1 dated 3 January 2016).

Construction of the lowermost level:

- At the intended installation points
  - Establish the load-distributing base structure in accordance with section 4.2.1
  - Arrange base jacks as per section 4.2.2
- Attach decking transom to a pair of base jacks (see section 4.2.2)
- Place system deck on the decking transom (see section 4.2.8)
- Attach the vertical frame to the pair of base jacks and secure against toppling over (see section 4.2.4)
- Install longitudinal ledger between the decking transoms (see section 4.2.5)
- Attach the vertical diagonal brace (see section 4.2.6)
- Position the ladder frames on the vertical frames (see section 4.2.8)

- Align the ladder ascent:
  - Align the vertical frames so that they are vertical and the system decks are horizontal
  - Position vertical frames in the levels of the vertical frames of the scaffolding
  - Establish the distance from the scaffold (see Figure 48)

- Fit a gap cover between the scaffold deck and the ladder frame

Construction of the other levels:

- Fit the vertical frame (see Figure 31) and, if necessary, connect to the scaffold using scaffold tubes and standard couplers
- Install the guardrails (see section 4.2.5)
- Fit front guardrail (see section 4.4.5)
- Install the vertical diagonal brace (see section 4.2.6)
- Position the ladder frame on the vertical frames (see section 4.2.8)

The hatches of the ladder frames are to be arranged in an offset manner. They may only be opened for climbing through and must be closed again immediately afterwards. Otherwise, the hatches are to remain closed.

- Fit a gap cover between the scaffold deck and the ladder frame
- If necessary, add more anchorage to the scaffolding

Upper scaffold finish section:

The upper scaffold finish section of the front ladder ascent is assembled in the same way as the finish section for the upper scaffolding level (see section 4.5).

5.2.3 INNER LADDER ASCENT

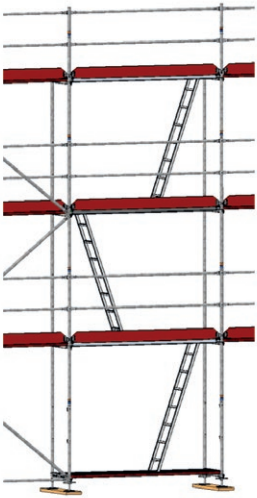


Figure 49: Inner ladder ascent

The inner ladder ascent may only be used for the combinations of bay lengths and load classes stated in the following table. In other cases, front ascents are required.

Table 4: Inner ladder ascent, load classes

Load class	Bay length
1	≤ 3.0 m
2	≤ 3.0 m
3	≤ 3.0 m

Ladder frames are used for the inner ladder ascent (see Figure 49).

The scaffold bay on the decking transoms under the ladder frame is to be fitted with decking (see sections 4.2.2 and 4.2.8).

The hatches of the ladder frames are to be arranged in an offset manner. They may only be opened for climbing through and must be closed again immediately afterwards. Otherwise, the hatches are to remain closed.

The vertical frames of the ladder frame have to be anchored to the façade at every second level at a minimum.

5.3 EXTENSION BRACKETS

When using extension brackets, it may be necessary to complete the side protection with system-independent components (see section 4.7 and e.g. Figure 51 and 52).

5.3.1 Inner extension brackets

The single-deck inner extension brackets are used to widen the decking surface on the inside of the scaffold (see Figure 50). They may be fitted at all scaffolding levels.

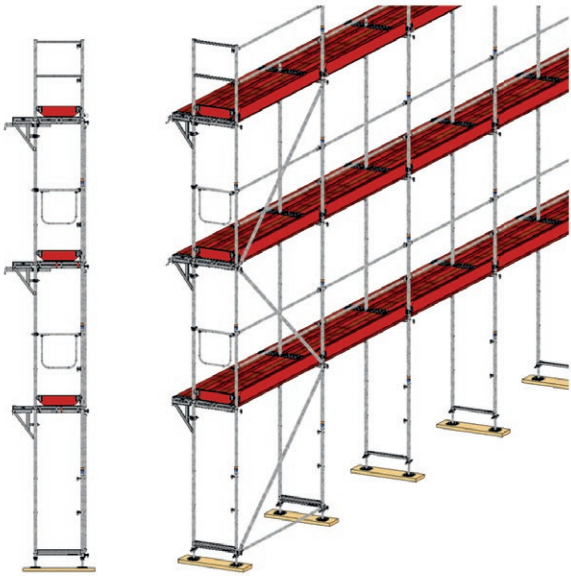


Figure 50: Scaffold with inner extension brackets

The extension brackets are connected to the vertical frames by means of the welded-on semi-couplers (see section 5.10).

The extension brackets are decked with 0.29 m-wide system planks and secured against lifting (see section 4.2.8).

5.3.2 OUTER EXTENSION BRACKETS

Outer extension brackets are used to widen the decking surface on the outside of the scaffold (see Figure 51 and Figure 52).

Outer brackets may only be used up to load class 4.

They may only be fitted at the topmost scaffolding level.

A gap cover needs to be fitted between the main and extension decking when outer extension brackets are used if a gap of more than 8 cm exists between them or if the closing of the gap is necessary for other considerations (e.g. passenger traffic in the vicinity of the scaffold).

Single-deck extension brackets:

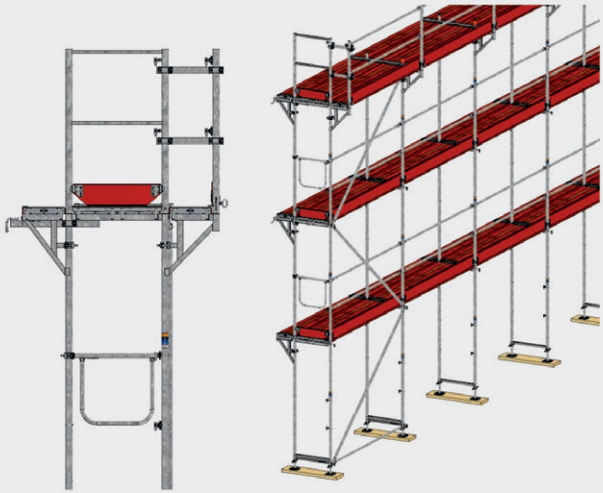


Figure 51: Scaffold with outer and inner single-deck extension brackets

The single-deck outer extension brackets are attached in the same way as the inner extension brackets (see section 5.3.1).

Two-deck extension brackets:

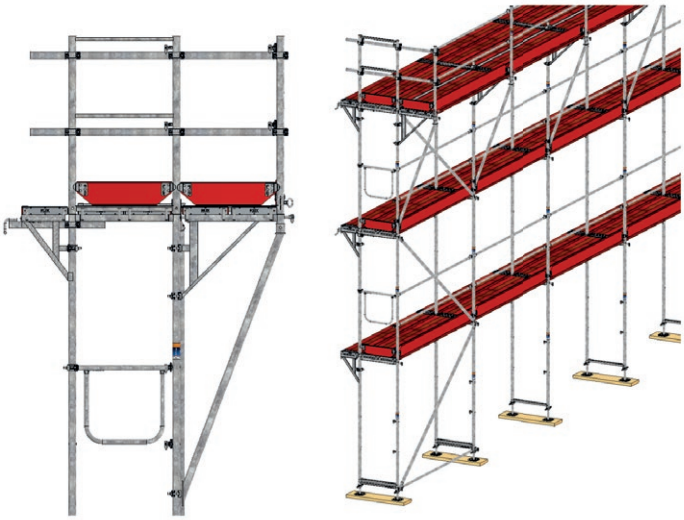


Figure 52: Scaffold with double-deck extension brackets on the outside and support prop

The two-deck outer extension brackets are connected to the vertical frames by means of the welded-on semi-couplers (see section 5.10).

To underpin the two-deck outer extension brackets, a support prop is connected to each of the extension brackets and the vertical frame. The support strut is necessary for safety catch scaffolds.

Either one or two system decks are then fitted to the two-deck extension brackets (see section 4.2.8).

The use of ladder frames is not permitted on extension brackets.

5.4 PASSAGE FRAMES

Passage frames are used to secure traffic routes (see Figure 53). The passage frames are to be aligned so as to be perpendicular.

Each passage frame consists of a horizontal passage frame connector and two vertical passage frame standards.

The passage frames are mounted in the same way as the vertical frames (see sections 4.2 and 4.4).

Figure 53: Passage frame

The design of the scaffold with passageway frame is shown in section 9.2 and in Appendix C of approval Z-8.1-185.1 dated 3 January 2016. The additional measures specified there need to be observed:

- Additional horizontal ledgers
- Additional anchorage
- Additional vertical diagonal braces
- Additional transverse diagonals
- Additional inner standard reinforcements

Access to the second scaffolding level is by means of a front stairway or ladder ascent.

5.5 BRIDGING GIRDERS

Bridging is necessary if, for example, passageways have to be kept free.

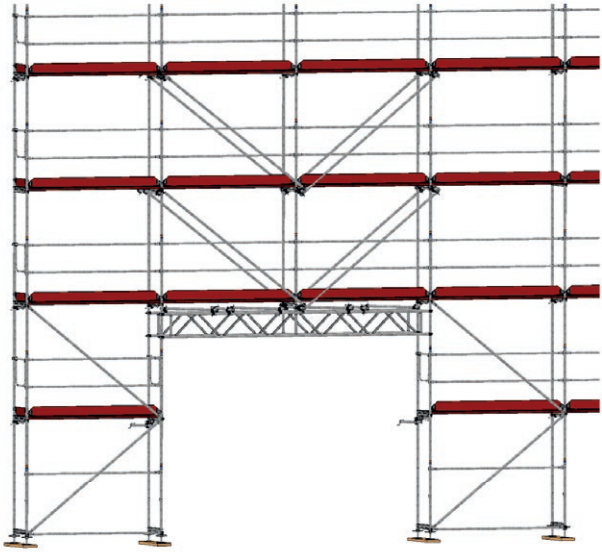


Figure 54: Bridging

The bridging elements are placed directly under the first or second scaffolding level and braced (see section 9.2 and Appendix C of approval Z-8.1-185.1 dated 3 January 2016). For this purpose, bridging girders are used which are connected to the vertical frames by means of the welded-on semi-couplers (see section 5.10).

