

INSTRUCTION FOR ERECTION AND USE

UNIFIX 70

Instructions for Erection and Use

UNIFIX 70

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CONTENTS

1.	General.....	1
2.	Erecting the scaffold UNIFIX 70.....	3
2.1	General requirements	3
2.2	Erecting the first bay	3
2.2.1	Load-distributing bed	3
2.2.2	Foot spindles and foot plates	3
2.2.3	Height adjustment, levelling frame	4
2.2.4	Vertical frames, passageway frames	4
2.2.5	Stiffening by vertical diagonal braces.....	5
2.2.6	Providing the decks	6
2.2.7	Aligning.....	6
2.3	Erecting further bays.....	6
2.3.1	Standard bay	6
2.3.2	Corner figuration.....	7
2.3.3	Scaffold access	8
2.4	Erecting further scaffold layers	9
2.4.1	Principles.....	9
2.4.2	Handling scaffold components.....	9
2.4.3	Assembling vertical frames and guardrails.....	10
2.4.4	Decking	15
2.4.5	Vertical diagonal braces	
2.4.6	Completing the side protection	15
2.4.7	Anchoring (anchor grids, anchor forces)	16
2.4.8	Scaffold retainers.....	17
2.5	Version variations and installing supplementary components.....	19
2.5.1	General.....	19
2.5.2	Anchor grid staggered by 8 m	20
2.5.3	Anchor grid 4 m	21
2.5.4	Anchor grid 4 m at every 2nd tier of frames	22
2.5.5	Netting in front of closed façade	23
2.5.6	Netting in front of open façade	24
2.5.7	Tarpaulin covering	25
2.5.8	Longer foot spindles	26
2.5.9	Passageway frames	27
2.5.10	Widening brackets	30
2.5.11	Bridge bearers	31
2.5.12	Access by ladder	32

2.5.13	Protective shelter	33
2.5.14	Roof safety scaffold	34
2.5.15	Securing the scaffold components against lifting	37
2.5.16	Free-standing scaffold tiers over the last anchoring.....	38
3.	Dismantle scaffolds	39
4.	Use of scaffold system.....	39
5.	System components	40

UNIFIX 70 Translation of drawings

Figure	Page	German	English
7	7	Podesttraverse	Landing cross arm
14	20	Dachfanggerüst	Roof safety scaffold
14	20	Schutzdach	Protective shelter
14	20	Geländerholm als Fußriegel	Guardrail brace as foot ledger
15	21	Schutzdach	Protective shelter
15	21	Geländerholm als Fußriegel	Guardrail brace as foot ledger
15	21	Leitergang mit Innenleiter max. 4m für alle Aufbauvarianten	Ladder passage with inner ladder: max. 4m For erection version
16	22	Geländerholm als Fußriegel	Guardrail brace as foot ledger
17	23	Dachfanggerüst	Roof safety scaffold
17	23	Geländerholm als Fußriegel	Guardrail brace as foot ledger
18	24	Dachfanggerüst	Roof safety scaffold
18	24	Schutzdach	Protective shelter
18	24	Geländerholm als Fußriegel	Guardrail brace as foot ledger
18	24	Querdiagonale in jeden unteren Rahmen; alternativ Rohr mit Drehkupplung	Diagonal cross brace in each lower frame; Tube with swivel coupler alternatively
18	24	Leitergang mit Innenleiter	Ladder passage with inner ladder
19	25	Dachfanggerüst	Roof safety scaffold
19	25	Winddichte Plane	Weatherproof tarpaulin
19	25	Geländerholm als Fußriegel	Guardrail brace as foot ledger
19	25	Leitergang mit Innenleiter	Ladder passage with inner ladder
20	26	Dachfanggerüst	Roof safety scaffold
20	26	Schutzdach	Protective shelter
20	26	Geländerholm als Fußriegel	Guardrail brace as foot ledger
21	27	Dachfanggerüst	Roof safety scaffold
21	27	Geländerholm als Kopf- und Fußriegel	Guardrail brace as foot ledger
22	28	Dachfanggerüst	Roof safety scaffold
22	28	Geländerholm als Kopf- und Fußriegel	Guardrail brace as head and foot ledger
23	29	Geländerholm	Guardrail brace
23	29	Belagsicherung	Deck retainer
23	29	Gerüsthälter nur bei Ankerraster 2	Scaffold retainer only for anchor grid 2
23	29	Diagonale nur bei Ankerraster 2	Diagonal brace only for anchor grid 2
23	29	Diagonale nur bei Ankerraster 2	Diagonal brace only for anchor grid 2
24	30	Belagsicherung	Deck retainer
25	31	Schutzdach	Protective shelter
25	31	Querdiagonale	Diagonal cross brace
25	31	Rohr mit drehbarer Kupplung	Tube with swivel coupler

25	31	Traverse für Zwischenstandhöhen	Cross arm for intermediate standing height
25	31	Geländerholm als Fußriegel	Guardrail brace as foot ledger
27	33	Geländerholm	Guardrail brace
27	33	Auslegen bis Fassade	Arrange the decking up to the facade
27	33	Schutzdachaufsatz	Top unit of protective shelter
27	33	Übergangsboden	Transition deck
28	34	Schutzwandpfosten auf Vertikalrahmen	Guard system support on vertical frame
28	34	Schutzwandpfosten auf Dachfangrahmen	Guard system support on vertical frame
28	34	Schutzwandpfosten auf Ausleger 74	Guard system support on outrigger 74
28	34	Dachfangrahmen	Roof safety frame
28	34	Belagsicherung	Deck retainer
28	34	Übergangsboden	Transition deck
28	34	Auslegerstrebe	Outrigger strut
29	36	Schutzwandpfosten	Guard system support
29	36	Schutzgitter	Safety meshguard
29	36	Bordbrett	Toeboard
29	36	Belag	Decking
30	36	Netz aufgefädelt	Net, threaded on
30	36	Geländerholm	Guardrail brace
30	36	Schutzwandpfosten	Guard system support
30	36	Gurtschnellverschluss	Quick-look buckle
31	37	Fallstecker	Locking clip
32	38	Schutzdach	Protective shelter
32	38	Geländerholm als Fußriegel	Guardrail brace as foot ledger
32	38	Leitergang mit Innenleiter	Ladder passage with inner ladder

1. General

The scaffolding system UNIFIX 70 is a frame-type steel scaffolding of prefabricated components that has a system width of 0.74 m. The bay sizes (graticule) are 3.00 m, 2.50 m, 2.00 m and 1.50 m. Short lengths of 0.74 m and 1.06 m are also available. The frame height is 2.00 m and thus defines the distance between the working levels. The frames are butted by spigot fittings arranged over the support ledgers at the height of the scaffold decks. The diagonal braces and rear guardrail are connected with the posts by tilting pins. The support ledgers have bolts holding the deck elements horizontally. Thus, the scaffold is reinforced at right angles and in parallel.

These Instructions for Erection and Use shall only apply to use of the scaffold as technological equipment for industrial purposes. These instructions describe how to erect and dismantle the standard version of this scaffold. Scaffolds may only be erected, converted or dismantled under the supervision of a qualified person and by personnel specially instructed on how to carry out such work.

If the scaffolding system is used for scaffolds deviating from the standard version, these deviations must be evaluable according to both the Technical Building Regulations and the stipulations of the National Technical Approval Z-8.1-847 and are to be calculated on a case-to-case basis.

The scaffold system UNIFIX 70 meets the requirements of scaffold group 3 in accordance with DIN 4420-1 (area-related live load of 200 kg/m^2) and may be used as safety and roof safety scaffold (height of fall max. 2.0 m).

The individual scaffold may be used in accordance with the data of Table 1 with live loads of the scaffolding groups as per DIN 4420-1 and for safety and roof safety scaffolds. (except: solid wooden decks of previous version, $l = 3.0 \text{ m}$ acc. to Annex A, page 11).

Table 1: Use of decking

Designation	Z-8.1-847 Annex	Bay size l [m]	Use for safety and roof safety scaffold	Use in scaffolding group
Solid wooden deck	10	1,50	admissible	≤ 6
		2,00	admissible	≤ 5
		2,50	admissible	≤ 4
		3,00	admissible	≤ 3
Solid wooden deck, former design	11	≤2,50	admissible	≤ 3
		3,00	inadmissible	≤ 3
Steel deck	12	2,00	admissible	≤ 6
		2,50	admissible	≤ 5
		3,00	admissible	≤ 4
Aluminium deck with Alumide deck end fitting (Alumide deck)	13	2,00	admissible	≤ 6
		2,50	admissible	≤ 5
		3,00	admissible	≤ 4
Aluminiumdeck (former design)	14	2,00	admissible	≤ 6
		2,50	admissible	≤ 5
		3,00	admissible	≤ 4
Aluminium deck with plywood (aluminium deck)	15	≤3,00	admissible	≤ 3
Aluminium hatch type access with plywood	41	≤3,00	admissible	≤ 3
Aluminium hatch type access with aluminium deck	43	≤3,00	admissible	≤ 3
Steel ladder frame	46	2,00	admissible	≤ 6
		2,50	admissible	≤ 5
		3,00	admissible	≤ 4
Wooden deck with hatch-type access	47	2,00	admissible	≤ 6
		2,50	admissible	≤ 5
		3,00	admissible	≤ 4
Steel ladder frame, former design	50	2,00	admissible	≤ 5
		2,50	admissible	≤ 4
		3,00	admissible	≤ 3
Steel deck	54	2,00	admissible	≤ 6
		2,50	admissible	≤ 5
		3,00	admissible	≤ 4
Solid wooden deck	55	≤3,00	admissible	≤ 3
Aluminiumdeck with plywood	56	≤3,00	admissible	≤ 3
Aluminium hatch-type access with plywood and integr. ladder	57	≤3,00	admissible	≤ 3

2. Erecting the scaffold UNIFIX 70

2.1 General requirements

Prior to erection check the scaffold components for any defects. Never use defective components.
Erect the scaffold in the order described below.

2.2 Erecting the first bay

2.2.1 Load-distributing bed

The scaffold must always be set up on a sufficiently strong base. If this is not the case use load-distributing beds, e. g. with timber planks (see Figure 1).

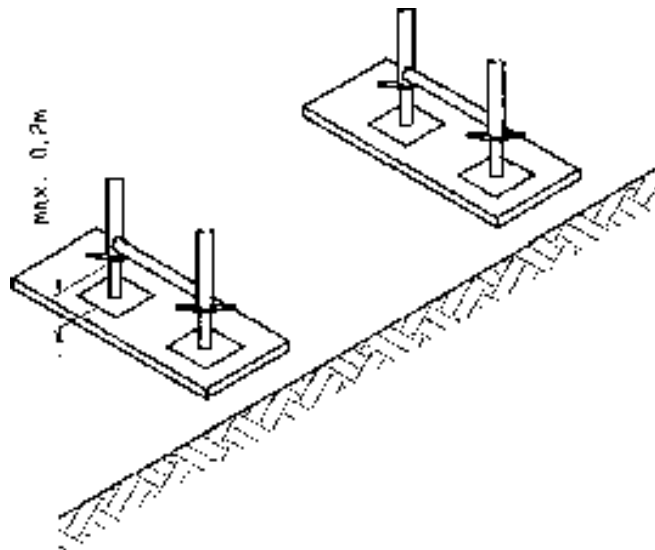


Figure 1: Load-distribution beds with timber planks

2.2.2 Foot spindles and foot plates

Provide a foot spindle or foot plate under each scaffold standard. The foot spindles may only be extended up to 20 cm. Observing the instructions in Chapter 2.5.8 "Longer foot spindles", it is permissible to extend the foot spindles up to 50 cm (see Figure 20).

2.2.3 Height adjustment, levelling frames

For slopes or sharp elevation differences within the erection level and to achieve specific scaffold layer heights, levelling frames of the following heights: 0.50 m, 1.00 m or 1.50 m must be used (see Figure 2). For adjusting height differences up to 0.50 m, foot spindles are to be used (see Chapter 2.2.2).

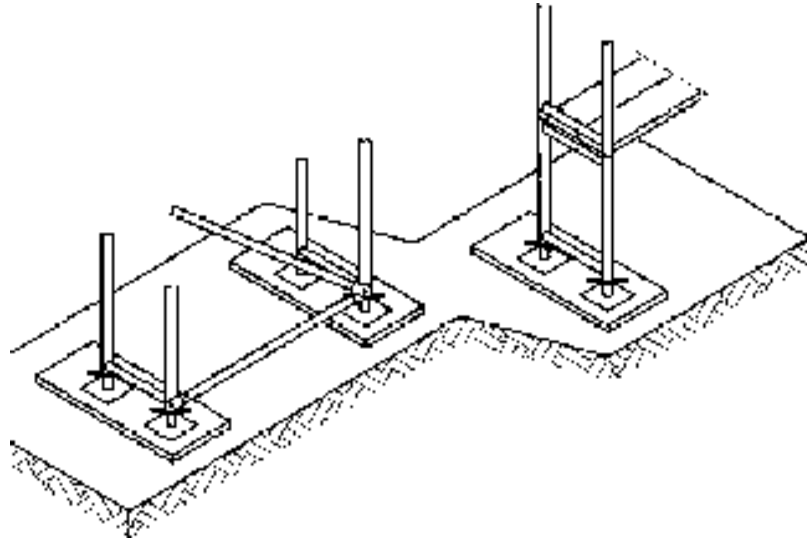


Figure 2: Levelling frame

2.2.4 Vertical frames, passageway frames

Position vertical frames or passageway frames vertically and at the given distance to the facade onto the foot spindles and foot plates (see Figure 3). An employee has to secure them to prevent falling until installing the vertical diagonal brace (see Chapter 2.2.5).