Alternatively, lattice girders may be used which are connected to each vertical frame by means of two standard couplers (see section 5.10).

The bracing or reinforcement of the bridging or lattice girders has to take place at the centre of the bridging itself as well as at the centre of both bays to be bridged. For bracing, the top chords of the two parallel girders have to be kept horizontal. This can be achieved either by anchorage to the building or by applying a horizontal latticework structure made up of scaffold tubes and couplers (see Figure 55 and Figure 56).

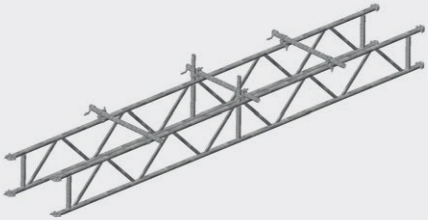


Figure 55: Horizontal bracing with anchorage

Figure 56: Horizontal bracing with latticework structure

The design of the scaffold with bridging girder is shown in section 9.2. The additional measures specified there need to be observed:

- Additional vertical diagonal braces (for instance, in two scaffolding levels above the girder)
- Additional horizontal ledgers
- Additional anchorage

The additional vertical diagonal braces above the bridging girders are to be connected to the vertical standards by means of standard couplers and tubing (see Figure 57). Alternatively, the diagonals can be connected near the nodes with swivel couplers of the class B – as per EN 74-1:2005 – with a load-bearing capacity of 9.09 kN.

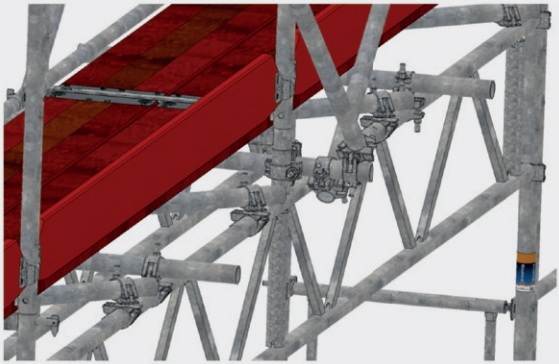


Figure 57: Connection of diagonal braces with standard couplers

5.6 PROTECTIVE ROOF

The protective roof may only be mounted on the outer side of a scaffold in the second scaffolding level (H = 4 m) (see Figure 58).

Principal guardrails are to be fitted between the protective roof and the working area at this level.

The protective roof configuration consists of an outer extension bracket (a support prop for extension brackets in the case of a three-deck protective roof), a protective roof extension arm, decks, a gap cover and deck retainers for the protective roof extension arm. The entire surface at this level (protective roof and working area) has to be gap free and be flush with the building structure.

The design of the scaffold with protective roof is described in section 9.2 and in Appendix C of approval Z- 8.1-185.1 dated 3 January 2016. The additional measures specified there need to be observed:

- Additional horizontal ledgers
- Additional anchorage
- Additional vertical diagonal braces

Figure 58: Protective roof

Personal protective equipment has to be worn during the assembly work. The snap hook on the personal protective equipment may only be attached at the approved anchorage points (see section 4.4.2).

Firstly, the entire façade scaffolding, including side protection components, has to be erected and anchored up to the 3rd scaffolding level to a height of approx. 6.20 m.
anchored up to the third level i.e. to a height of approx. 6.20 m.

Then, the protective roof has to be fitted.
To do this, extension brackets are to be mounted from the first scaffolding level at a height of approx. 2.20 m (see section 5.3.2). In this respect the scaffolder only works in the area secured by guardrails.

The scaffolder then climbs up to the second scaffolding level and secures her/himself there with the personal protective equipment by attaching the snap hook to the horizontal top decking ledger on the vertical frames, i.e. at a height of approx. 6.20 m (see section 4.4.2).

Subsequently, the decks are fitted on the extension brackets on the second scaffolding level at a height of approx. 4.20 m (see section 4.2.8).

Then the protective roof extension arms are attached to the extension brackets. Additional decks are then mounted on the protective roof extension arms (see section 4.2.8).

Finally, deck retainers are inserted into the protective roof extension arms and then affixed to the outer standards of the vertical frames by means of the welded-on semi-couplers (see section 5.10).

5.7 PROTECTIVE WALL

Protective walls are used to provide a conform level of safety against falling when working on roof areas.

The design of a protective wall has to comply with the respectively valid requirements. Further information on assembly, use and dimensions can be found in DGUV Information 201-011, formerly BGI/GUV-I 663 - Handlungsanleitung für den Umgang mit Arbeits- und Schutzgerüst (Instruction Manual for Handling Working and Protective Scaffolds) in its currently valid version. The protective wall comes with a safety catch section that needs to conform with the provisions detailed in the above-mentioned DGUV documents.

Examples of applications on flat and inclined roofs

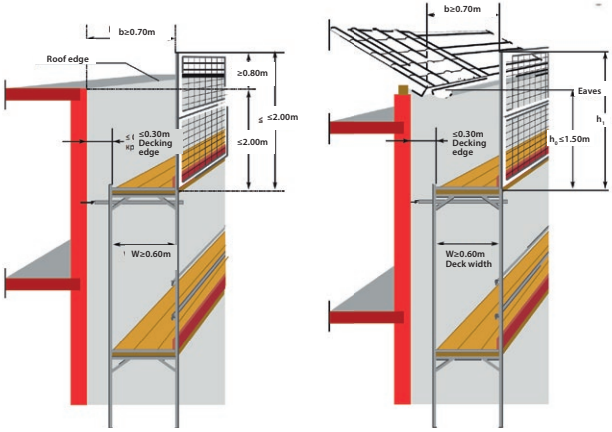


Figure 59: Protective wall with dimensions

Protective wall on vertical frames:

The 2.0 m protective mesh supports with transom are fitted to the vertical frames and secured to the inner scaffold standard by means of locking pins and the ring bolts on the protective mesh post (see Figure 32 / Figure 60).

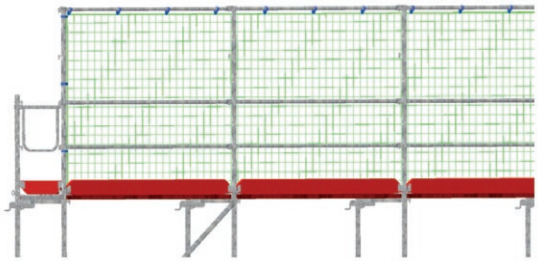


Figure 60: Protective wall on vertical frames

Protective wall on outer extension brackets:
The 2.0 m protective mesh supports with transom are fitted to the 2-deck extension brackets and secured by means of locking pins and the ring bolts on the protective mesh post (see Figure 32 and Figure 61).

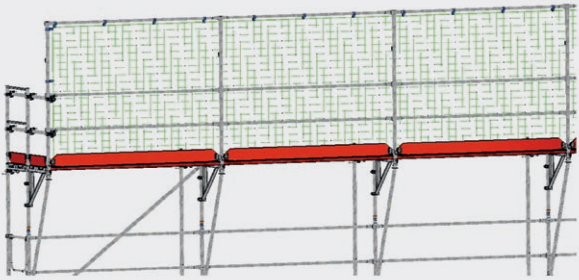


Figure 61: Protective wall on extension brackets

To complete the protective wall configuration, safety nets as per DIN EN 1263-1 are used.

The safety nets are to be attached to a principal guardrail at a height of 2.00 m above the decking surface and at toe board height.
When safety nets without edge reinforcement ropes are used, they have to be threaded onto the principal guardrail loop for loop.
When safety nets with edge reinforcement ropes are used, they have to be attached to the principal guardrail at a maximum spacing distance of 75 cm with suitable quick-action fasteners.
The mesh size of the safety nets may not exceed 100 x 100 mm.

As an alternative to the safety nets, protective mesh grating can be fitted in each scaffold bay by affixing the ends of the mesh grating to the gravity lock pins (see section 4.2.5).

5.8 FREE-STANDING SCAFFOLDING LEVELS ABOVE THE UPPERMOST ANCHORS

During construction phases of new buildings, the topmost scaffolding level may protrude above the uppermost anchorage level by 2 m (see Figure 62).

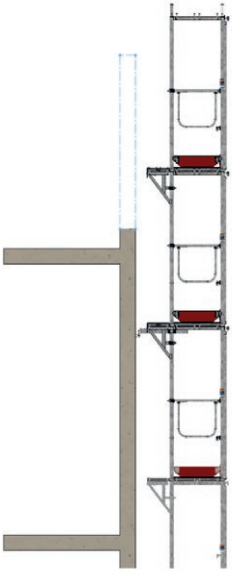


Figure 62: Free-standing scaffolding level as an intermediate state during erection

The non-anchored scaffold frames are to be rigidly connected to the scaffold frames beneath, e.g. by means of locking pins (see Figure 32).
The anchor positions in each uppermost anchorage level have to be designed to withstand a force of at least 4.1 kN acting at a right-angle to the façade.

5.9 CLADDING

The scaffold may be clad e.g. with nets or tarpaulins.

Additional anchorage is required for cladded scaffolds (see section 9.2).

When cladding the scaffold with nets, RUX nets are to be used that meet the requirements for air permeability and the spacing of the fastenings. The nets are fastened to the outer standard tubes of the vertical frames with one-way ties at a maximum spacing of 20 cm.

System-independent tarpaulins may be used for cladding with tarpaulins.

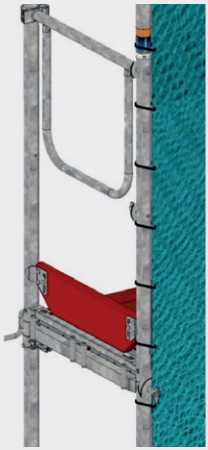


Figure 63: Cladding with nets

Figure 64: Cladding with tarpaulins

Nets and tarpaulins are fastened to the outer standards of the vertical frames using one-way ties. The maximum permissible distance between the fastenings is 20 cm.

Scaffold claddings are to be fitted around the front sides of the scaffolding.

5.10 COUPLERS

The terms standard, swivel and semi-coupler are used in many places in these Instructions for Assembly and Use to simplify matters. These terms generally stand for scaffold couplers of class B or BB as per DIN EN12811-1 or DIN EN 74-1:2005.

When using scaffold couplers, ensure that the following points are observed:

- The couplers may only be used with scaffold tubes made of steel or aluminium with an external diameter of 48.3 mm that meet the requirements of DIN EN 12810-1 for round steel tubes and round aluminium tubes
- The nuts of the couplers are to be tightened with a torque of 50 Nm
- If class BB coupler configurations are used, only couplers of identical design may be used; both couplers have to contact each other in an unloaded state
- A grease-oil mixture has to be applied to the threads of the screws/bolts and nuts and re-greased when the grease-oil mixture is worn away
- Threads may not have any corroded surfaces
- The free end of a scaffold tube has to protrude at least 4 cm outside the coupler

6 DISMANTLING THE SCAFFOLDING

To dismantle the scaffolding, reverse the sequence of the work steps described above.

The anchors may only be removed when the scaffolding levels above them have been completely dismantled. Components have to be dismantled immediately when their anchors have been removed.

To avoid tripping hazards, dismantled scaffold components are not to be stored on traffic routes.

Dismantled scaffold components may not be thrown down from the scaffolding.

The scaffold components are to be appropriately transported and stored.

7 USAGE

The scaffold may be used in accordance with the combinations of load classes and bay lengths stated in the following table.

Table 5: Load classes and permissible bay lengths

Load class	Bay length	Permitted load capacity	Outer bracket
1	≤ 3.0 m	75 kg / m²	permitted
2	≤ 3.0 m	150 kg / m²	permitted
3	≤ 3.0 m	200 kg / m²	permitted

The load capacities shown constitute maximum permissible loads on one scaffolding level.

Every user of a scaffolding is responsible for its proper use and adherence to the operational safety requirements applying to the scaffold. Should any defects become apparent on the scaffold, the erection surface or the anchorage either before or during usage, the scaffolder/ scaffold builder is to be notified of this immediately. In this case, the scaffold may not be used any longer until the defects have been rectified and the scaffold user has to correspondingly mark and block-off the scaffold without delay.

It is forbidden to jump on decks or to throw anything down on to them.

It is forbidden to lean over guardrails.

The hatches of the ladder frames may only be opened immediately before ascending or descending and must be closed again immediately afterwards.

Scaffold surfaces that serve as a protective roof may not be walked on by the scaffold user.

The depositing and storage of materials and equipment is not permitted on the following areas:

- Hatches of ladder frames
- Front ascents (stairway or ladder ascent)
- Areas that serve as a safety catch scaffolding or protective roof

The scaffold user has to ensure that the scaffold is not accessed by unauthorised persons during the period it is in use.

The valid statutory requirements of the Industrial Safety Regulation (BetrSichV) and the Accident Prevention Requirement "Construction Work" (BGV C22) are to be observed when using the scaffold.

Further information on usage can be found in DGUV Information 201-011, formerly BGI/GUV-I 663 - Handlungsanleitung für den Umgang mit Arbeits- und Schutzgerüst (Instruction Manual for Handling Working and Protective Scaffolds) in its currently valid version.

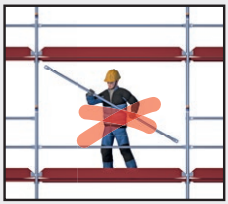
The following safety instructions are to be observed.

8 SAFETY INSTRUCTIONS

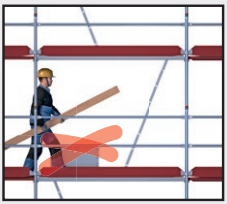
WARNINGS

- **Unauthorised access and use of the scaffolding is forbidden.**
- **Any defects or deficiencies are to be reported to the scaffold builder immediately and the scaffold is to be cordoned off and made inaccessible.**

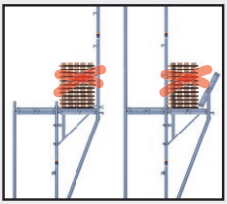
Pay careful attention to the Safety Instructions



Any modifications to the scaffolding may only be carried out by the scaffold builder

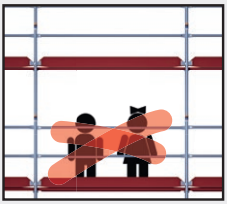


Keep hatches in the ascent decks closed

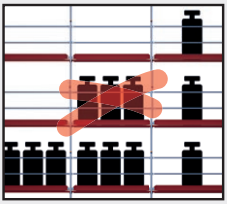


Do not store material on safety catch scaffolds or protective roofs

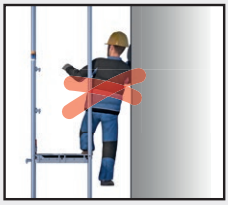
Workplaces may not be located above one another at any one time



Children may not access the scaffolding at any time

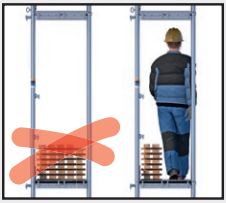


Do not overload scaffold decks



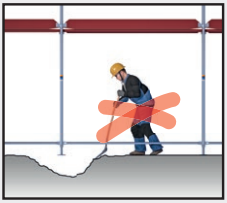
Pay careful attention to any possible risk of falling between the scaffold and the building

Only use fitted ladders or stairways for ascent and descent



When material is stored, make sure there is still sufficient space left to move along the decking

Do not jump on decks



Do not endanger the stability of the scaffolding by excavating or digging around the base

9 STANDARD DESIGN OVERVIEW

9.1 COMPONENT ELEMENTS OF THE STANDARD DESIGN

Table 6: Component elements of the standard design

Designation	Approval Z-8.1-185.1, Appendix A, Page
Vertical frame with gravity lock	002
Vertical frame with guardrail lug	003
Base jack	007
Base plate	008
Decking transom / Base transom / Intermediate transom	009
Wooden plank	010
Profiled wooden plank	012
Aluminium deck	014
Aluminium floor panel with end cap	015
Steel deck	016
Vertical diagonal brace	017
Tie bar (steel shore tube)	018
Principal guardrail, intermediate guardrail (back railing)	019
Principal, intermediate guardrail (toggle rails)	020
Wooden toe board	021
Guardrail post with gravity lock / with guardrail lug	022
Deck holder 650	023
Guardrail post with transom 650 and gravity lock	024
Guardrail post with transom 650 and guardrail lug	025
Front guardrail (front guardrail double) 650	026
Front guardrail frame with gravity lock / with guardrail lug	027
Protective mesh	028
Protective mesh supports	029
Aluminium ladder frame with aluminium profiled surface	031
Aluminium ladder frame with plywood surface	034
Aluminium platform stairway	036
Double handrail for aluminium platform stairway	038
Inner handrail for aluminium platform stairway	039
Inner extension bracket with deck retainer	040
Suspension bracket with deck retainer	041
Outer extension bracket, single-deck, with support	042
Outer extension bracket, double-deck, with support	043
Support prop for extension bracket, double-deck	044
Protective roof extension arm	045
Deck retainer for protective roof extension arm, double-deck	046
Outer extension bracket, triple-deck, with support	047
Support prop for extension bracket, triple-deck	048
Deck retainer for protective roof extension arm, triple-deck	049
Gap cover	050
Passage frame connector 1650	051
Passage frame standard	052

Designation	Approval Z-8.1-185.1, Appendix A, Page
Bridging girder 4.00 m with diagonal brace 30x20	053
Bridging girder 5.00 m with diagonal brace 30x20	054
Bridging girder 6.00 m with diagonal brace 30x20	055
Mounting safety guardrail post	056
Telescopic guardrail	057
Lead-off adapter for stairway standard 650	058
Stairway standard 650	059
Guardrail holder for deck	060
Vertical frames 2 m (with gravity lock connection)	061
Vertical frames 2 m (with guardrail lug)	063
Base jacks	064
Aluminium deck with end cap and deck connector	065
Principal guardrail	066
Steel toe board	067
Aluminium toe board	068
Inner extension bracket (coupler bracket without support)	069
Deck transom	070
Intermediate transom 0.65	071
Aluminium ladder frame with integrated ladder and building veneer plywood BFU 100 G	072
Aluminium ladder frame with integrated ladder entirely out of aluminium	073
Compensation frame (vertical frame 0.5 m)	075
Compensation frame (vertical frame 1 m)	076
Base plate	077
Vertical frame 2 m with gravity lock connection	078
Vertical frame 2 m with guardrail lug	079
Vertical frame 1 m	080
Plank out of solid wood D=45 mm	081
Plank out of solid wood D=48 mm	082
Aluminium deck D = 45 mm	083
Tie bar	084
Longitudinal ledger/Principal guardrail	085
Front guardrail frame	086
Deck retainer	087
Wooden toe board	088
Extension bracket, single-deck and double-deck	089
Ladder frame 3 m	090
Ladder access frame 2.5 m	091
Steel tube ladder	092
Ladder frame, complete (2 struts, 1 ledger)	093
Base jack	094
Deck holder	095
Bridging girder 4 m	096
Bridging girder 5 m	097
Bridging girder 6 m	098
Guardrail post with transom for system scaffold with lugs	099

Permissible load classes for the system decks can be seen in section 4.2.8

9.2 STANDARD DESIGN CONFIGURATIONS

9.2.1 PRELIMINARY REMARKS

For the Super 65 system scaffolding, the stability and usability of the standard design have been verified with the approval Z-8.1-185.1 dated 3 January 2016. The standard design includes all scaffold constellations detailed in section 9.2. These scaffolding constellations are identically depicted in Appendix C of approval Z-8.1-185.1.

The following representations show configurations that depict the standard design and describe the required additional measures referred to in previous sections. All components are shown at their designated positions.

Anchor arrangement:
The following table shows the arrangement of the anchors:

Table 7: Anchor arrangement

Design	Closed façade	Partially open façade
No cladding	8 m offset	
Clad with netting	8 m offset	4 m or 4 m offset
Clad with tarpaulin	2 m	

In addition to the anchor arrangement shown, more anchorage may be required for some configurations (see section 9.2).