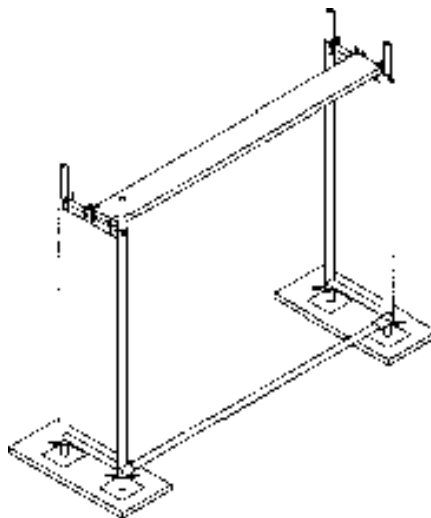


Figure 3: Erecting the first scaffold bay

2.2.5 Stiffening by vertical diagonal braces

Provide a vertical diagonal brace as longitudinal bracing at the exterior of the UNIFIX 70 bay. For this purpose it is necessary to mount the lower diagonal brace onto the foot spindles and foot plates respectively **before** the frames are put in place. The diagonal brace has double holes at one end and is inserted into the external tilting pins so that the double holes are positioned below. To reinforce the lowest level, the tilting pin must be inserted into the inner hole.

To distribute the diagonal forces onto the two base points it is necessary to install a guardrail brace on the level where the lower diagonal brace has been fastened (Fig. 4).

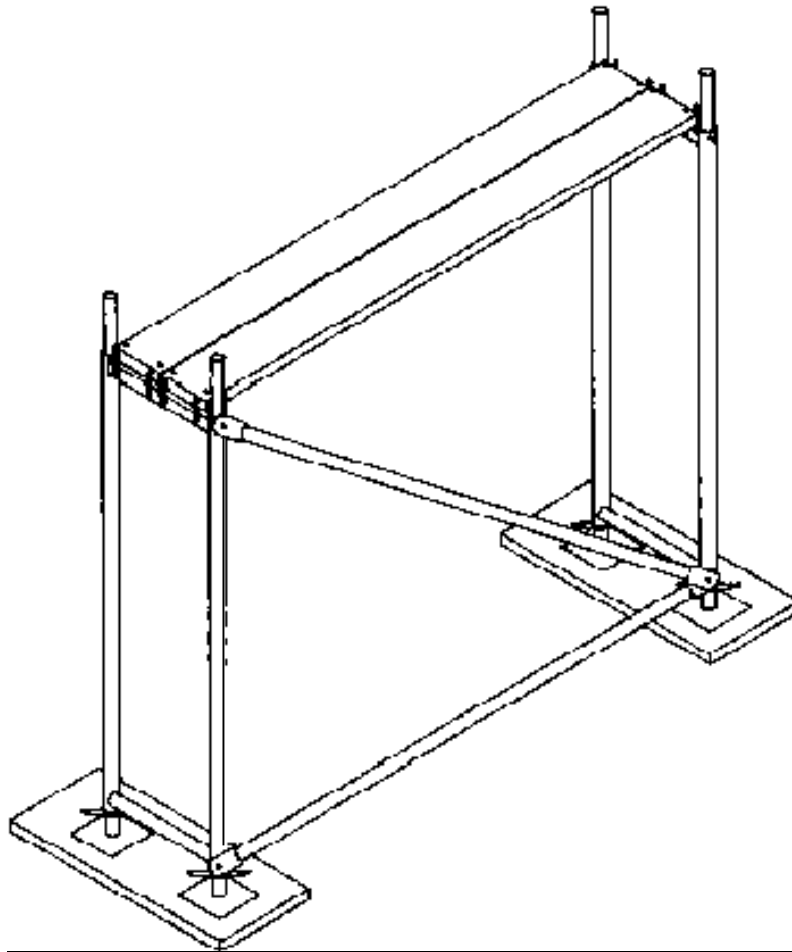


Figure 4: Completing the first scaffold bay

2.2.6 Providing the decks

Decks listed in the certificate of approval may be used only. In each bay two 0.32 m decks (steel, timber, aluminium) or one 0.64 m aluminium- plywood deck have to be provided. On the transoms of the frames they are kept in place by bolts. Thus, the scaffold will be stiffened both at right angles and parallel to the façade.

2.2.7 Aligning

Prior to further erection align the first bay vertically and horizontally. Check the wall distance. The distance between the façade and the inner edge of the deck (bracket deck or bay deck) shall be max. 30 cm, otherwise an internal side protection is required.

2.3 Erecting further bays

2.3.1 Standard bay

The other bays have to be erected as described above starting from the first bay. As a minimum provide each 5th bay again with a vertical diagonal brace. Make sure that the frames of the installed bays are plumb.

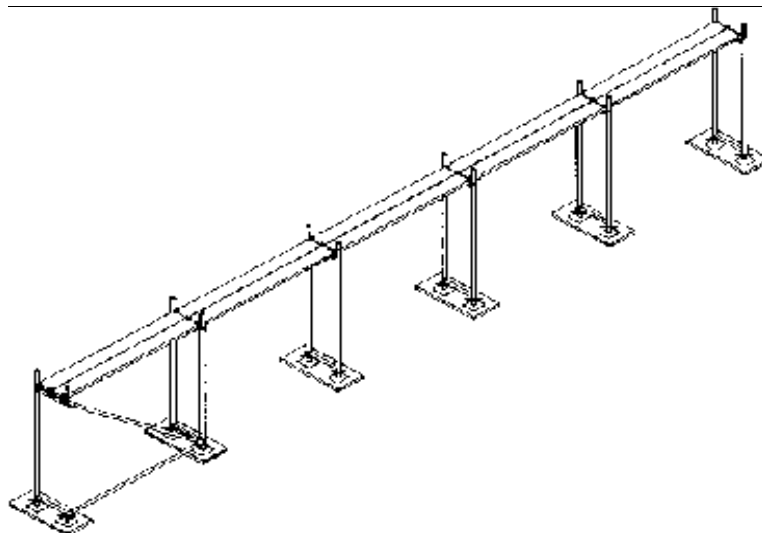


Figure 5: Inserting/installing the vertical diagonal braces

2.3.2 Corner figuration

The corners can be formed in two ways. In any case it must be made sure at the beginning of erection that both scaffolds (longitudinal, cross scaffold) have the required distance to the façade.

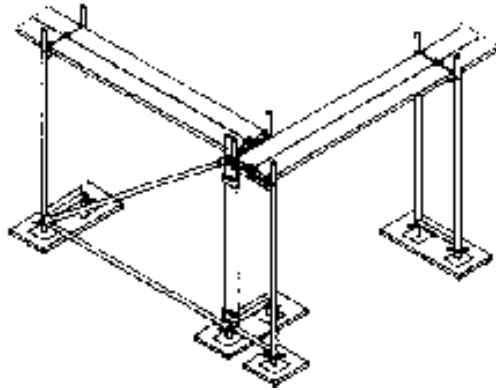


Figure 6: Corner

figuration (version 1)

In the first version (Fig. 6) the front face of one scaffold leads onto the longitudinal side of the other. The two frame uprights placed in parallel at the outside have to be connected by swivel couplers, i.e. on the lowest level by two swivel couplers, and in upward direction at a distance of maximum 4 m each by a swivel coupler near the node points. The foot spindle and foot plate respectively of a corner post will not be needed.

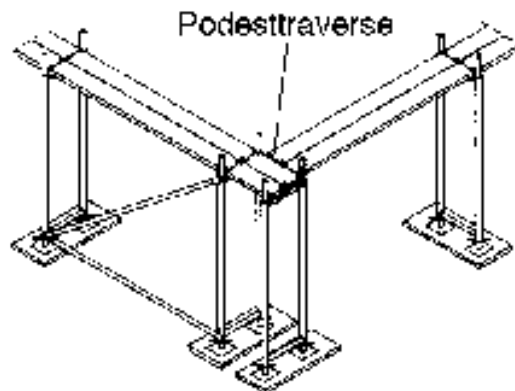


Figure 7 : Corner figuration (version 2)

In the second version (Fig.7) a short bay being 0.74 m in length has to be put up in the corner area. The bottoms of the cross scaffold rest on a landing cross arm to be specifically provided in this case. To keep a uniform distance to the two walls, erection should begin at the corner of the building.

If the right-angled scaffolds are properly connected, no anchoring will be needed at the corner of the building. The directly neighbouring frame tiers have to be anchored like edge frames.

2.3.3 Scaffold access

The bay used for scaffold access needs to be defined before erection begins. The access for the UNIFIX 70 is an inner ladder frame for which both hatch-type access decks with integrated ladder and horizontal steel frames with loose wooden decks with hatch and a separate steel ladder can be used. When installing the decks make sure that the ladders are arranged alternatively right and left in the bay concerned (Fig. 8). In the access bay it is necessary to provide decking and foot rails on the lowest level to support this decking.

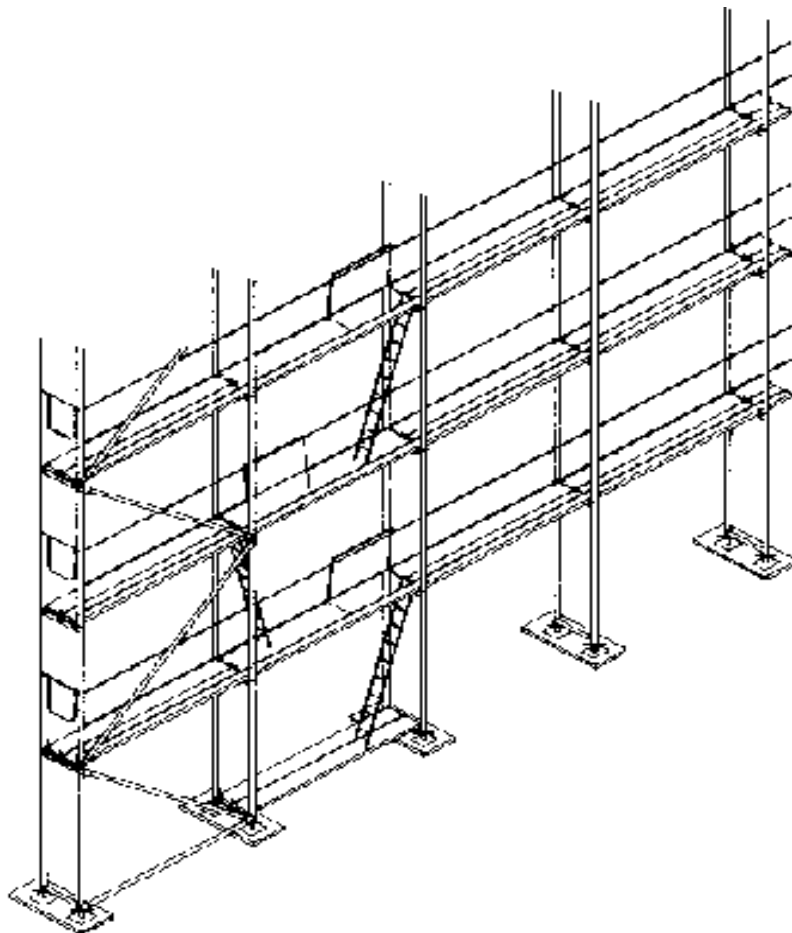


Figure 8: Internal ladder access

2.4 Erecting further scaffold layers

2.4.1 Principles

Carry out all scaffolding so that falling is prevented or the risk of falling is kept at a minimum.

Protective measures are:

- technological protective measures
- personal protective equipment to prevent falling
- specific instructions

As a technological protective measure ALFIX provides the advanced guardrail post with telescopic guardrail, see chapter 2.4.3.1. If the scaffold contractor concludes after risk assessment that another protective measure should be taken, this has to be documented in separate use instructions. If "Personal protective equipment to prevent falling" in compliance with BGR 198 is to be used, it will be necessary to use the fastening points provided at the scaffold as shown in chapter 2.4.3.2. Risk assessment must also include any necessary rescue of a person who has fallen down. Personal protective equipment may be life lines with integrated fall damper with the rope being max. 4 m long. The self-securing one-hand spring hook must have an opening width of min. 50 mm.

*) BGR 198 (formerly ZH 1/709): Use of personal protective equipment against falling.
Hauptverband der gewerblichen Berufsgenossenschaften; as amended in 2000. Regulations by employer's insurance association can be downloaded from www.fa-bau.de.

2.4.2 Handling scaffold components

For scaffolds higher than 8 m (deck height over erection area) it is necessary to use builder's hoists. This also includes hand-operated pulley tackles.

If the total scaffold length is smaller than 10 m and the scaffold height does not exceed 14 m, no such builder's hoists need to be used - in deviation from the first paragraph.

In scaffold bays where vertical handling is done by hand, guardrail and intermediate braces must be in place. For such manual handling at least one person must be involved on each scaffold layer.

2.4.3 Assembling vertical frames and guardrails

2.4.3.1 Advanced guardrails

Advanced guardrail posts with telescopic guardrails provide a temporary side protection over the entire scaffold layer.

On the first layer (standing height 2 m) the components have to be assembled from the floor. On the other levels the advanced guardrail post and the two connected telescopic guardrails have to be relocated vertically only.

Erection shall start at the front face of the scaffold. Mount the advanced end guardrail on the guardrail post using the M10x60 bolt, see Figure 9-1. Suspend a telescopic guardrail in the hook at the post and mount the post on the corner member of the scaffold, see Figure 9-2.

- Put up the guardrail post on the outer side of the assembly frame with the lower fork located on the guardrail brace of the lower scaffold layer
- The upper fork embraces the assembly frame tube below the frame corner and is secured by closing the wedge (hammer blow).

Now, mount a guardrail post on the inner member threading the end guardrail into the suspension hooks, see Figure 9-3. Then, mount the guardrail along the facade. Suspend the other end of the telescopic guardrail in the next guardrail post, and also another Telescopic guardrail, Fig.9-4. Now, lift the guardrail post and the telescopic guardrail and install it in the next assembly frame as described before, see Figure 9-5. Suspension of the telescopic guardrails and installation of the next guardrail post with guardrails being suspended is repeated over the entire length of the scaffold.