9.2.2 OVERVIEW OF CONFIGURATIONS

Table 8: Schedule of configurations

Special fittings		Façade		Fittings *)				Configuration as per Appendix C, page 22, 23, 30, 31 as well as Tab. B.4 and page	Anchor forces and foundation loads as per Tab. B.3 configuration
		Partially open	Closed	Inner brackets	Outer brackets	Net	Tarpaulin		
Without		√	√					1	3-1
		√	√	X				2	3-2
		√	√	X	X			3	3-3
		√		X	X	X		4	3-4
			√	X	X	X		5	3-5
		√		X	X		X	6	3-6
			√	X	X		X	7	3-7
With protective wall		√	√					1, 8, 24	4-1
		√	√	X				2, 8, 24	4-2
		√	√	X	X			3, 8, 25	4-3
		√		X	X	X		4, 8, 25	4-4
			√	X	X	X		5, 8, 25	4-5
		√		X	X		X	6, 8, 25, 32	4-6
			√	X	X		X	7, 8, 25, 32	4-7
With protective roof	3-deck	√	√					1, 9, 26	5-1
		√	√	X				2, 9, 26	
		√	√	X	X			3, 9, 26	
	2-deck	√	√					1, 10, 27	5-2
		√	√	X				2, 10, 27	
		√	√	X	X			3, 10, 27	
Passage frames		√	√					1, 11, 28	6-1
		√	√	X				2, 12, 29	6-2
		√	√	X	X			3, 12, 29	6-3
Bridging		√	√					1, 13, 33	7-1
		√	√	X				2, 14, 33	7-2
		√	√	X	X			3, 15, 33	7-3
		√		X	X		X	6, 16, 33	7-4
			√	X	X		X	7,16, 33	

*) The equipment marked with "X" **may**, but does not have to be fitted.

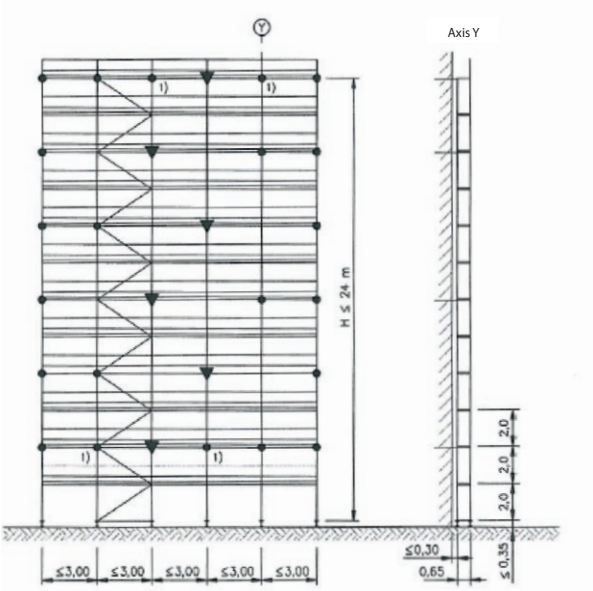
Appendix C and Tables B.4 and B.3 mentioned in the above schedule are part of the general type approval for the facade scaffolding system: RUX rapid-erection scaffolding SUPER 65 with the approval number Z-8.1-185.1 dated 3 January 2016.

9.2.3 REPRESENTATION OF CONFIGURATIONS

9.2.3.1 Basic configuration

Unclad scaffold with bay lengths of up to 3.0 m, without brackets, without any special fittings, partially open / closed façade:

(Configurationnumber: **01**)



● Scaffold tie
▼ V-shaped tie
1) Scaffold tie can be dispensed with in front of closed façades

Max. jack extension: 350 mm
Anchorage: 8 m offset, with additional ties in front of open façade

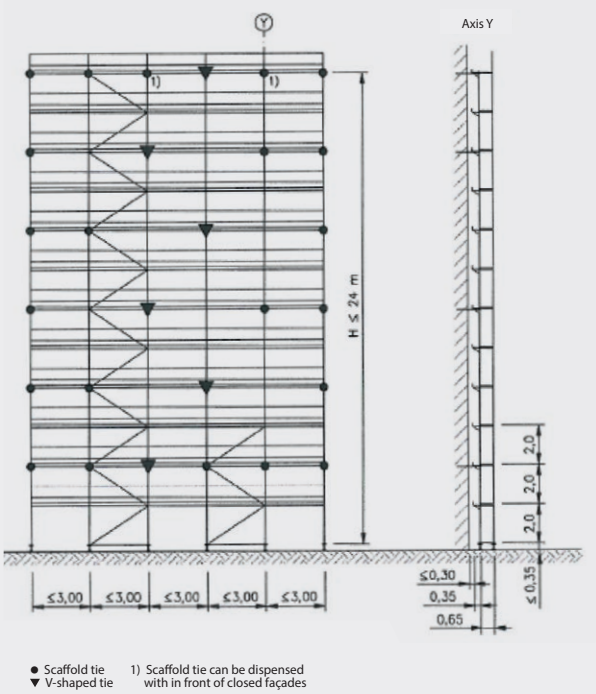
Façade			Partially open	Closed
Jack loads		Inside: Outside:	9.5 kN 15.0 kN	9.5 kN 15.0 kN
Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 2.2 kN	1.6 kN 1.6 kN
	V-shaped tie bar:	Parallel: Max. inclined load:	4.8 kN 3.4 kN	

The values can be tensile or compressive forces.

9.2.3.2 Bracket configuration 1 (with inner brackets)

Unclad scaffold with bay lengths of up to 3.0 m, with inner brackets, without any special fittings, partially open / closed façade:

(Configurationnumber: **02**)



● Scaffold tie
▼ V-shaped tie

1) Scaffold tie can be dispensed with in front of closed façades

Max. jack extension: 350 mm
Anchorage: 8 m offset, with additional ties in front of open façade

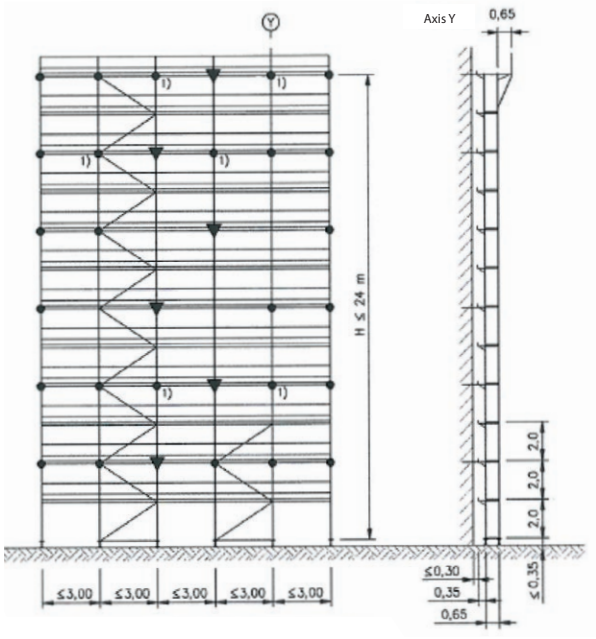
Façade			Partially open	Closed
Jack loads		Inside: Outside:	16,3 kN 15,8 kN	16,3 kN 15,8 kN
Anchor forces	Orthogonal:	<22 m =24 m	4,1 kN 2,2 kN	1,6 kN 1,6 kN
	V-shaped tie bar:	Parallel: Max. inclined load:	6,3 kN 4,5 kN	

The values can be tensile or compressive forces.

9.2.3.3 BRACKET CONFIGURATION 2 (WITH INNER AND OUTER BRACKETS)

Unclad scaffold with bay lengths of up to 3.0 m, with inner and outer brackets, without any special fittings, partially open / closed façade:

(Configuration number: **03**)



● Scaffold tie
▼ V-shaped tie
1) Scaffold tie can be dispensed with in front of closed façades

Max. jack extension: 350 mm
Anchorage: 8 m offset, with additional ties in front of open façade

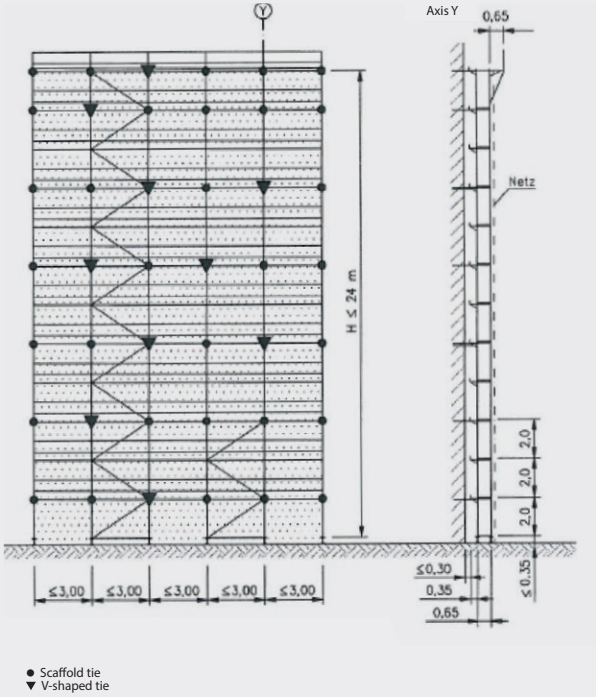
Façade			Partially open	Closed
Jack loads		Inside: Outside:	17.9 kN 22.2 kN	17.9 kN 22.2 kN
Anchor forces	Orthogonal:	<22 m =24 m	3.2 kN 1.4 kN	1.6 kN 1.6 kN
	V-shaped tie bar:	Parallel: Max. inclined load:	6.3 kN 4.5 kN	

The values can be tensile or compressive forces.

9.2.3.4 BRACKET CONFIGURATION 2, NET-CLAD, PARTIALLY-OPEN FAÇADE

Net-clad scaffold with bay lengths of up to 3.0 m, with inner and outer brackets, without any special fittings, partially open façade:

(Configurationnumber: **04**)



Max. jack extension: 350 mm
Anchorage: 4 m

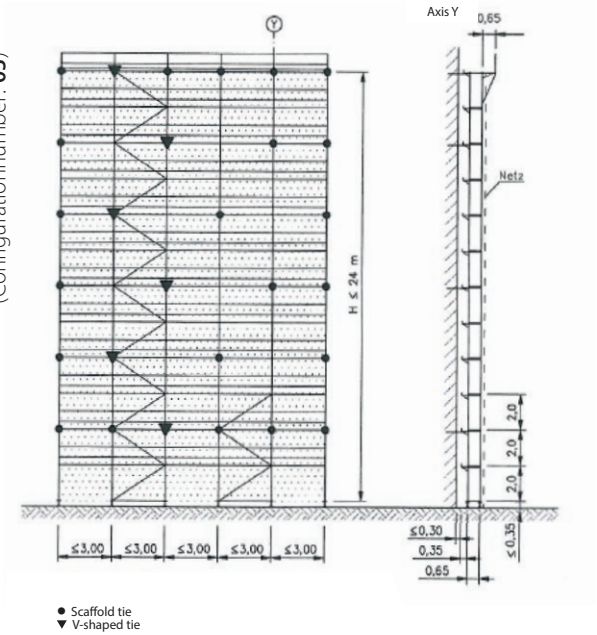
Façade			Partially open	Closed
Jack loads		Inside: Outside:	17.9 kN 22.2 kN	
Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 2.5 kN	
	V-shaped tie bar:	Parallel: Max. inclined load:	5.8 kN 4.1 kN	

The values can be tensile or compressive forces.

9.2.3.5 BRACKET CONFIGURATION 2, NET-CLAD, CLOSED FAÇADE

Net-clad scaffold with bay lengths of up to 3.0 m, with inner and outer brackets, without any special fittings, closed façade:

(Configurationnumber: **05**)



Max. jack extension: 350 mm
Anchorage: 4 m

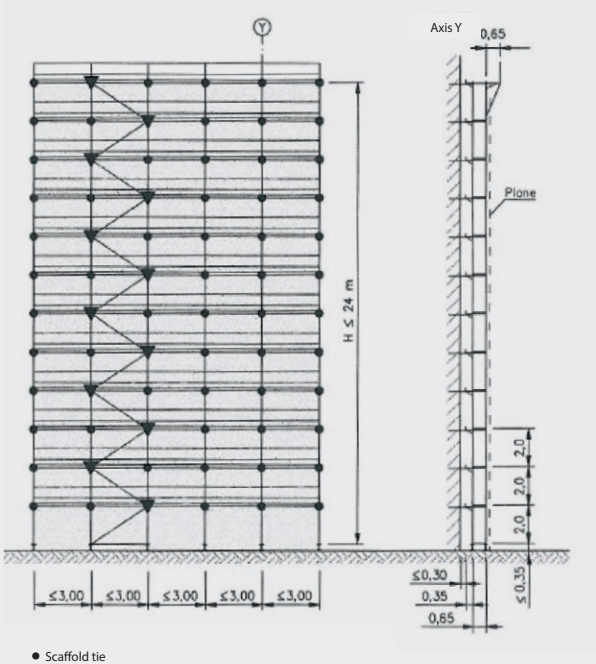
Façade			Partially open	Closed
Jack loads		Inside: Outside:		17.9 kN 22.2 kN
Anchor forces	Orthogonal:	<22 m =24 m		3,0 kN 1.7 kN
	V-shaped tie bar:	Parallel: Max. inclined load:		4.4 kN 3.1 kN

The values can be tensile or compressive forces.

9.2.3.6 BRACKET CONFIGURATION 2, TARPAULIN-CLAD, PARTIALLY-OPEN FAÇADE

Tarpaulin-clad scaffold with bay lengths of up to 3.0 m, with inner and outer brackets, without any special fittings, partially open façade:

(Configurationnumber: **06**)



Max. jack extension: 350 mm
Anchorage: 2 m

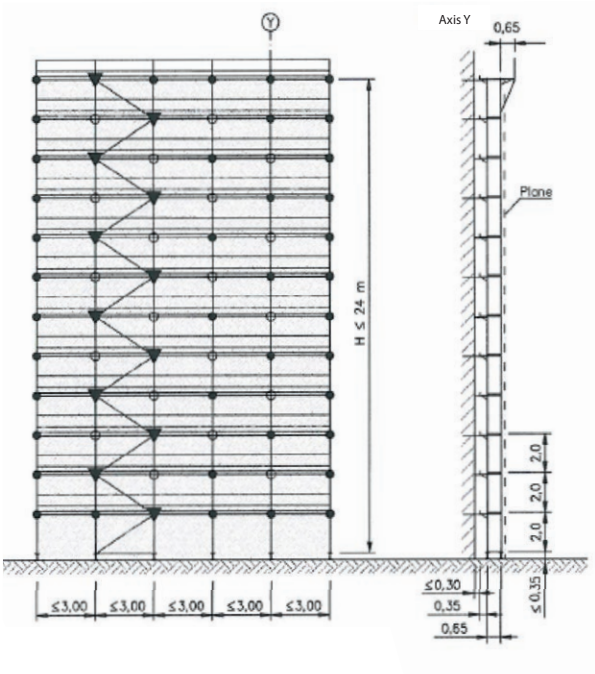
Façade			Partially open	Closed
Jack loads		Inside: Outside:	17.9 kN 22.2 kN	
Anchor forces	Orthogonal:	<22 m =24 m	6.7 (5.3) kN 4.1 kN	
	V-shaped tie bar:	Parallel: Max. inclined load:	5.2 kN 4.7 kN	

The values can be tensile or compressive forces. Values in brackets = max. tensile force.

9.2.3.7 BRACKET CONFIGURATION 2, TARPAULIN-CLAD, CLOSED FAÇADE

Tarpaulin-clad scaffold with bay lengths of up to 3.0 m, with inner and outer brackets, without any special fittings, closed façade:

(Configurationnumber: **07**)



● Scaffold tie
▼ V-shaped tie
O Pressure support

Max. jack extension: 350 mm
Anchorage: 2 m

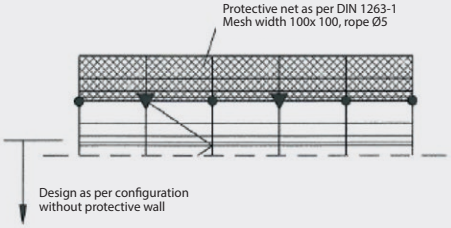
Façade			Partially open	Closed
Jack loads		Inside: Outside:		17.9 kN 22.2 kN
Anchor forces	Orthogonal:	<22 m =24 m		5.3 (4.4) kN 2.8 kN
	V-shaped tie bar:	Parallel: Max. inclined load:		5.2 kN 4.7 kN

The values can be tensile or compressive forces. Values in brackets = max. tensile force.

9.2.3.8 PROTECTIVE WALL BASIC AND BRACKET CONFIGURATIONS

Scaffold with bay lengths of up to 3.0 m, with or without inner and outer brackets, partially open / closed façade:

(Config.number: **08**)



	Façade			Partially open	Closed
Basic configuration	Jack loads		Inside: Outside:	9.5 kN 15.1 kN	9.5 kN 15.1 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.0 kN 3.3 kN	1.6 kN 2.1 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	5.2 kN 3.7 kN	

	Façade			Partially open	Closed
Bracket configuration 1, inner brackets	Jack loads		Inside: Outside:	15.9 kN 15.9 kN	15.9 kN 15.9 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.0 kN 3.3 kN	1.6 kN 2.1 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.7 kN 4.7 kN	

	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets	Jack loads		Inside: Outside:	17.7 kN 22.3 kN	17.7 kN 22.3 kN
	Anchor forces	Orthogonal:	<22 m =24 m	3.2 kN 2.7 kN	1.6 kN 2.1 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.7 kN 4.7 kN	

	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets with net	Jack loads		Inside: Outside:	17.7 kN 22.3 kN	17.7 kN 22.3 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 3.9 kN	2.9 kN 2.9 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.7 kN 4.7 kN	4.3 kN 3.0 kN

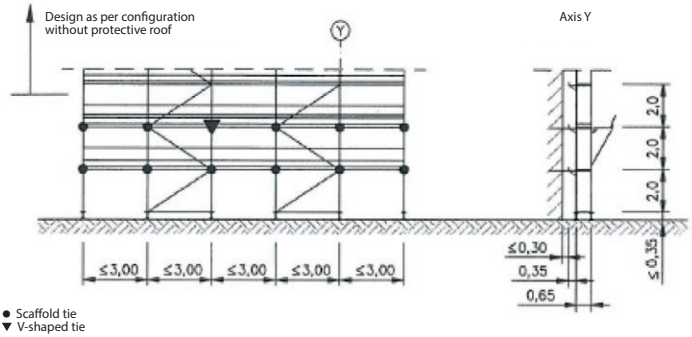
	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets with tarpaulin	Jack loads		Inside: Outside:	17.7 kN 22.3 kN	17.7 kN 22.3 kN
	Anchor forces	Orthogonal:	<22 m =24 m	6.7 (5.3) kN 5.6 kN	5.3 (4.5) kN 4.2 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	5.9 kN 4.7 kN	5.9 kN 4.7 kN

The values can be tensile or compression forces. Values in brackets = max. tensile force.

9.2.3.9 PROTECTIVE ROOF CONFIGURATION (3-DECK)

Unclad scaffold with bay lengths of up to 3.0 m, with or without inner and outer brackets, partially open / closed façade:

(Configurationnumber: **09**)



Max. jack extension: 350 mm
Anchorage: Additional ties at first and second levels

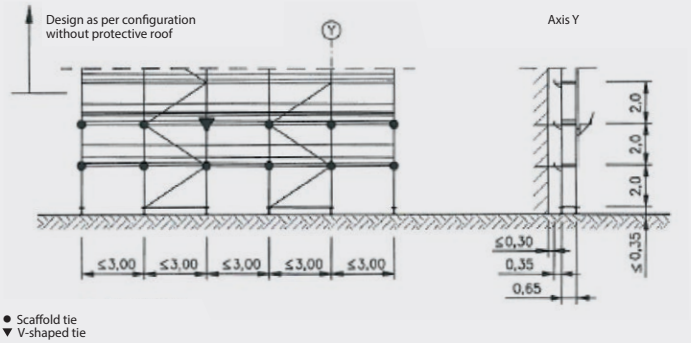
	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets	Jack loads		Inside: Outside:	17.6 kN 23.6 kN	17.6 kN 23.6 kN
	Anchor forces	Orthogonal:	<22 m =24 m	3.2 kN 1.4 kN	1.8 kN 1.4 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.3 kN 4.5 kN	

The values can be tensile or compressive forces.