The advanced guardrail must have been provided on the entire scaffold layer before this level may be accessed and the assembly frames and the normal three-piece side protection erected, see Figure 9-6. The following scaffold layer has to be protected to prevent falling by vertically relocating the advanced guardrail post with telescoping guardrails being connected on both sides, see Figure 9-7.

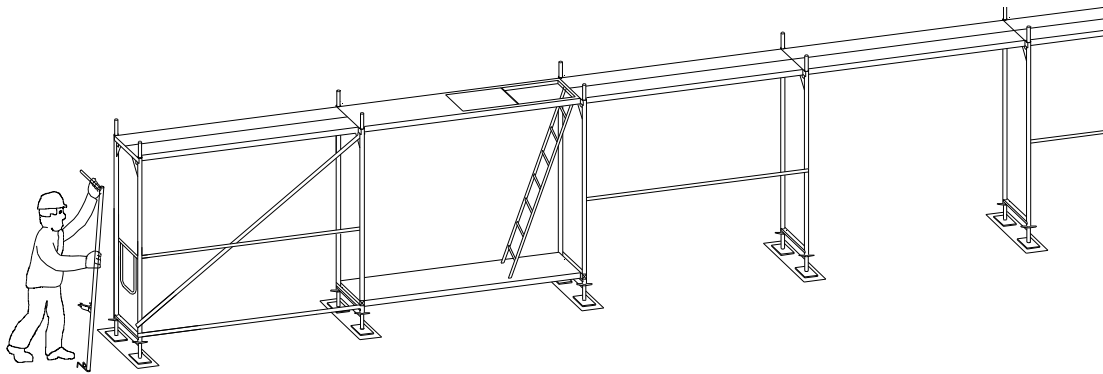


Figure 9-1: Preparing the guardrail post with advanced end guardrail

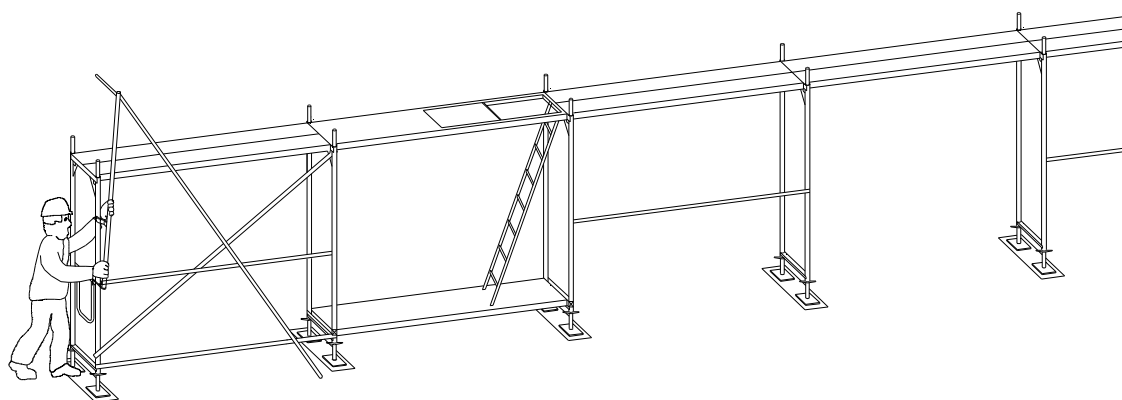


Figure 9-2: Mounting an advanced guardrail post with end guardrail and telescopic guardrail

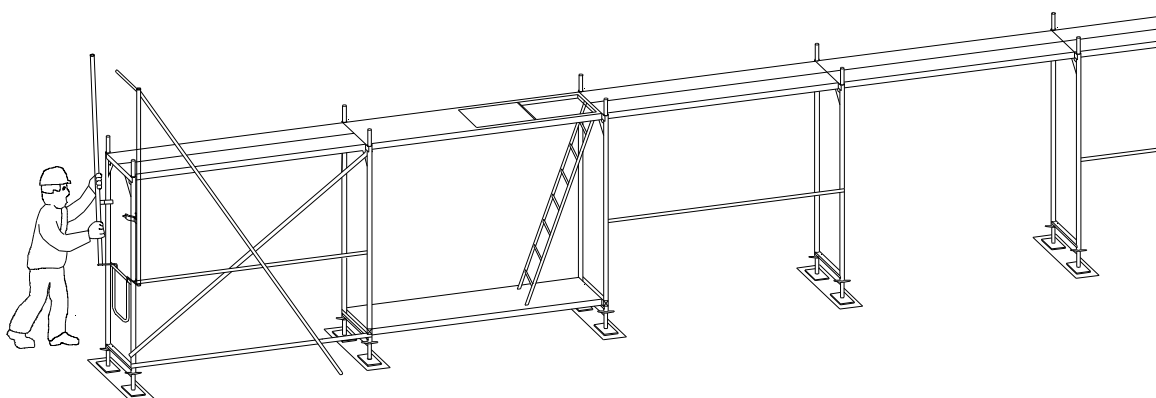


Figure 9-3 : Mounting the advanced guardrail post on inner member

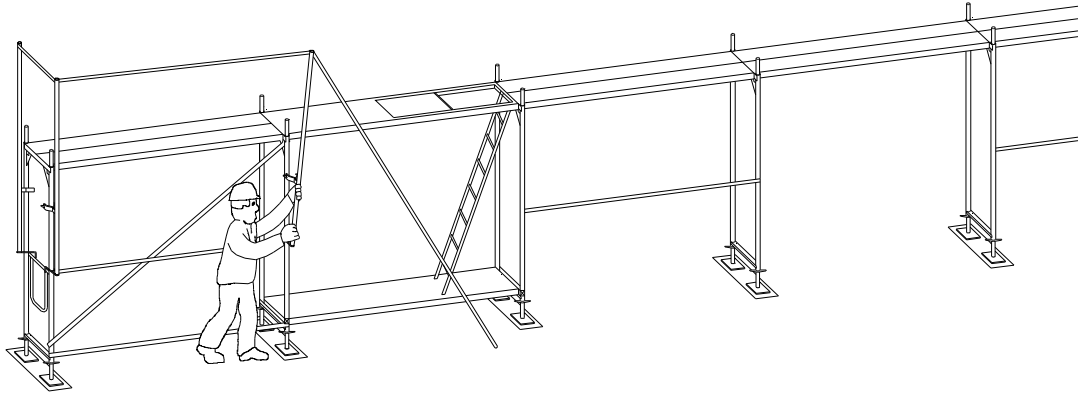


Figure 9-4: Mounting the guardrail post with the other end of guardrail and another Telescopic guardrail

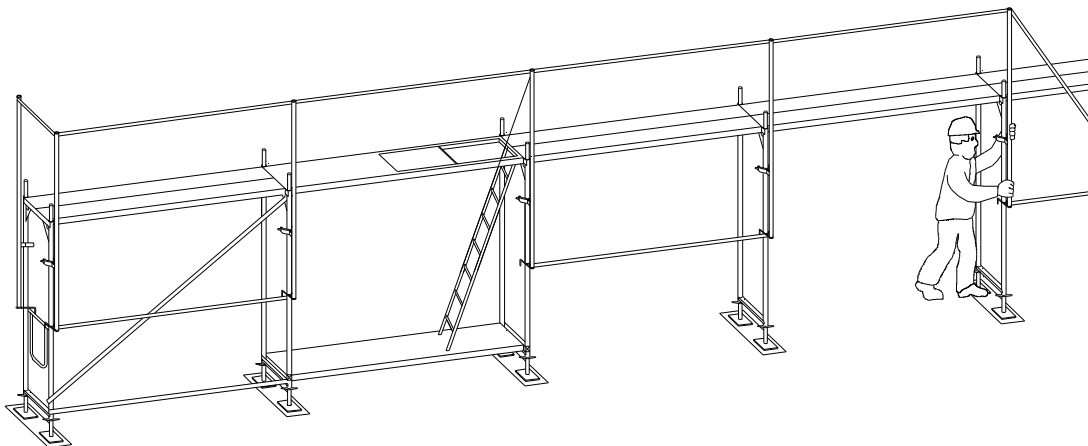


Figure 9-5: Completing the advanced guardrail over entire scaffold layer

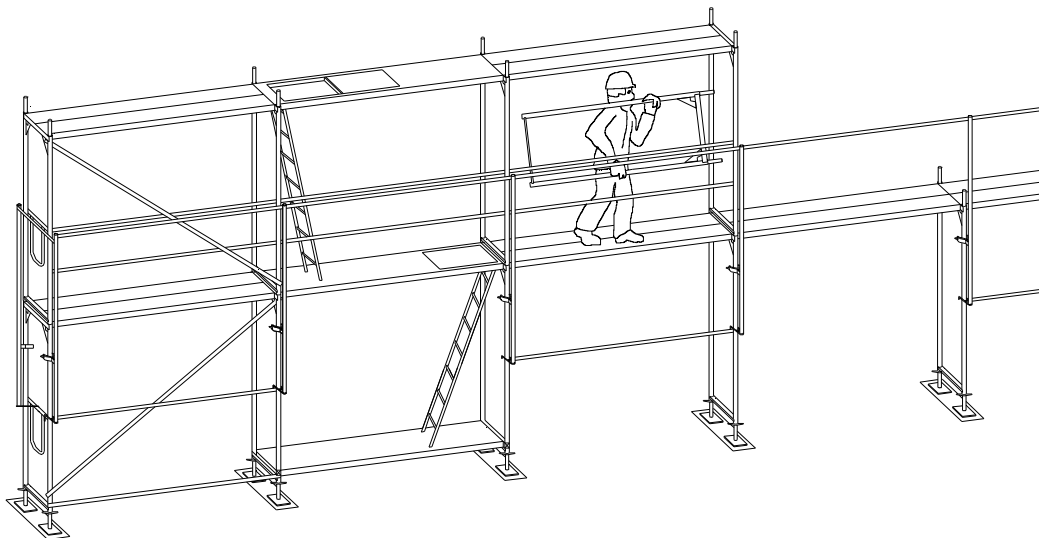


Figura 9-6: Erecting the next scaffold layer (assembly frame, decks stiffener, 3-piece side protection) protected by the advanced guardrail

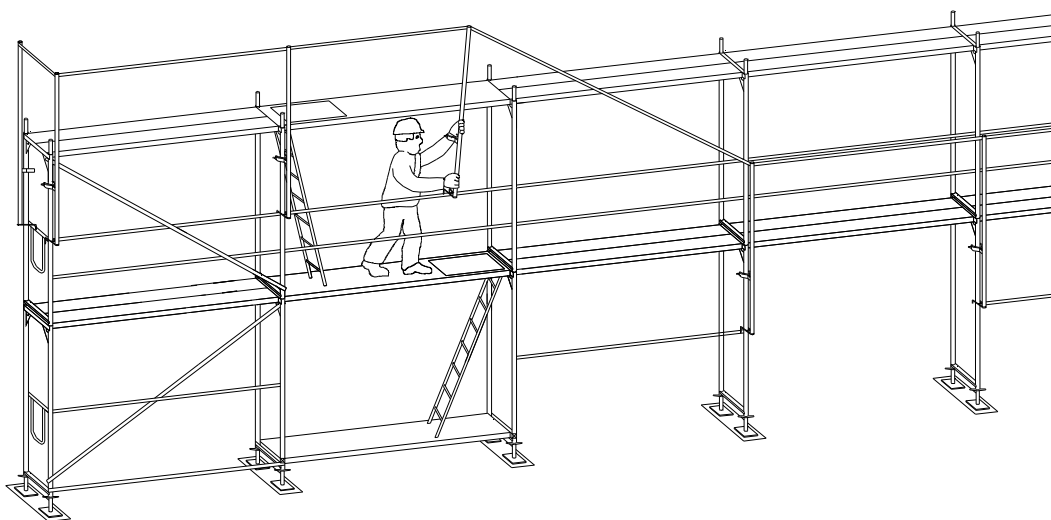


Figure 9-7: Vertical relocation of advanced guardrail post and telescopic guardrail

2.4.3.2 Fixing points for personal protective equipment

If personal protective equipment is to be worn, the following fixing points can be used:

- Transom (frame corner)

(Figure 10-1)

- Assembly frame above the guardrail connection or on guardrail brace

(Figure 10-2)

Use spring hooks in accordance with DIN 362 with an opening width of > 50 mm as lifting tackle.

First access to scaffold layer: Fix the spring hook in the frame corner on the external side of scaffold.

For this purpose hook the spring hook above, while standing on the ladder, on the external side in the frame corner, see Figure 10-3. A scaffold bay consisting of two assembly frames and a guardrail brace can be put up using this kind of protection.

For further erection work the above mentioned fixing points may also be used at freestanding assembly frames.

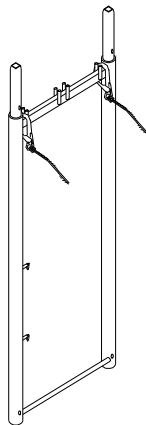


Figure 10-1: Fixing point on transom (frame corner, outside or inside of scaffold)

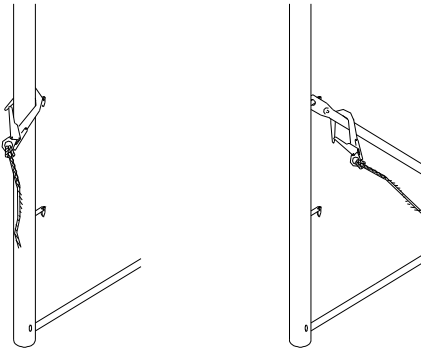


Figure 10-2: Fixing point above guardrail connection or on guardrail brace

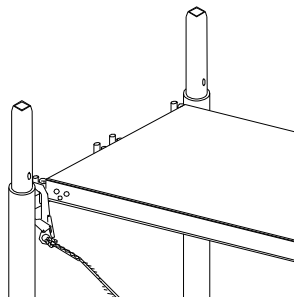


Figure 10-3: Fixing in frame corner on the outside of scaffold for initial access to scaffold layer

2.4.4 Decking

Provide the decking as described in chapter 2.2.6. Always mount the decking starting from the lower secured scaffold layer.