9.2.3.10 PROTECTIVE ROOF CONFIGURATION (2-DECK)

Unclad scaffold with bay lengths of up to 3.0 m, with or without inner and outer brackets, partially open / closed façade:

(Configurationnumber: **10**)



Max. jack extension: 350 mm
Anchorage: Additional ties at first and second levels

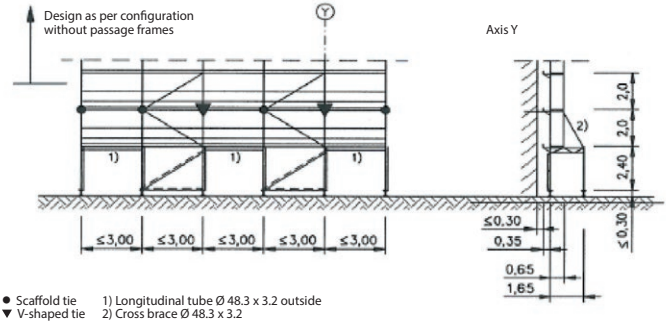
	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets	Jack loads		Inside: Outside:	17.6 kN 23.6 kN	17.6 kN 23.6 kN
	Anchor forces	Orthogonal:	<22 m =24 m	3.2 kN 1.4 kN	1.8 kN 1.4 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.3 kN 4.5 kN	

The values can be tensile or compressive forces.

9.2.3.11 PASSAGE FRAMES BASIC AND BRACKET CONFIGURATIONS

Unclad scaffold with bay lengths of up to 3.0 m, with or without inner and outer brackets, partially open / closed façade:

(Configurationnumber: **11**)



Max. jack extension: 300 mm
Anchorage: Additional ties at the second level

	Façade			Partially open	Closed
Basic configuration	Jack loads		Inside: Outside:	17.6 kN 6.7 kN	17.6 kN 6.7 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 2.2 kN	1.7 kN 1.7 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.7 kN 4.7 kN	

	Façade			Partially open	Closed
Bracket configuration 1, inner brackets	Jack loads		Inside: Outside:	25.3 kN 7.1 kN	25.3 kN 7.1 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 2.2 kN	1.7 kN 1.7 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.4 kN 4.5 kN	

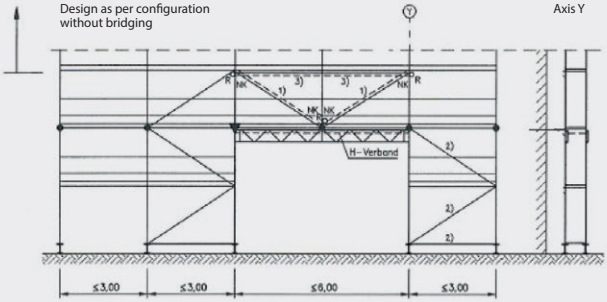
	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets	Jack loads		Inside: Outside:	28.2 kN 9.0 kN	28.2 kN 9.0 kN
	Anchor forces	Orthogonal:	<22 m =24 m	3.8 kN 1.5 kN	1.7 kN 1.7 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.4 kN 4.5 kN	

The values can be tensile or compressive forces.

9.2.3.12 BRIDGING BASIC CONFIGURATION

Unclad scaffold with bay lengths of up to 3.0 m, without brackets, partially open / closed façade:

(Configurationnumber: **12**)



1) Scaffold tube Ø48.3 x 3.2 inside and outside with standard couplers
2) Additional diagonals outside and below a longitudinal ledger outside
3) Horizontal scaffold tubes Ø48.3 x 3.2 inside and outside with standard couplers

Max. jack extension: 300 mm
Anchorage: Additional ties at the bridging

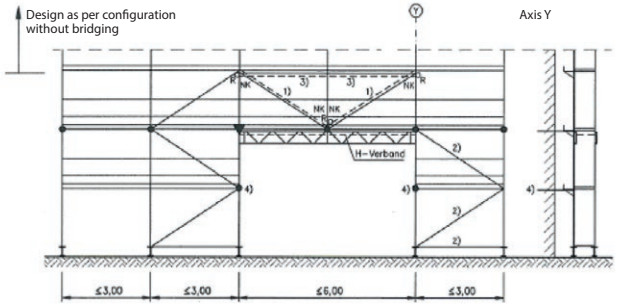
	Façade			Partially open	Closed
Basic configuration	Jack loads		Inside: Outside:	14.6 kN 17.7 kN	14.6 kN 17.7 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 2.2 kN	1.7 kN 1.7 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	4.8 kN 3.4 kN	

The values can be tensile or compressive forces.

9.2.3.13 BRIDGING BRACKET CONFIGURATION 1 (WITH INNER BRACKETS)

Unclad scaffolding with bay lengths of up to 3.0 m, partially open / closed facade

(Configurationnumber: **13**)



● Scaffold tie
▼ V-shaped tie

H-formation (scaffold tubes with couplers)

- - - Diagonal/Longitudinal tube inside
NK = Standard coupler
R = Cross tube Ø 48.3x3.2

1) Scaffold tube Ø48.3 x 3.2 inside and outside with standard couplers
2) Additional diagonals outside and below a longitudinal ledger outside
3) Horizontal scaffold tubes Ø48.3 x 3.2 inside and outside with standard couplers
4) Additional scaffold tie in the area of the bridging at a height of 2 m

Max. jack extension: 300 mm
Anchorage: Additional ties at the bridging

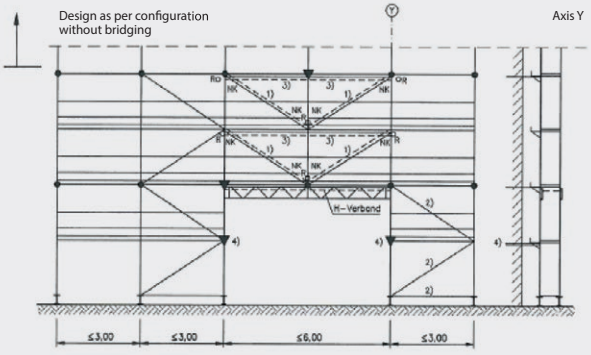
	Façade			Partially open	Closed
Bracket configuration 1, inner brackets	Jack loads		Inside: Outside:	23.4 kN 19.5 kN	23.4 kN 19.5 kN
	Anchor forces	Orthogonal:	<22 m =24 m	4.1 kN 2.2 kN	1.7 kN 1.7 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.5 kN 4.6 kN	

The values can be tensile or compressive forces.

9.2.3.14 BRIDGING BRACKET CONFIGURATION 2 (WITH INNER AND OUTER BRACKETS)

Unclad scaffold with bay lengths of up to 3.0 m, partially open / closed façade:

(Configurationnumber: **14**)



1) Scaffold tube Ø48.3 x 3.2 inside and outside with standard couplers
2) Additional diagonals outside and below a longitudinal ledger outside
3) Horizontal scaffold tubes Ø48.3 x 3.2 inside and outside with standard couplers
4) Additional scaffold tie in the area of the bridging at a height of 2 m

Max. jack extension: 300 mm
Anchorage: Additional ties at the bridging

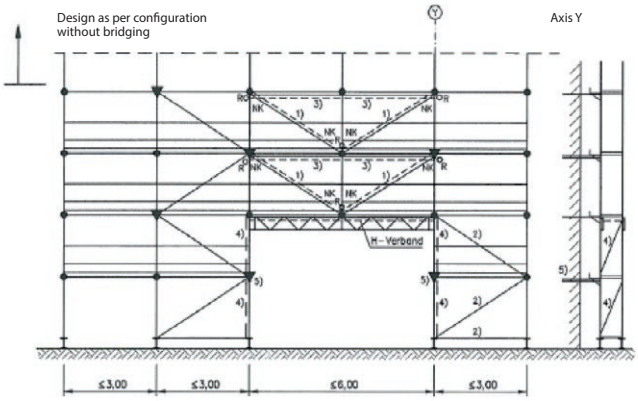
	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets	Jack loads		Inside: Outside:	24.5 kN 24.8 kN	24.5 kN 24.8 kN
	Anchor forces	Orthogonal:	<22 m =24 m	3.2 kN 1.4 kN	1.7 kN 1.7 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	6.5 kN 4.6 kN	

The values can be tensile or compressive forces.

9.2.3.15 BRIDGING BRACKET CONFIGURATION 2 WITH TARPAULIN

Tarpaulin-clad scaffold with bay lengths of up to 3.0 m, partially open / closed façade:

(Configurationnumber: **15**)



● Scaffold tie
▼ V-shaped tie

H-formation (scaffold tubes with couplers)

- - - Diagonal/Longitudinal tube inside
NK = Standard coupler
R = Cross tube Ø 48.3x3.2

1) Scaffold tube Ø48.3 x 3.2 inside and outside with standard couplers
2) Additional diagonals outside and below a longitudinal ledger outside
3) Horizontal scaffold tubes Ø48.3 x 3.2 inside and outside with standard couplers
4) Cross diagonals Ø 48.3 x 3.2 with swivel couplers:
for open façades at H = 4 m, for closed façades at H = 2 m
5) Additional V-shaped tie in the area of the bridging at a height of 2 m

Max. jack extension: 300 mm
Anchorage: Additional ties at the bridging

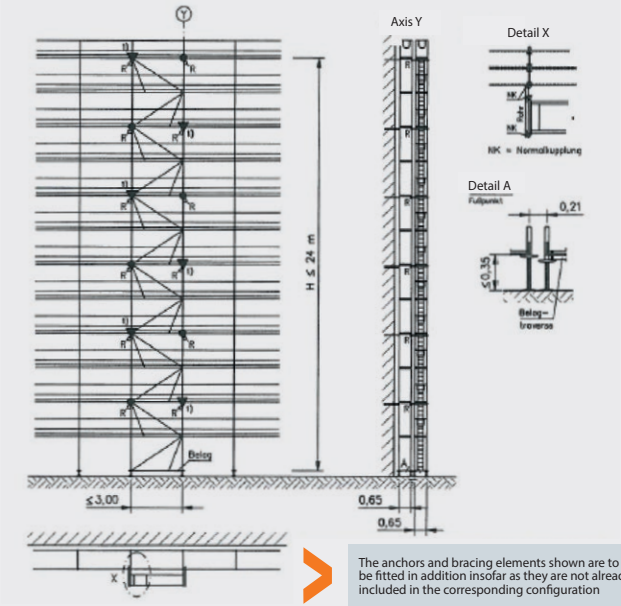
	Façade			Partially open	Closed
Bracket configuration 2, inner and outer brackets with tarpaulin	Jack loads		Inside: Outside:	24.7 kN 26.8 kN	24.7kN 26.8 kN
	Anchor forces	Orthogonal:	<22 m =24 m	6.8 (5.3) kN 4.2 kN	5.3 (4.5) kN 2.9 kN
		V-shaped tie bar:	Parallel: Max. inclined load:	5.5 kN 4.8 kN	

The values can be tensile or compressive forces.