2.4.5 Vertical diagonal braces

Mount the vertical diagonal braces continually as the scaffold erection progresses. For mounting the external tilting pins are used but, in contrast to the lowest level, the outer hole of the double hole end has to be used.

2.4.6 Completing the side protection

All scaffold tiers that are not only used for scaffold erection but also for working have to be provided with double guardrails and lower guardrail braces (midrails), toeboards and front face guardrails. The double guardrails and guardrail braces are mounted using the inner tilting pins. The toeboards have to be mounted on the toeboard holders with their end fittings so that the top edges are all on one level. The front face guardrails are attached to the inner upright using the halfcoupler and mounted at the outer upright using the tilting pin.

In the topmost scaffold tier the side protection is attached to the guardrail post support using welded cross members. When using simple rail posts it will be necessary to provide a deck retainer. To secure the front faces, special front face guardrail frames with integrated toeboard and intermediate brace are used.

All components with gravity flips used to connect side protection elements should be installed only in such a way that the gravity flips always show to the completed scaffold tier.

2.4.7 Anchoring (anchor grids, anchor forces)

The anchor grids and related anchor forces for the normal scaffold area can be gathered from Table 2. It gives the important anchor forces (working loads) at a level of +20 m. On lower levels these forces are maximum 10 % less so that there is no need to indicate different values. For tarpaulin covered scaffolds the tensile forces are indicated. Observe paragraph 2.5.7.

Anchoring measures that are necessary when supplementary components are used and the forces to be considered in such cases are given in paragraph 2.5 (design versions).

Provide the scaffold anchors concurrently with scaffold erection. For this also see chapter 7.6

"Anchoring" of BGR 166. As fasteners use eye bolts for scaffold erection that are minimum 12mm in diameter and plastic expansion fasteners or similar depending on the load-carrying capacities required

- 1) BGR 166: System scaffolds (frame and modulars scaffolds)
When applying the content of BGR 166 also observe the operational safety regulations (BetrSichV)

Table 2: Anchor forces (working loads) standard area; figures in brackets apply to the corner area.

Anchor grid	Covering	Bay length	Closed façade		Open façade	
			F ⊥	F	F ⊥	F
8 m offset or 4 m every 2nd tier of frames	without	≤2.50 m	1.1 kN	2.5 kN (2.8 kN)	3,5 kN	2.5 kN (3.4 kN)
		3.00 m	1.5 kN	2.5 kN (2.9 kN)	4.0 kN	2.5 kN (3.5 kN)
	Net	≤2.50 m	2.3 kN	1.7 kN (2.9 kN)	—	—
		3.00 m	2.7 kN	2.0 kN (3.4 kN)	—	—
4 m or 4 m offset	without	≤2.50 m	0.6 kN	2.5 kN (2.8 kN)	1.8 kN	2.5 kN (3.4 kN)
		3.00 m	0.7 kN	2.5 kN (2.9 kN)	2.0 kN	2.5 kN (3.5 kN)
	Net	≤2.50 m	1.2 kN	1.7 kN (2.3 kN)	3.5 kN	2.5 kN (4.3 kN)
		3.00 m	1.4 kN	2.0 kN (2.7 kN)	4.2 kN	2.8 kN (4.9 kN)
	Tarpaulin	≤2.50 m	2.6 kN	4.0 kN (5.3 kN)	—	—
		3.00 m	3.1 kN	4.4 kN (6.0 kN)	—	—
2 m	Tarpaulin	≤2.50 m	1.3 kN	2.0 kN (2.7 kN)	4.4 kN	2.0 kN (4.2 kN)
		3.00 m	1.5 kN	2.2 kN (3.0 kN)	5.2 kN	2.2 kN (4.8 kN)

2.4.8 Scaffold retainers

Connect the scaffold retainers near the node points. For this purpose use standard couplers that have a test mark in accordance with DIN EN 74.

2.4.8.1 Short scaffold retainers

Short scaffold retainers are fastened at the inner post of the scaffold frame only (Fig. 11). They absorb the anchor forces at right angles to the façade.

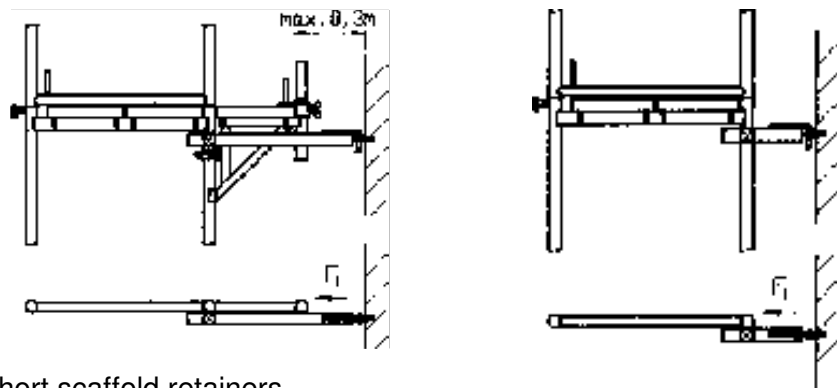


Figure 11: Short scaffold retainers

2.4.8.2 Long scaffold retainers

Long scaffold retainers are fastened at the inner and outer post of the frame (Fig. 12a). They absorb the anchor forces at right angles and parallel to the façade. As an alternative it is also possible to use scaffold retainers that have a fork embracing the support ledgers (Fig. 12b).

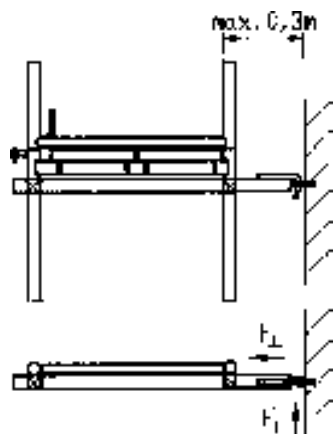


Figure 12a: Long scaffold retainers

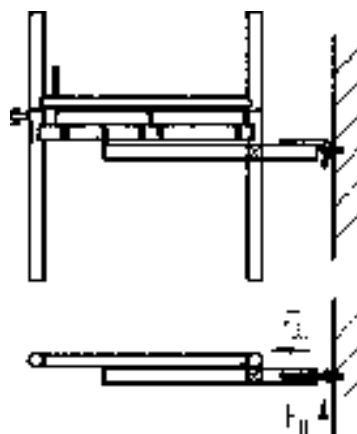


Figure 12b: Long scaff. retainers

2.4.8.3 Triangular ties

Triangular ties may also only be fastened at the inner post of the frame (Fig. 13). They absorb anchor forces at right angles and parallel to the façade and have to be installed when there is a larger distance of the scaffold to the wall to transfer the parallel forces. It must be kept in mind that due to the inclined position of the scaffold retainers the forces to be anchored will change: The inclined tensile and compressive forces at the eyebolts as shown in the scaffold retainer configuration of Fig. 13 below 45° are approx. $0.7 \times F$ and $0.7 \times F$ respectively.

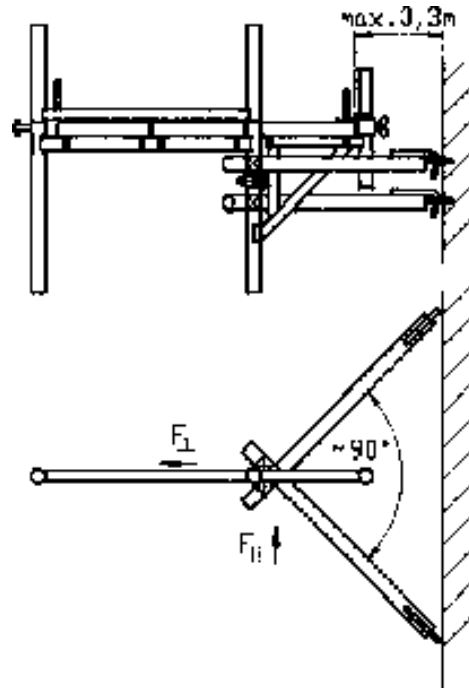


Figure 13: Triangular ties

2.5 Version variations and installing supplementary components

2.5.1 General

This paragraph describes the different version variations that are permitted for the UNIFIX 70 scaffold. The anchor grids depend on the wind permeability of the façade and the kind of covering that might be used. The edge frames have to be anchored principally at a vertical distance of maximum 4 m. All supporting and anchor forces below are working loads.

A "closed" façade has no openings in the standard version whereas an "open" façade may consist of openings up to 60 % of the front face.

Nets used must have an aerodynamic certificate. The wind loads of the versions shown in Figures 17 and 18 were calculated based on the forces coefficients $C_{fx} = 0.6$ and $C_{fy} = 0.2$.

Also described are the specific measures to be taken to install the supplementary components, such as passageway frame, extension brackets, bridge bearers, roof safety scaffolds, protective shelters.

The supporting forces under the scaffold posts for the load case "Working condition" can be obtained from Table 3 depending on the equipment and overall height. The dead weight of the wooden decking (max. dead weight) has been taken into account.

Table 3: Support reaction forces

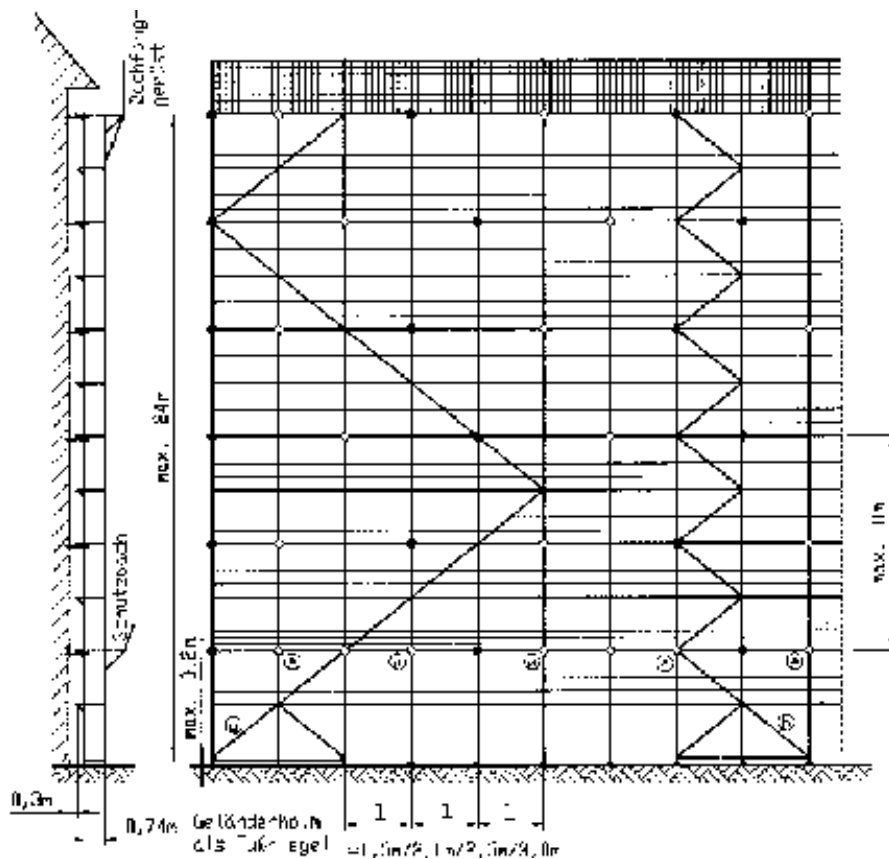
Bracket	Equipment	Bay length	H = 24 m	H = 16 m	H = 8 m
Inner upright	without	2.50 m	6.7 kN	5.3 kN	3.8 kN
		3.00 m	7.7 kN	6.1 kN	4.5 kN
	Inner bracket in every level	2.50 m	12.4 kN	9.7 kN	7.3 kN
		3.00 m	14.5 kN	11.6 kN	8.7 kN
Outer upright	without (Guard system support on frame)	2.50 m	9.4 kN	7.2 kN	5.1 kN
		3.00 m	2.5 kN	8.4 kN	6.0 kN
	Protective shelter	2.50 m	10.1 kN	8.0 kN	5.8 kN
		3.00 m	11.8 kN	9.3 kN	6.9 kN
	Guard system support on outer bracket	2.50 m	14.3 kN	12.1 kN	10.0 kN
		3.00 m	16.7 kN	14.3 kN	11.8 kN

2.5.2 Anchor grid staggered by 8 m

The anchor grid "staggered by 8 m" can be used in front of a closed façade with solid wooden decks, steel decks, aluminium deck with plywood and aluminium decks (alumide deck and previous version) with no need to take additional measures. Aluminium decks that have a bay length of 3.0 m may only be used for types that have no inner bracket.

For open façades solid wooden decks, steel decks or aluminium decks with plywood have to be used. In addition it is necessary to anchor each tier of frames at a height of + 4 m.

Vertical diagonal braces are needed for reinforcement in each 5th bay. They can be arranged continuously or like a tower. When the length of bay is 3 m and it has inner brackets it is necessary to provide another diagonal brace in every 5th bay on the lowest level (0 to + 2 m).



l bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainer fastened at inner upright only

- long scaffold retainer fastened at outer an inner upright or triangular tie when using inner brackets

acc.to 2.4.7.1. (Fig. 11)

acc. to 2.4.7.2 (Fig. 12)

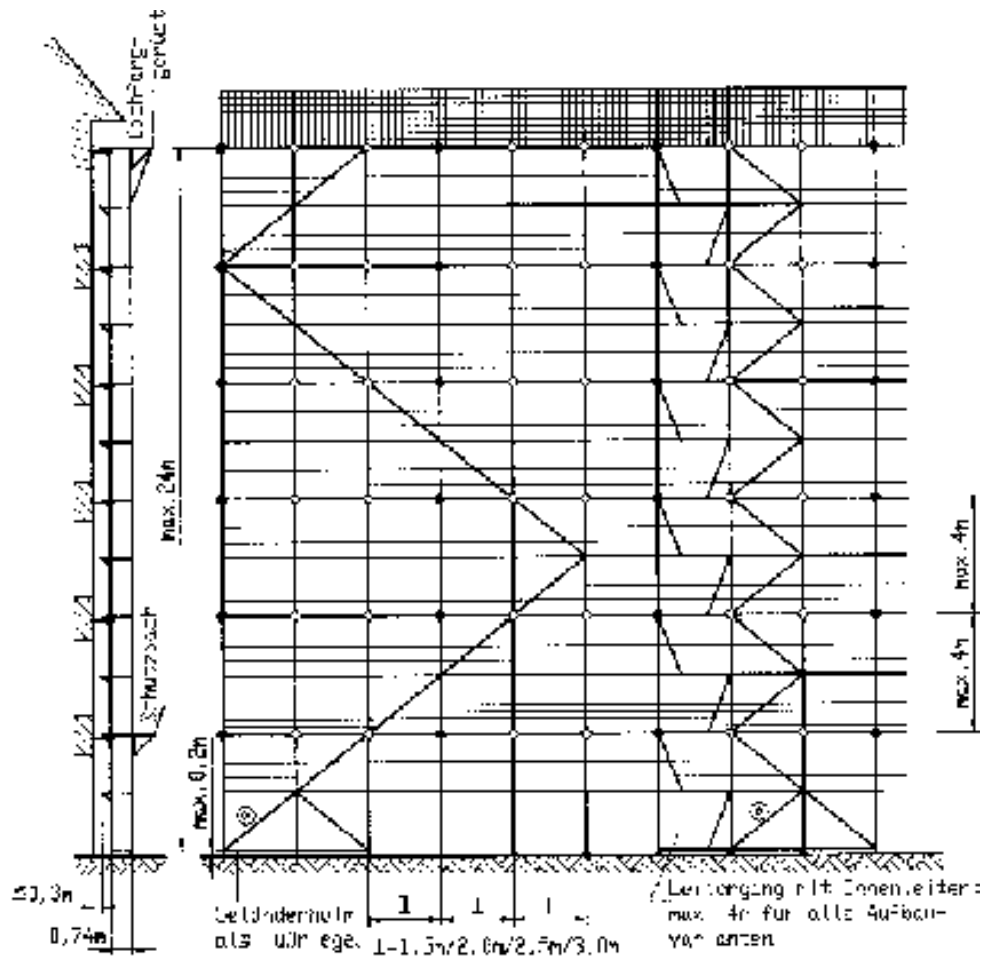
acc. to 2.4.7.3 (Fig. 13)

Figure 14: Anchor grid staggered by 8 m

2.5.3 Anchor grid 4 m

The "4 m" anchor grid (Figure 15) can be used with aluminium decks, solid wooden decks, steel decks, aluminium decks with plywood in front of open and closed façades.

Vertical diagonal braces are required in every 5th bay. They can be arranged continuously or as a tower. When aluminium decks 3 m bay lengths are used it will be necessary to install an additional diagonal brace in every 5th bay on the lowest level ± 0 to $+2$ m .



l bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainer fastened at inner upright only

• long scaffold retainer fastened at outer and inner upright

or triangular tie when using inner brackets

acc. to 2.4.7.1 (Fig. 11)

acc. to 2.4.7.2 (Fig. 12)

acc. to 2.4.7.3 (Fig. 13)

Figure 15: Anchor grid 4 m

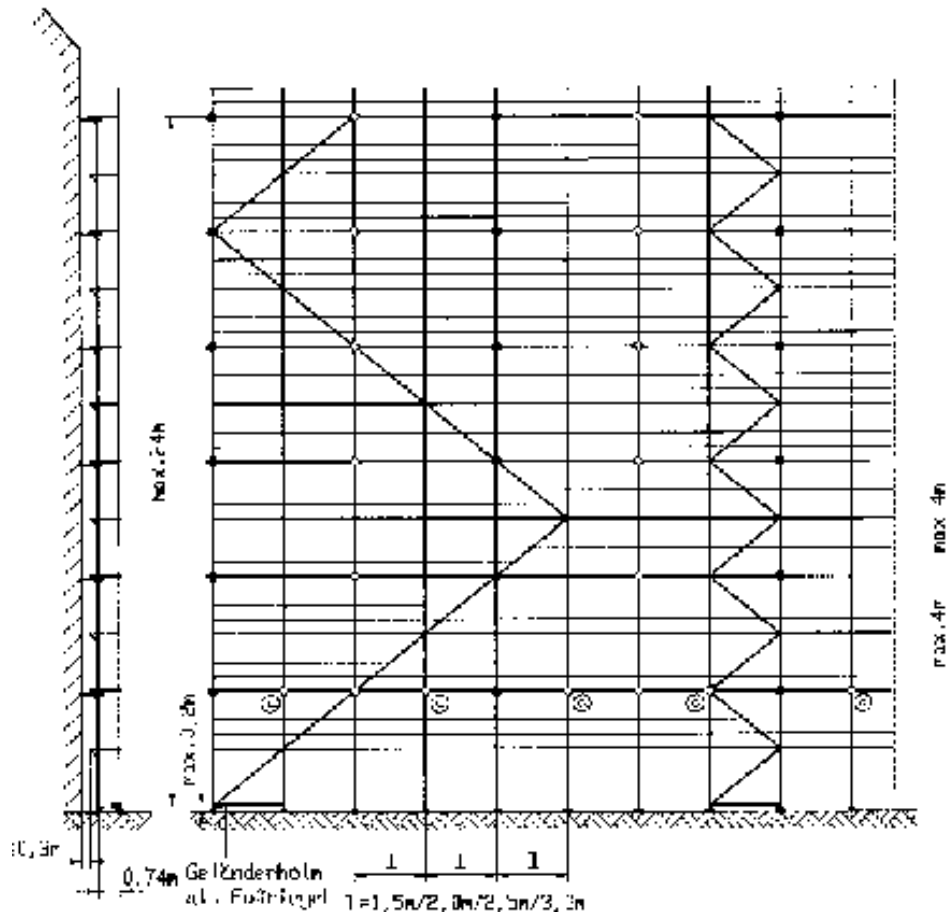
2.5.4 Anchor grid 4 m at every 2nd tier of frames

The "4 m" anchor grid at every 2nd tier of frames (Figure 16) can be used with solid wood deck, steel deck, aluminium deck and aluminium deck with plywood in front of closed façades.

For open façades solid wooden decks, steel decks or aluminium decks with plywood have to be used. Additionally, each tier of frames at the height of + 4 m must be anchored.

Vertical diagonal braces arranged continuously as a tower are required in every 5th bay.

Roof safety scaffolds and protective shelters are not permissible with this anchor grid.



l bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainer fastened at inner upright only

- long scaffold retainer fastened at outer and inner upright or triangular tie when using inner brackets

acc. to 2.4.7.1 (Fig. 11)

acc. to 2.4.7.2 (Fig. 12)

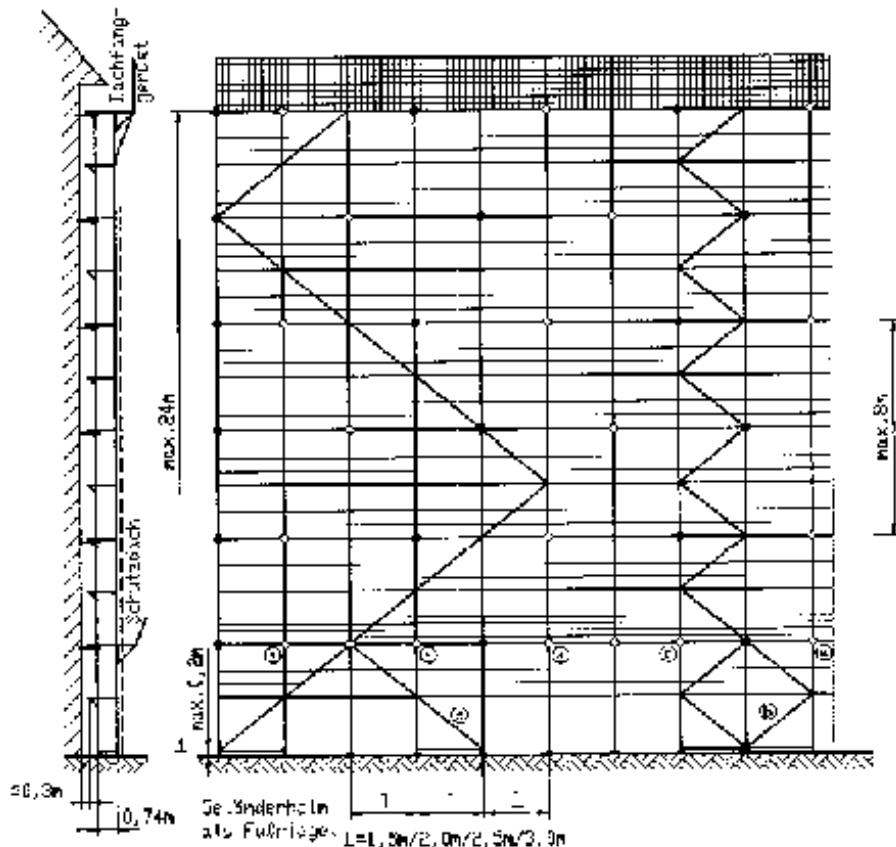
acc. to 2.4.7.3 (Fig. 13)

Figure 16: Anchor grid 4 m at every 2nd tier of frames

2.5.5 Netting in front of closed façade

Net-covered scaffolds in front of closed façades (Figure 17) can be erected using an anchor grid "staggered by 8 m" when solid wooden decks, steel decks or aluminium decks with plywood are used. When bays are 3 m in length anchoring will be needed at every node point at a height of + 4 m. Aluminium boards and decks require a "4 m" anchor grid (see also Fig. 15).

Continuous or tower-like vertical diagonal braces are needed in every 5th bay. A bay length of 3 m and inner brackets require an additional brace in every 5th bay on the lowest level from 0 to + 4 m.



Anchoring of protectice shelter & roof safety scaffold, see 2.5.13 & 2.5.14

l bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainer fastened at inner upright only

acc. to 2.4.7.1 (Fig. 11)

• long scaffold retainer fastened at outer and inner upright

acc. to 2.4.7.2 (Fig. 12)

or triangular tie when using inner uprights

acc. to 2.4.7.3 (Fig. 13)

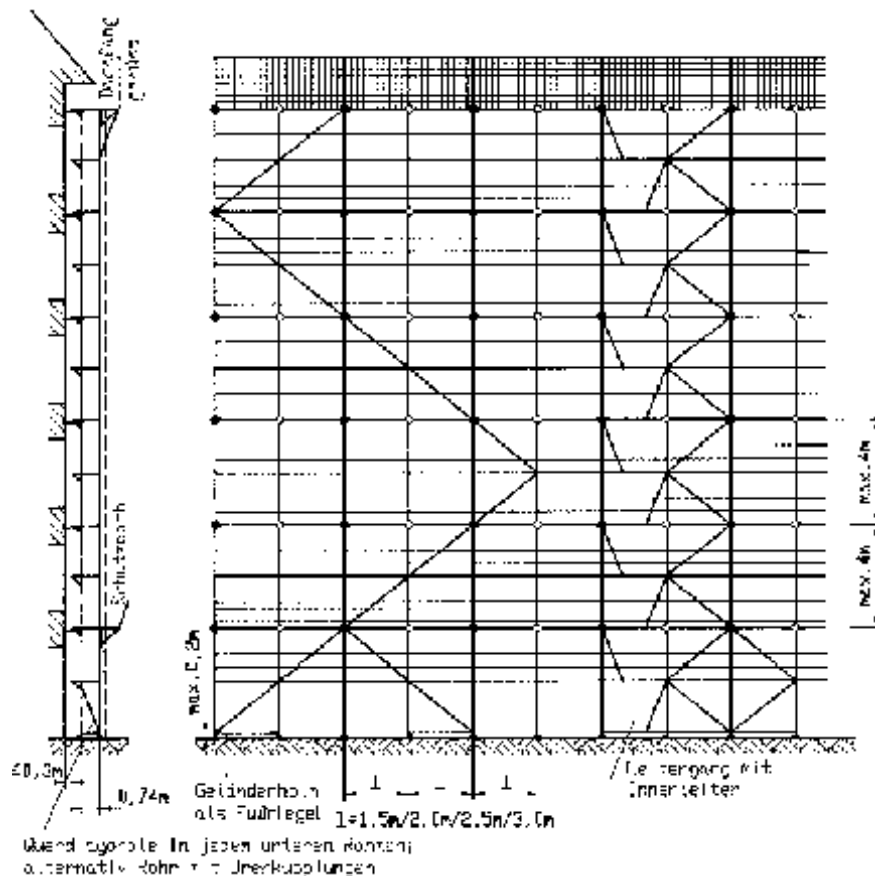
Figure 17: Netting in front of closed façades

2.5.6 Netting in front of open façade

For net-covered scaffolds in front of open façades (Figure 18) the "4 m" anchor grid is admissible for all kinds of decks.

A vertical diagonal brace is required in every 5th bay. Continuous or tower-like arrangement.

An additional diagonal brace has to be installed in every 5th bay from 0 to +4 m. The lower frames require the installation of additional diagonal cross braces. scaffold tubes of 48.3 mm diameter with swivel couplers can also be installed as an alternative.