9.2.3.16 FRONT LADDER ASCENT BASIC AND BRACKET CONFIGURATIONS

Clad/Unclad scaffold with bay lengths of up to 3.0 m, partially open / closed façade:

(Configurationnumber: **16**)



● Scaffold tie
▼ V-shaped tie

R = Connecting tubes between ladder ascent and scaffold at the anchorage level (see detail X)

Max. jack extension: 350 mm

Anchorage: Anchors to be fitted at each anchorage level in the area of the ladder ascent (4m)
1) Additional V-shaped tie bar at each connection level of the ascent tower

	Façade		Partially open	Closed
All configurations	Jack loads	Ascent tower:	9.0 kN	9.0 kN
	Increase anchor loads of the configuration by:		1.05 kN	

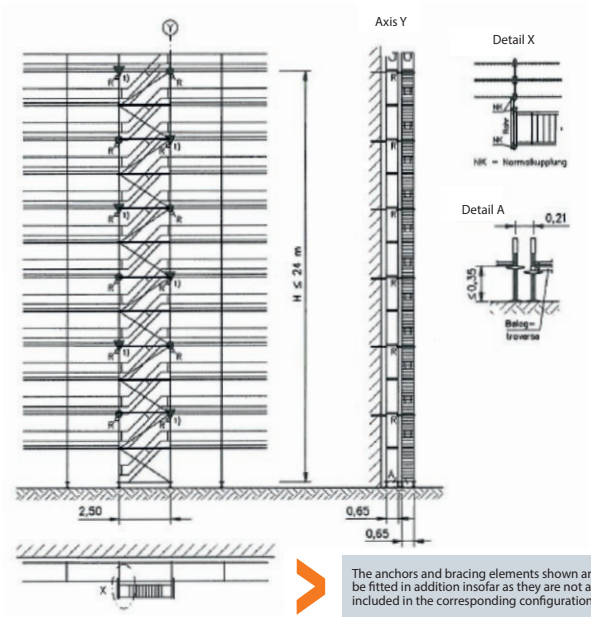
The values can be tensile or compressive forces.

9.2.3.17 FRONT STAIRWAY ASCENT WITH VERTICAL FRAMES

Basic and bracket constellations

Clad/Unclad scaffold with bay lengths of up to 3.0 m, partially open / closed façade:

(Configurationnumber: **17**)



● Scaffold tie
▼ V-shaped tie

R = Connecting tubes between stairway ascent and scaffold at the anchorage level (see detail X)

Max. jack extension: 350 mm

Anchorage: Anchors to be provided at each anchorage level in the area of the ascent (4m)

1) Additional V-shaped tie bar at each connection level of the ascent tower

	Façade		Partially open	Closed
All configurations	Jack loads	Ascent tower:	9.0 kN	9.0 kN
	Increase anchor loads of the configuration by:		1.05 kN	

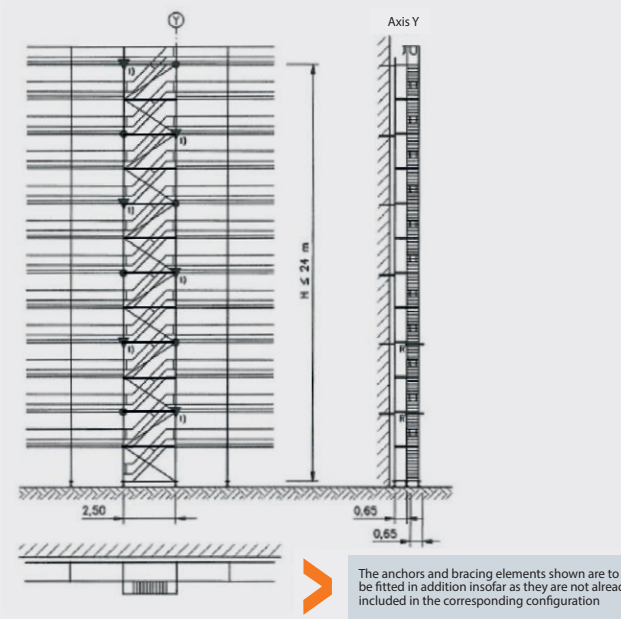
The values can be tensile or compressive forces.

9.2.3.18 FRONT STAIRWAY ASCENT WITH STAIRWAY STANDARDS

Basic and bracket constellations

Clad/Unclad scaffold with bay lengths of up to 3.0 m, partially open / closed façade:

(Configurationnumber: **18**)



● Scaffold tie
▼ V-shaped tie

Max. jack extension: 350 mm

Anchorage: Anchors to be provided at each anchorage level in the area of the ascent (4m)

1) Additional V-shaped tie bar at each connection level of the ascent tower

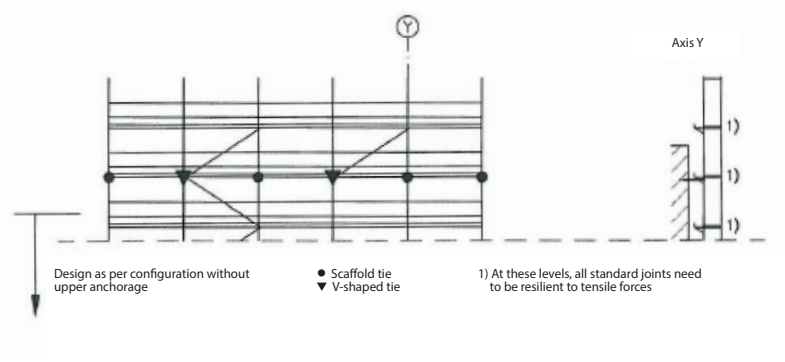
	Façade		Partially open	Closed
All configurations	Jack loads	Ascent tower:	10.8 kN	10.8 kN
	Increase anchor loads of the configuration by:		1.05 kN	

The values can be tensile or compressive forces.

9.2.3.19 TOPMOST LEVEL NOT ANCHORED

Basic and bracket constellation 1 (inner brackets)
Clad/Unclad scaffold with bay lengths of up to 3.0 m, partially open / closed façade:

(Configurationnumber: **19**)



Anchorage: Additional ties in the uppermost anchorage level
1) At these points, ensure all standard joints are connected so as to be resistant to tensile forces

	Façade	Partially open	Closed
All configurations	Anchor loads at the uppermost anchorage level:	4.1 kN	

The values can be tensile or compressive forces.

10 ADDITIONAL TECHNICAL INFORMATION

10.1 EXAMPLE OF AN ANCHORAGE PROTOCOL

11 NOTES

GENERAL TERMS AND CONDITIONS OF SALE, DELIVERY AND PAYMENT OF RUX GMBH

§ 1 – Scope
1. These General Terms and Conditions shall apply exclusively; any terms and conditions of orderer that are contrary to or deviate from our Terms and Conditions shall be deemed unaccepted unless expressly agreed to in writing. Our General Terms and Conditions of Sale, Delivery and Payment shall also apply when we carry out the delivery to the orderer without reservation although we are aware of contrary or deviating terms and conditions on the part of the orderer.
2. Our General Terms and Conditions of Sale, Delivery and Payment shall also apply to all future transactions with the orderer.

§ 2 – Quotations
1. All parts and elements of our quotations are submitted without engagement.
2. We reserve the right of ownership and copyright to illustrations, drawings, calculations and other documentation. The documents mentioned may not be made accessible to third parties without our express written consent.

§ 3 – Prices and Terms of Payment
1. Insofar as nothing to the contrary has been agreed contractually, our prices are quoted "ex works", excluding packing and freight costs; such shall be invoiced separately.
2. All prices indicated are net prices; they are quoted exclusive of the statutory level of VAT valid on the day of delivery.
3. Insofar as nothing to the contrary has been agreed contractually, the orderer shall be deemed as being in default at the latest 30 days after receipt of invoice or request for payment insomuch that default has not occurred earlier on the basis of a dunning letter having been sent. The orderer shall not be entitled to make any deductions for discount without a specific written agreement.
4. The orderer shall only be entitled to offsetting rights when same's counter claims have been deemed legally binding, are uncontested or have been agreed by us. Moreover, the orderer shall only be entitled to assert retention rights when the counter claims arise from the same contractual relationship as the claim for payment.
5. Any order values below our minimum order value of EUR 50.00 shall be subject to an administration fee of EUR 20.00.