Anchoring of protective shelter & roof safety scaffold, see 2.5.13 & 2.5.14

1 bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainer fastened at inner upright only

acc. to 2.4.7.1 (Fig. 11)

• long scaffold retainer fastened at outer and inner upright

acc. to 2.4.7.2 (Fig. 12)

or triangular tie when using inner brackets

acc. to 2.4.7.3 (Fig. 13)

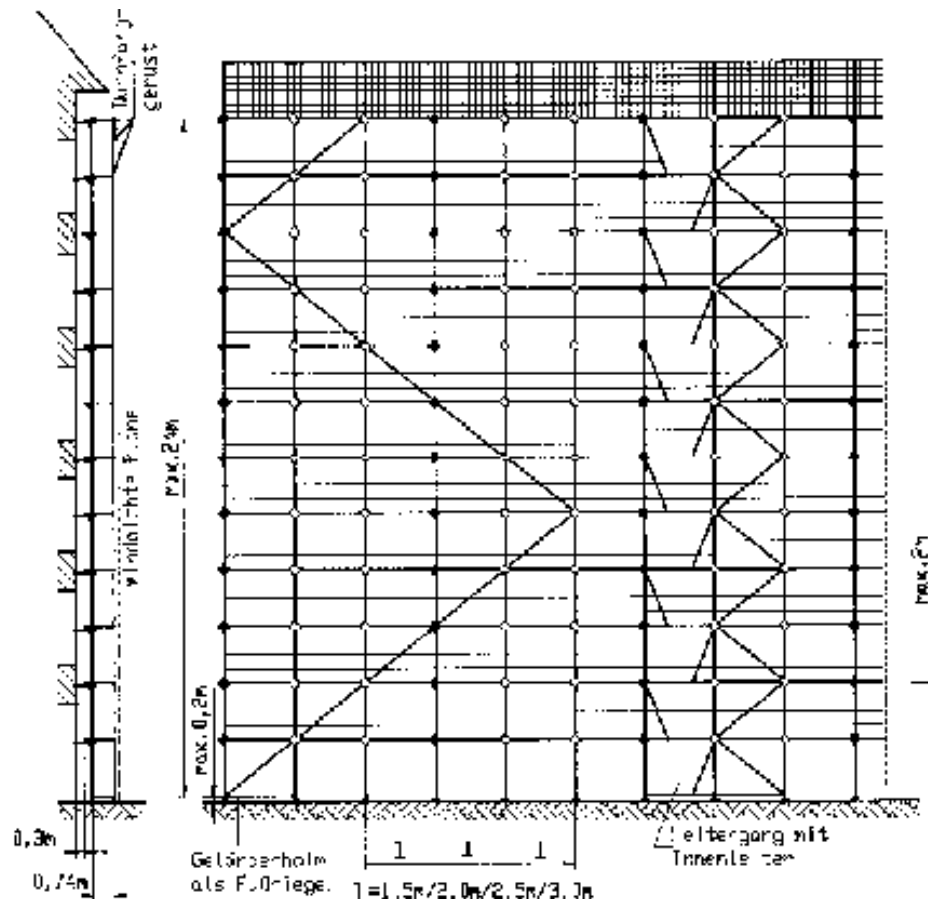
Figure 18: Netting in front of open façade

2.5.7 Tarpaulin covering

For tarpaulin-covered scaffolds in front of open façade (Figure 19) the "2 m" anchor grid is permitted for all types of decking.

With closed façades it is permitted that every 2nd anchor point is compression-resistant only ($a = 4$ m, when using inner brackets $a = 4$ m staggered).

Vertical diagonal braces arranged continuously or as a tower will be required in every 5th bay.



Anchoring of roof safety scaffold, see 2.5.14

l bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainer fastened at inner upright only

acc. to 2.4.7.1 (Fig. 11)

- long scaffold retainer fastened at outer and inner upright or triangular tie when using inner brackets

acc. to 2.4.7.2 (Fig. 12)

acc. to 2.4.7.3 (Fig. 13)

Figure 19: Tarpaulin-covered scaffold

2.5.8 Longer foot spindles

According to 2.2.2 foot spindles may be extended up to 20 cm. The 50 cm long screw jack may be extended up to 35 cm and the 66 cm long one up to 50 cm provided the following rules are observed:

The anchor grid shown in Figure 20 (8m staggered, at +4m every tier of frames anchored) can be used with solid wooden decks, steel decks or aluminium decks with plywood in front of closed or open façades. If aluminium boards or decks are used, every tier of frames has to be anchored at 4 m intervals (see Figure 15). The associated anchor forces are shown in Table 1.

The guard system support is permitted on the vertical frame only. If at bay width of 2.5 m the spindle extension length does not exceed 35 cm, the guard system support may also be mounted on the outer bracket.

Vertical diagonal braces are required in every 5th bay. To be arranged continuously or as a tower. On the first two levels from 0 to +4 m additional diagonal braces have to be provided in every 5th bay.

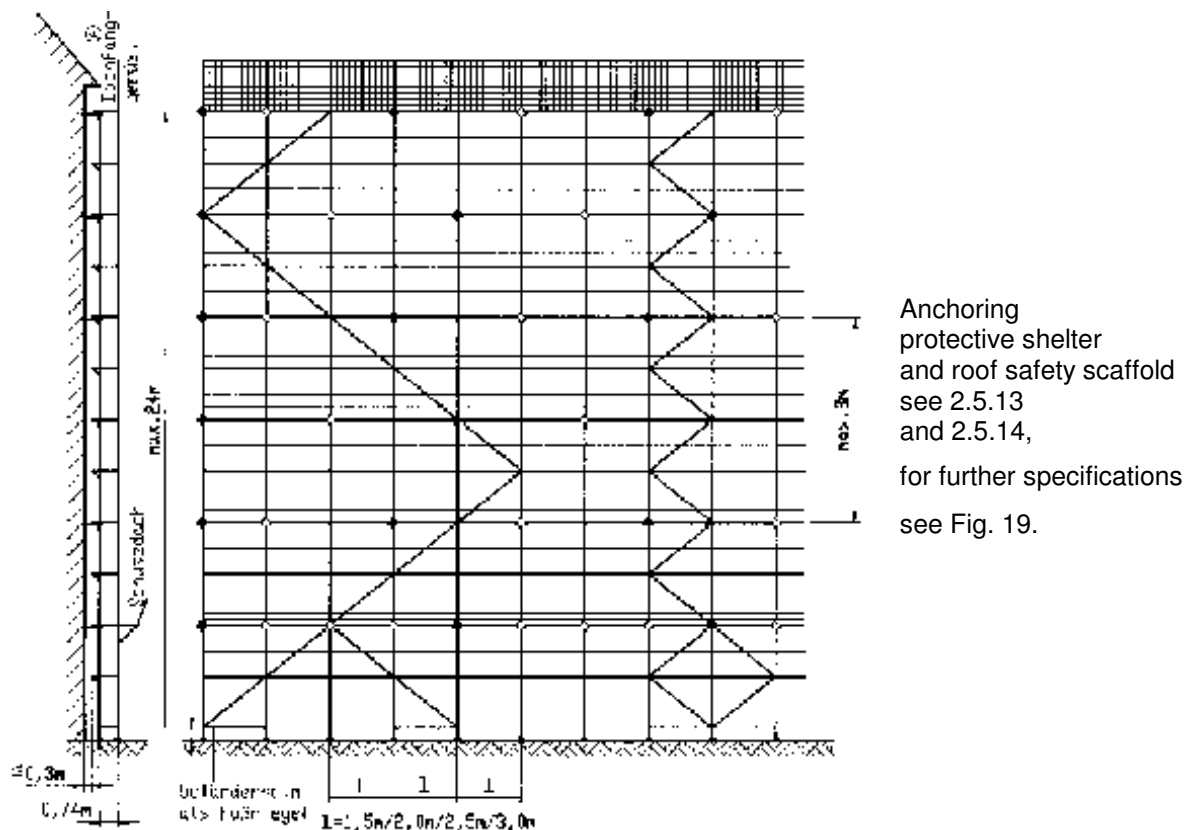


Figure 20: Use of longer foot spindles

2.5.9 Passageway frames

The passageway frames have a clearance width of 1.75 m and a clearance height of 2.00 m plus foot spindle extension. The overall height of passageway frame is 2.40 m. For erection it must be observed that the end with the tube distance of 0.74 m shows towards the façade. The decks arranged on the passageway frame form a protective shelter and are kept in place by suitable lift-out protection devices.

Anchor grid 1 as shown in Figure 21 (8 m staggered, each tier of frames anchored at +4 m height) applies when using solid wood decks, steel decks or aluminium decks with plywood up to a bay length of 2.50 m for closed and open façades, whereas it applies to closed façades only when the bay length is 3 m. Inner brackets are not allowed. Up to a bay length of 2.50 m every second anchor point can be omitted at + 4 m in front of a closed façade. With aluminium boards or decks each tier of frames must be anchored at 4 m intervals (see Fig. 15). The anchor forces can be gathered from Table 1.

In every 5th bay vertical diagonal braces have to be provided. At a height of + 2.40 m they are attached to the frame upright using a swivel coupler. The vertical diagonal braces may be arranged continuously or as a tower. For passageway frames it is necessary to provide foot and head ledgers of guardrail braces to distribute the loads. When using a bay length of 3.0 m guard system supports are allowed on the vertical frame only. For roof safety scaffold anchoring see paragraph 2.5.14.

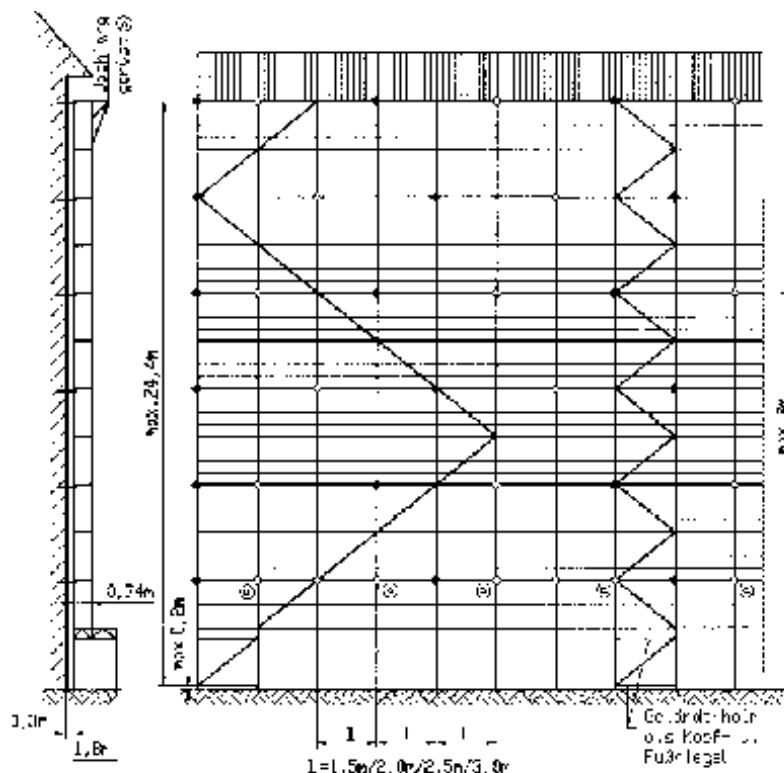
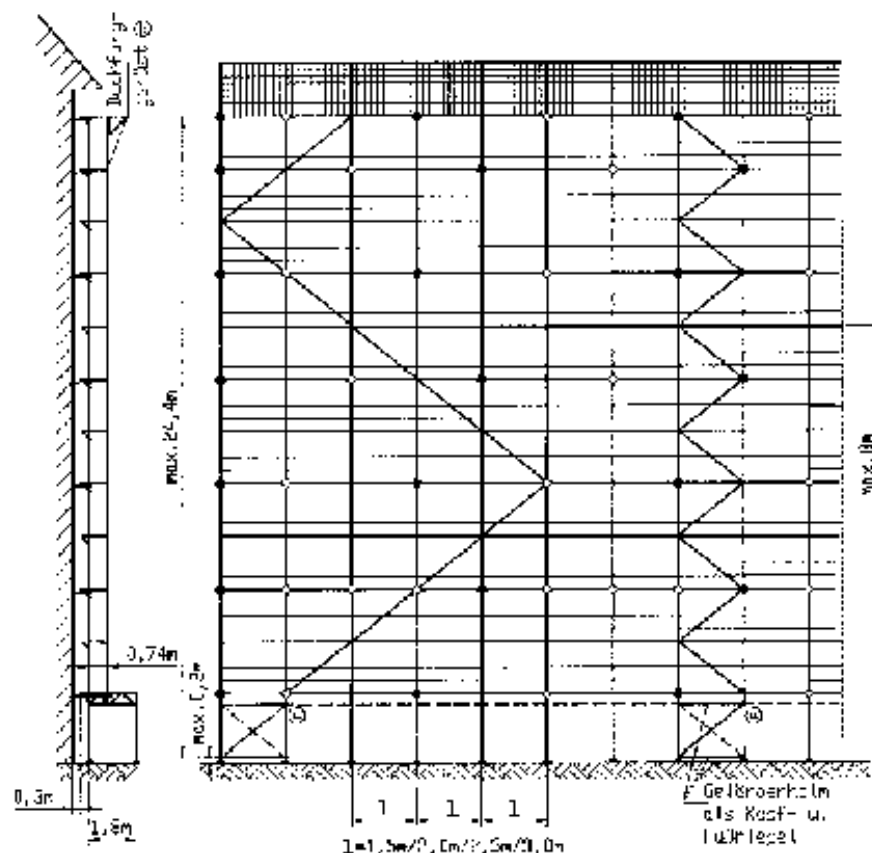


Figure 21: Passageway frame, anchor grid 1

Anchor grid 2 as shown in Figure 22 (8 m staggered, on +2 m first anchor row, on +6 m every tier of frames anchored) applies when using solid wooden decks, steel decks or aluminium decks with plywood for closed or open façades. When the bay length in front of open façades is 3.0 m no inner brackets are allowed. When using aluminium boards or decks every tier of frames must be anchored at 4 m intervals (see Fig. 15). The anchor forces can be gathered from Table 1.

In every 5th bay vertical diagonal braces are required. They are attached to the frame upright on a level of +2.40 m using a swivel coupler and may be arranged continuously or as a tower. Passageway frames need an additional diagonal brace inside. For the purpose of load distribution foot and head ledgers consisting of guardrail braces have to be provided. They are arranged continuously inside on the top.

When using bay lengths of 3.0 m guard system supports are allowed on the vertical frame only. For roof safety scaffold see paragraph 2.5.14.



l bay length (1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainers fastened at inner upright only

acc. to 2.4.7.1 (Fig. 11)

• long scaffold retainers fastened at outer and inner upright

acc. to 2.4.7.2 (Fig. 12)

or triangular tie when using inner brackets

acc. to 2.4.7.3 (Fig.13)

Figure 22: Passageway, anchor grid 2

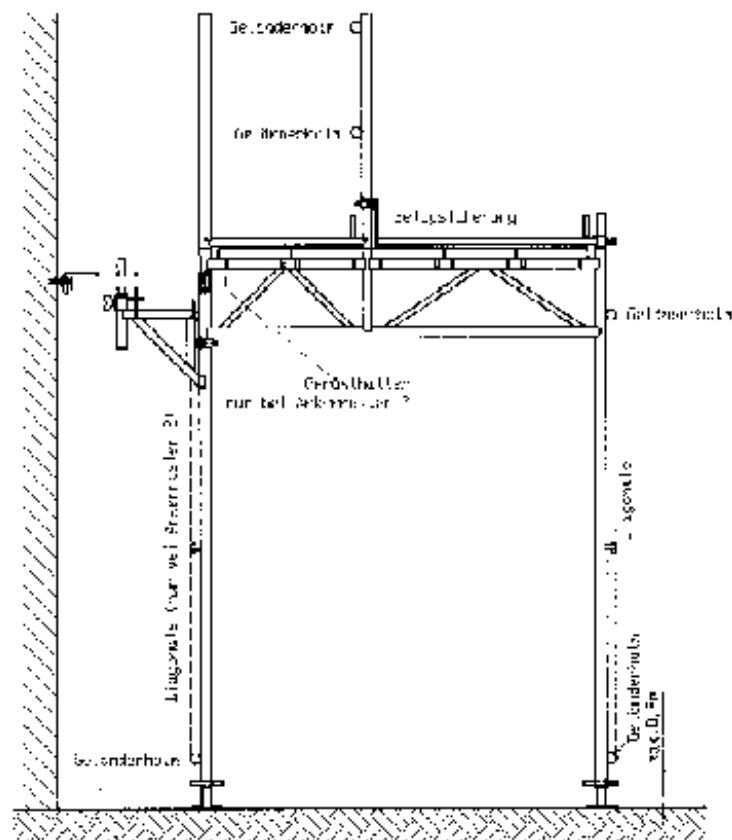


Figure 23: Passageway frame, details

The supporting forces under the uprights on the building side which depend on the scaffold height and the allowable equipment of the selected anchor grid for the load case "Working condition" can be gathered from Table 4. The dead weight of wooden decks are included.

Table 4: Supporting forces under the inner uprights

Bay length l	Inner brackets	H = 24 m	H = 16 m	H = 8 m
2.50 m	without	15.3 kN	12.6 kN	10.0 kN
2.50 m	with	21.0 kN	17.2 kN	13.4 kN
3.00 m	without	14.3 kN	11.3 kN	8.3 kN
3.00 m	with	21.1 kN	16.8 kN	12.4 kN

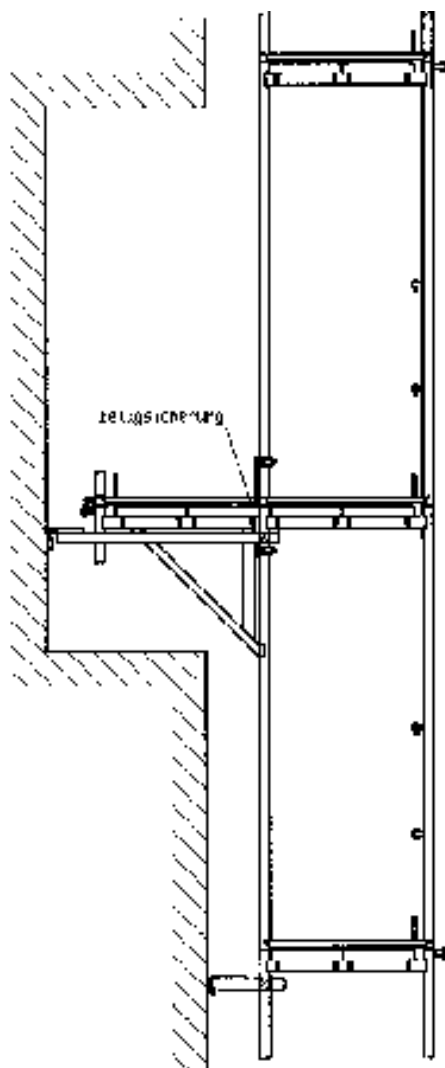
2.5.10 Widening brackets

The inner bracket and outrigger 32 are brackets for a 32 cm decking with integrated deck retainer. They can be arranged on the inner side of scaffold on all levels.

Outrigger 64 is a wider inner bracket provided with two 32 cm decks or one 64 cm deck. The distance of the front tube coupler to the frame upright is 0.74 m which is equivalent to the system width.

Outrigger 64 may be placed on one level only. This level and the one below have to be safely anchored. On the outrigger level every second point of anchorage has to be secured by triangular ties as shown in Fig. 13. On the level below only short scaffold retainers are required at each post as shown in Fig. 10. The relevant anchor forces are given in Table 2.

Planks and decks are secured against lifting by deck retainers.



Outrigger 74 is an outer bracket provided for two 32 cm decks or one 64 cm deck. This bracket has two tube couplers at the distance of the frame width of 0.74 m. The decks are arranged before the tilting pins to connect the vertical diagonal braces. Thus, a gap occurs between the bay deck and the bracket deck that needs to be covered by a transition deck. The outrigger may be installed on one level only. As regards anchorage the data of outrigger 64 is applicable. The decks are retained in the same way as those of the frames on the topmost tier.

Brackets and - if possible - the decks shall be installed from the secured lower scaffold level. Otherwise safety measures for installation have to be defined and taken after a separate risk assessment.

Figure 24: Outrigger 64

2.5.11 Bridge bearers

The bridge bearers are capable of supporting a tier of frames. They are usually installed at a height of + 4 m (Fig. 25). They are arranged on the level of posts and are coupled so that the central tube couplers are located on the same level as those of the frame. In the middle of the tube sockets an additional cross arm has to be installed to accommodate the decks. Safety measures for the installation of lattice girders, decks and side protection elements have to be defined and taken after a separate risk assessment.

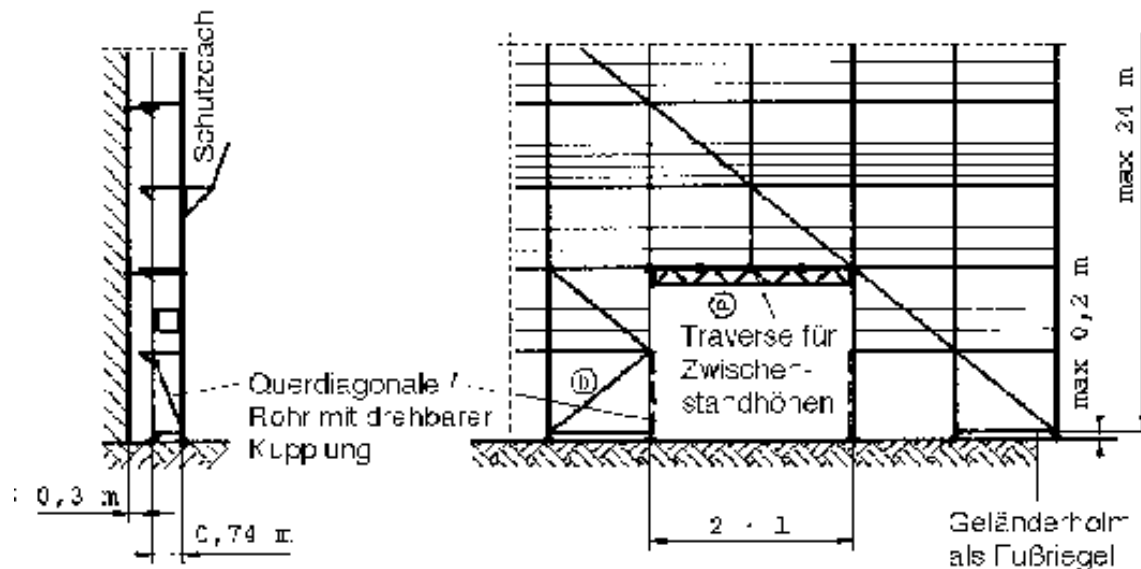


Figure 25: Bridge bearers

The bridge bearers are anchored at the supporting points, in the bay centre and at the square points on the top chord level. Long scaffold retainers must be used at the supporting points and square points (Fig. 11).

As an alternative to the anchoring between the supporting points it is also possible to arrange a horizontal brace so (Fig. 26) that it protects the square points of the lattice girder top chords against buckling.

Scaffold anchoring must comply with the versions shown, protective shelter and roof safety scaffold shall be in acc. with 2.5.13 and 2.5.14.

The lower assembly frames have to be reinforced by a diagonal cross brace.

For this purpose it is possible to use a tube of 48.3 mm diameter with swivel coupler.

With a bay length of 3 m the guard system support is permitted on the vertical frame only.

The date of the design versions determine the arrangement of the scaffold anchorage and the vertical diagonal braces. Up to the level of the bridge bearer an additional diagonal brace has to be provided on each level.

Table 5 gives the upright loads of the supporting frames for the load case "working condition" under the provision that the admissible equipment is used, as a function of scaffold height H and the relevant bay length l. the dead weight of the wooden planks were taken into account again.

Table 5: Supporting forces under the bridge bearers

Bay length l	Upright	H = 24 m	H = 16 m	H = 8 m
2.50 m	inside	18.3 kN	14.5 kN	10.7 kN
2.50 m	outside	23.1 kN	19.9 kN	16.7 kN
3.00 m	inside	21.4 kN	17.0 kN	12.6 kN
3.00 m	outside	18.3 kN	14.6 kN	10.9 kN

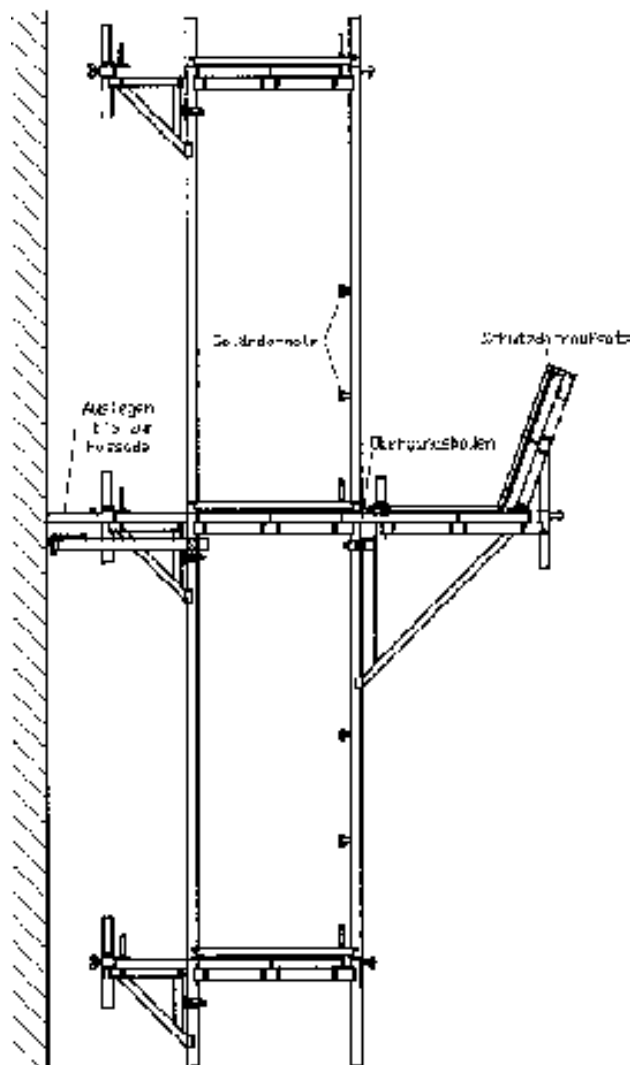
2.5.12 Access by ladder

The installation and arrangement of ladders are described in 2.3.3. The frames have to be anchored at a vertical distance of 4 m (see 2.5.2). In the bay used to install the ladder foot rails have to be mounted on both sides and provided with planks.

2.5.13 Protective shelter

The protective shelter is formed by outrigger 74 and the top unit. It serves to accommodate two sloping planks secured by a suitably shaped protection device against dislodgement. The gap between the scaffold deck and the bracket deck must be covered by a transition deck. No material must be deposited on the protective shelter. For this reason it is necessary to separate the protective shelter from the working area by a guardrail.

The protective shelter may be provided at the outer side of the scaffold at any height. Each frame has to be anchored on this level. Every second point of anchorage must be secured with long scaffold retainers or when using inner brackets triangular ties have to be used. Instead of triangular ties it is possible to use long scaffold retainers but which then have to be provided at each frame.