§ 4 – Delivery and Delivery Dates
1. Any prospective periods and dates for delivery and services that we mention shall always be interpreted as being approximate unless a fixed period or a fixed date has been expressly confirmed or agreed. Insofar as shipments have been agreed, delivery periods and delivery dates shall always refer to that point in time when delivery is made to the forwarder, carrier or other third party commissioned with the transportation.
2. Should we be in default with the delivery for reasons for which we are responsible, orderer's claims to compensation for the delay shall be limited to an amount of 0.5% of the value of the delivery for each completed week of delay, but restricted to a maximum amount of 5% of the value of the delivery. This limitation shall not apply when the default is a result of wilful intent, gross negligence or an infringement of essential contractual obligations (these are obligations that need to be satisfied to enable the contract to be properly fulfilled in the first place and whose observation our contractual partner may generally rely on).
3. Any claims for compensation on the part of the orderer for delays in delivery as well as any claims for compensation in lieu of the delivery that go beyond the limits mentioned in Clauses 1. and 2. above shall be deemed as excluded in all cases of a delay in delivery, even after expiry of any deadline that may have been set us for delivery. This shall not be applicable in cases of wilful intent and gross negligence or cases of injury to life, body and health where there is a mandatory liability; a change of the burden of proof to the disadvantage of the orderer shall not apply in this case. The orderer may only withdraw from the contract within the scope of the statutory requirements insofar as we are responsible for the delay in delivery.
4. Upon our request, the orderer shall be obliged to declare within a reasonable period of time whether, on account of the delay in delivery, same will withdraw from the contract and/or demand compensation in lieu of the delivery or insist on performance.
5. Should the orderer default in acceptance or infringe other obligations to cooperate, we shall be entitled to insist on compensation including any additional expenditure for the damage we incur. In this case, the risk of accidental destruction or of a coincidental deterioration of the purchased item shall pass to the orderer at that point in time when same is in default of acceptance.
6. Any acts of God or operational disruptions arising in our facilities or those of our suppliers which, through no fault of our own, temporarily prevent our delivering the contractual object at the agreed time or within the agreed period shall modify the dates and periods mentioned under Clauses 1. to 5. of this Paragraph by the duration of the disruptions caused by these circumstances. The orderer may withdraw from the contract when corresponding disruptions lead to a delay in performance of more than four months. Other rights to withdraw shall remain unaffected by this.
7. The adherence to agreed delivery dates or rightfully set delivery periods presupposes that our sub-suppliers punctually supply us with the ordered input materials or purchased parts necessary for the fulfilment of the order (reservation of self-supply). Should, as a consequence of unpunctual delivery by our sub-suppliers, we not be able to observe the agreed or set delivery dates, we shall not be deemed as being in default when the input material was ordered punctually and we have otherwise made every reasonable effort to ensure prompt delivery of the input material.

§ 5 – Transfer of Risk
1. Insofar as nothing to the contrary has been agreed contractually, "ex works" delivery shall be deemed as agreed. This shall also apply when the purchased item is sent to another address at the request of the orderer. Risk shall then transfer to the orderer when delivery of the purchased item is made to the transporting party.
2. Insofar as such is desired by the orderer, we shall take out transport insurance coverage for the shipment; the costs incurred are to be borne by the orderer.
3. Generally-speaking, the material is supplied unpacked and not protected against corrosion. In the case of material that is supplied packed, the orderer shall assume the obligation of unpacking and disposal of the packaging at own expense.

§ 6 – Warranty for Defects
1. Any warranty rights on the part of the orderer presuppose that same has properly fulfilled its obligations with regard to the inspection and making of complaints about defects pursuant to § 377 of the German Commercial Code (HGB). § 377 of the German Commercial Code shall also apply correspondingly when we perform just work on behalf of the orderer. Moreover, the delivered goods have to be stored and processed or used in a proper and appropriate manner. Proper and appropriate storage in the case of wooden material, for example, would include its ventilation. A proper and appropriate handling of the goods when assembling or dismantling scaffolding would require the observation of all prescribed technical requirements – including the DIN standards – and adherence to all approval regulations and state guidelines.
2. Insofar as the purchased item has a defect, we are always to be approached first and foremost for rectification as per § 439 of the German Civil Code (BGB).
3. Should we not be willing or able to perform rectification or should such extend beyond a reasonable period of time for reasons for which we are responsible or should rectification fail for other reasons, the orderer shall at own discretion be entitled either to withdraw from the contract or to demand a lowering of the purchase price (reduction).
4. Insofar as nothing to the contrary has been agreed below, any more extensive claims on the part of the orderer – irrespective of the legal foundation – shall be deemed excluded. We shall not therefore be liable for damage that has not occurred directly to the delivered object; in particular, we shall not be liable for lost earnings or other financial losses incurred by the orderer.
The above exemption from liability shall not apply when the cause of damage is the result of wilful intent or gross negligence or in cases of injury to life, body and health. Moreover, it shall not apply when a guarantee has been assumed regarding the condition of the object or its durability.
The above exemption from liability shall also not apply to such damage

caused by the culpable infringement of essential contractual obligations (these are obligations that need to be satisfied to enable the contract to be properly fulfilled in the first place and whose observation our contractual partner may generally rely on). Our liability in such circumstances shall be limited to the contractually-typical, foreseeable amount of damage provided it is not a case of wilful intent or gross negligence or when we have assumed guarantees.
5. Warranty claims on the part of the orderer shall be limited to twelve months. This shall not apply when legislation as per § 438 Clause 1 [2] of the German Civil Code (Building Structures and Components for Building Structures), § 479 Clause 1 of the German Civil Code (Right of Recourse) and § 634a Clause 1 [2] of the German Civil Code (Construction Defects) stipulate longer periods.

§ 7 – Total Liability
1. Any more extensive liability for compensation and reimbursement of expenditure than that envisaged in § 6 – irrespective of the nature of the claims asserted – shall be deemed excluded. This shall not apply to claims asserted against us pursuant to §§ 1 and 4 of the Product Liability Act. This exemption from liability shall likewise not apply in cases of wilful intent, gross negligence and injury to life, body and health or in cases of the infringement of essential contractual obligations (these are obligations that need to be satisfied to enable the contract to be properly fulfilled in the first place and whose observation our contractual partner may generally rely on).
The claim to compensation from an infringement of essential contractual obligations shall however be limited to the contractually-typical, foreseeable amount of damage insofar as it is not a case of wilful intent of gross negligence or there is liability due to a case of injury to life, body and health. A change of the burden of proof to the disadvantage of the orderer shall not apply in this case.
2. Insofar as our liability is excluded or limited, the same shall also apply to the personal liability of our employees, workers, co-workers, representatives and agents.

§ 8 – Retention of Title
1. We reserve the right of ownership to the purchased item until full payment of the purchase price including the incidental expenses (freight, packing etc.). In the event of any behaviour on the part of the orderer that is contrary to the contractual obligations, in particular in a case of default in payment, we shall be entitled to withdraw from the contract and repossess the purchased item. We shall be authorised to remarket the purchased item after repossessing it. After deducting the appropriate amount for remarketing costs, the remaining proceeds shall be set off against the obligation of the orderer.
2. The orderer shall be obliged to treat the purchased item with care. Orderer shall, at own expense, take out adequate reinstatement-value insurance coverage for the item against the risks of fire, water damage and theft. The orderer shall carry out any maintenance or repair work without delay – should such become necessary – at own expense.
3. The orderer shall be obliged to notify us immediately in writing in the event of seizure or other interventions by third parties. In such a case, the orderer shall also be obliged to support us to the full in the judicial and non-judicial assertion of our rights, in particular to make the necessary documents available.
4. The orderer shall be entitled to resell the purchased item in the ordinary course of business. However, same shall herewith assign to us as of now all claims in the amount of the final invoice amount (including value added tax) which shall accrue to same towards its customers or third parties from the reselling. This assignment is regardless of whether the purchased item is resold either with or without any further processing. We hereby accept this assignment. The orderer shall remain entitled to collect the claim within the scope of the ordinary course of business. This entitlement shall lapse when the orderer does not meet its payment obligations from the proceeds obtained or when same is in default with payment. It shall also lapse when insolvency or settlement proceedings are opened against the assets of the orderer or when the orderer suspends payments.
In such cases we shall be entitled to collect the assigned claim ourselves. The orderer shall be obliged to furnish us with all the information needed for the collection and to hand over all the associated documentation. In such a case the orderer shall also be obliged to inform the debtor (third parties) of the assignment.
5. The processing or modification of the purchased item by the orderer shall always be carried out on our behalf. Should the purchased item be processed together with other objects not belonging to us, we shall acquire co-ownership of the new object in the relationship of the value of the purchased item to the other processed objects at the point in time of processing. The same reservation of title shall apply to the object thus created as to the purchased item conditionally supplied.
6. Should the purchased item be inseparably combined with other objects not belonging to us, we shall acquire co-ownership of the new object in the relationship of the value of the purchased item to the other combined objects at the point in time of combination. Should the combination be such that the object of the orderer is to be regarded as the main object, it shall be deemed as agreed that the orderer transfers proportional co-ownership to us. The orderer shall safeguard the sole or co-ownership thus created on our behalf.
7. At orderer's request, we undertake to release the security – to which we are entitled – insofar as the realisable value of our security exceeds the secured claim by more than 10 percent; the selection of the security to be released shall be incumbent on us. In this case the orderer shall be obliged to mark the scaffolding material in its possession in such a way that, if necessary, it is possible to unequivocally identify the material still in our ownership. Should an assignment of claims be waived, the orderer shall be obliged to disclose upfront any and all claims from the sale of scaffolding material.

§ 9 – Place of Fulfilment, Applicable Law, Court of Jurisdiction
1. Unless anything to the contrary has been agreed, the place of fulfilment shall be the registered offices of our company. These are located in Hagen.
2. The law of the Federal Republic of Germany shall apply exclusively to all business relationships with us. The applicability of the CISG (UN Sales Law) shall be deemed as excluded.
3. Insofar as the orderer is a qualified businessperson, the courts of the Federal Republic of Germany shall have jurisdiction internationally for any and all legal disputes.
The court of jurisdiction shall be the registered offices of the company in all cases. However, we shall also be entitled to file for legal proceedings at the orderer's general court of jurisdiction. These provisions regarding jurisdiction shall also apply to any legal proceedings related to bills of exchange or cheques.
4. Should the orderer violate any requirements of VAT law, in particular regarding the required provision of a VAT ID number, the orderer shall be obliged to compensate us for any taxation disadvantage which may ensue from such. We reserve the right to assert more extensive claims for damages.

§ 10 – Concluding Provisions
Should the contract or these General Terms and Conditions of Sale, Delivery and Payment contain any loopholes, such legally valid provisions shall be deemed as agreed that close such loopholes and which the contractual parties would have agreed upon with a view to the commercial objective of the contract and the purpose of the General Terms and Conditions of Sale, Delivery and Payment if they had known about the loopholes.

As of 4 July 2016

RUX GmbH · Neue Straße 7 · D-58135 Hagen · Germany
Tel: +49 (0) 2331 47 09-0 · Fax: +49 (0) 2331 47 09-202
www.scafom-rux.de · info@scafom-rux.de
Managing Director: Volker Rux
HRB (Commercial Register No.) 4435 · Local Court of Hagen
VAT ID No. DE 813 733 780 · Tax No. 321/5784/0172

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scafom-rux Germany · RUX GmbH
Neue Str. 7 · 58135 Hagen · Germany
T +49 2331 4709-0 · info@scafom-rux.de

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