Anchor forces:

$F_{\perp} = 1.8 \text{ kN}$ (in front of close façade)

$F_{\perp} = 4.0 \text{ kN}$ (in front of open façade)

$F_{\parallel} = 2.2 \text{ kN}$ (in both cases)

The protective shelter and - if possible - the decks, must be installed from the secured lower level. Otherwise safety measures for installation have to be defined and taken after a separate risk assessment.

Figure 27: Protective shelter

2.5.14 Roof safety scaffold

The roof safety scaffold consists of safety meshguard supports and a barrier. The safety meshguard support is to be provided as top edging of the scaffold either on the normal vertical frame, on the roof safety frame or on the outrigger 74 depending on the size of eaves projection (Fig. 28). The safety meshguard support of nominal width 70 is used on the vertical frame and outrigger 74, whereas the safety meshguard support of a nominal width 100 is used on the roof safety frame. Outrigger 74 must be additionally provided with the outrigger strut. The vertical diagonal braces of the roof safety frame are connected at the top using a swivel coupler.

The distance between the barrier and the eaves moulding must be min. 0.70 m. If the barrier is 2 m high, the planking of the roof safety scaffold must be maximum 1.20 m below the eaves moulding, see Fig. 28.

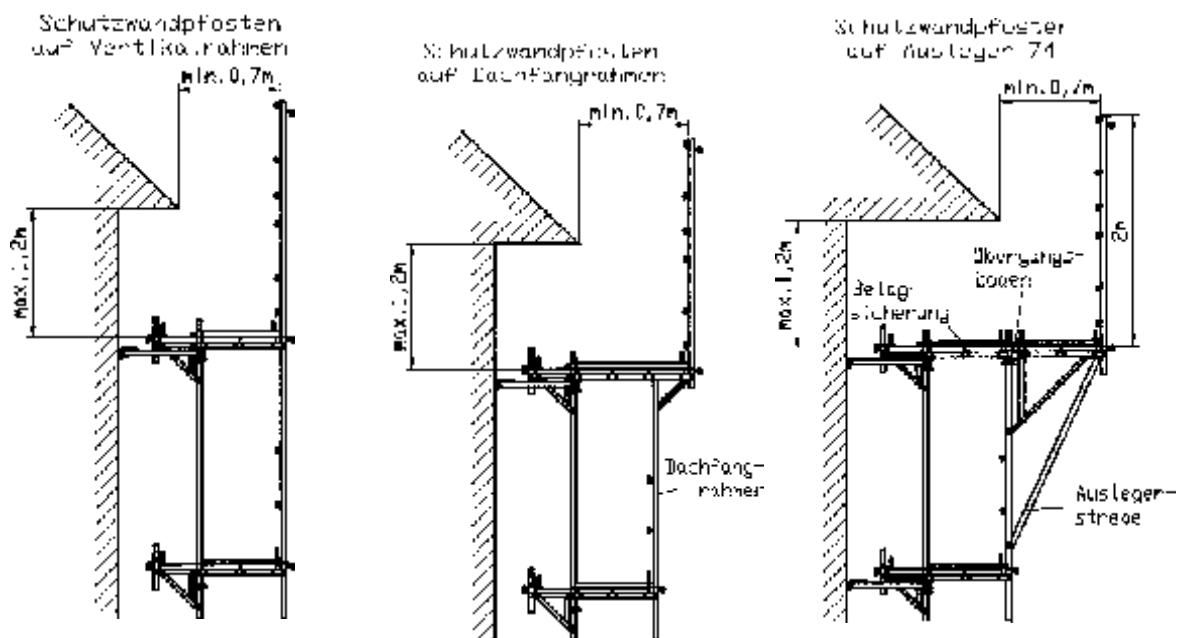


Figure 28: Roof safety scaffold (anchor forces A, B see Table 5)

On the topmost level every frame of the scaffold has to be anchored. For this purpose use a long scaffold retainer at every second point of anchorage (Fig. 12) and triangular ties respectively (Fig. 13) when using inner brackets.

Instead of triangular ties it is also possible to use long scaffold retainers for every frame. When the bay length is 3.0 m and a safety meshguard support provided on outrigger 74 the level below must also be anchored. For this purpose short scaffold retainers (Fig. 10) at every vertical frame will be sufficient. The anchor forces are max. 0.5 kN.

For anchor forces A and B see Table 6.

All kinds of decking can be used for the roof safety scaffold tier. Solid wooden planks being 3 m in length must meet Grade MS10/S13, however. The 3 m solid wooden planks of the previous version are not permissible for this purpose. On the outriggers 74 no hatch-type access decks are allowed.

The brackets and - if possible- the decks have to be installed from the secured lower level. Otherwise safety measures for installation have to be defined and taken after a separate risk assessment.

The barrier consists of two safety meshguards hooked in above each other (Fig. 29) or safety nets (Fig. 30) in accordance with DIN EN 1263 that have a maximum mesh size of 10 cm. The safety nets are fixed to the guardrails and posts either by quick-lock buckles (Fig. 30), or they have to be threaded up mesh by mesh. The manufacturers of quick-lock buckles must furnish evidence that they are suitable for use in the barrier of the roof safety scaffold.

Table 6: Anchor forces roof safety scaffold

Bay length 1	Covering	A \perp	B \perp	A \parallel , B \parallel
2.50 m	without	2.0 kN	2.6 kN	2.5 kN
3.00 m	without	2.3 kN	3.3 kN	2.5 kN
2.50 m	Net	2.8 kN	3.5 kN	2.5 kN
3.00 m	Net	3.4 kN	3.9 kN	2.6 kN
2.50 m	Tarpaulin	3.3 kN	3.9 kN	3.2 kN
3.00 m	Tarpaulin	4.0 kN	5.4 kN	3.4 kN

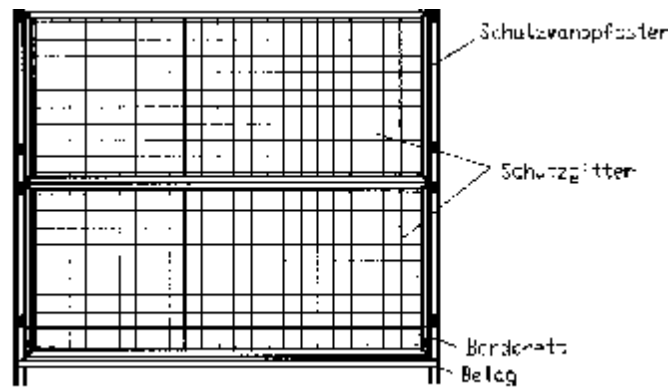


Figure 29: Barrier with safety meshguards

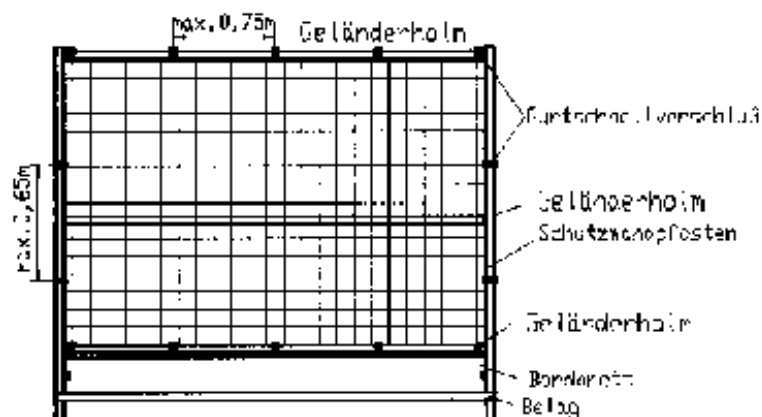
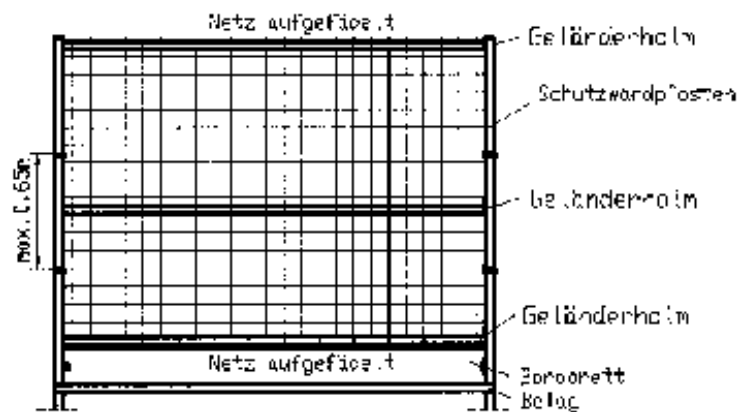


Figure 30: Barrier with safety nets

2.5.15 Securing the scaffold components against lifting

The lower transom of the above arranged frame secures the decking against lifting. On the topmost level this function is either fulfilled by the cross rail of the guardrail post or - when simple railing posts are used - by a separate deck retainer. Outriggers, passageway frames, protective shelter and roof safety scaffolds have to be provided with the relevant deck retaining devices.

A special deck retainer is available for the cross arms to be installed.

The vertical frames need not be secured tension-proof to each other.

This kind of securing can be effected, however, by locking pins or M 10 bolts to be inserted into the holes of the vertical member if this is considered necessary in individual cases.

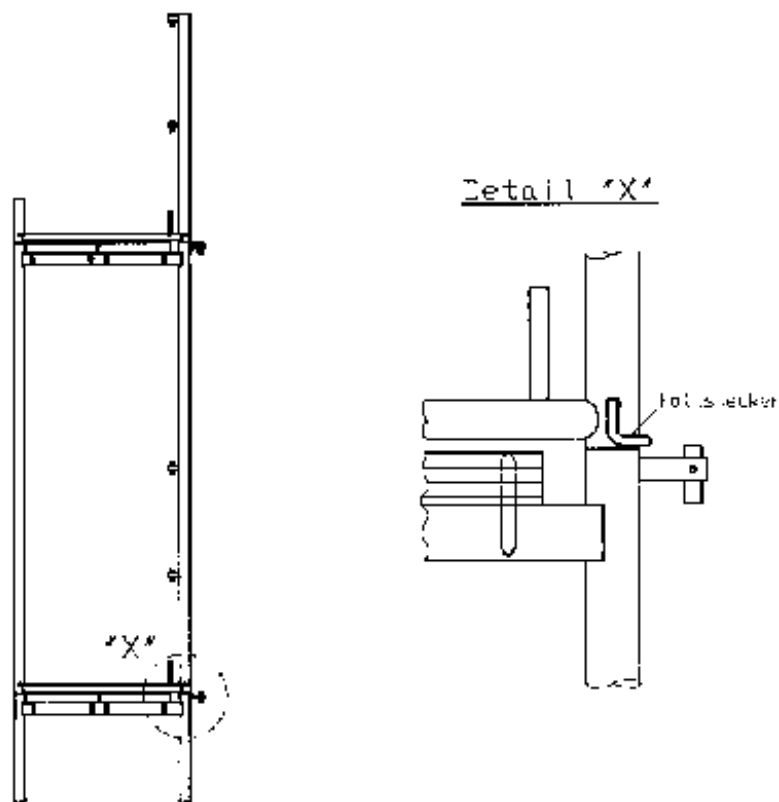


Figure 31: Securing against lifting

2.5.16 Free-standing scaffold tiers over the last anchoring

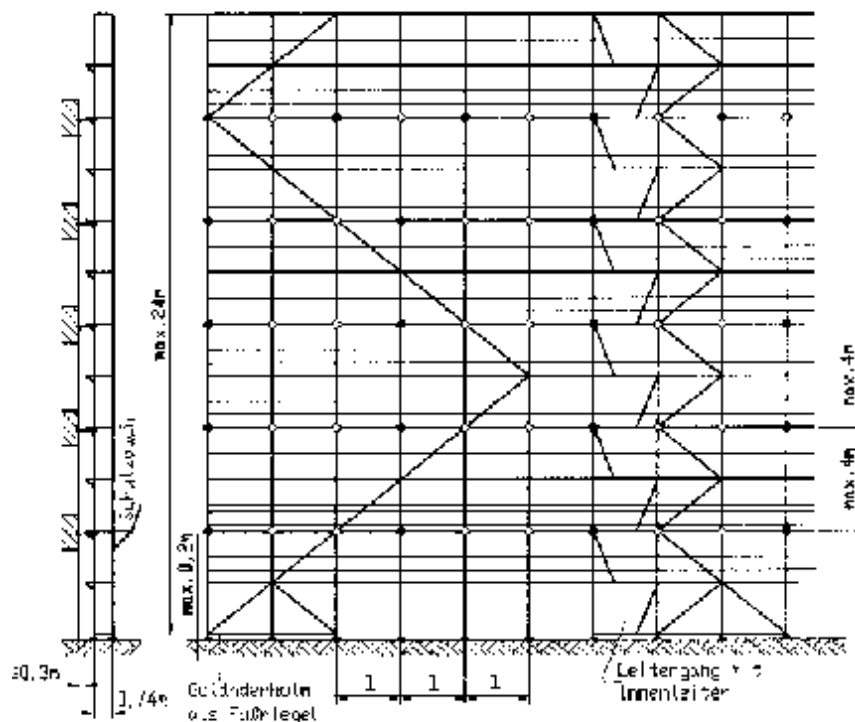
Free-standing scaffold tiers require the 4 m anchor grid on the last anchoring level (Fig. 32). Up to the second-last anchor level the data of 2.5.3 are applicable (Fig. 15).

On the topmost anchor level every second vertical frame must be anchored using long scaffold retainers (Fig. 12) or, when using inner brackets, triangular ties have to be used (Fig. 13). If there are no inner brackets and solid wooden decks, steel decks, aluminium planks and aluminium decks with plywood are used, only every third point of anchorage needs to be secured by long scaffold retainers.

On the topmost level the anchor forces have to be assumed as follows:

$$F_{\perp} = 3.1 \text{ kN and } F_{\parallel} = 2.7 \text{ kN}$$

A tension-proof connection of the frames projecting in upward direction is not required for this scaffold system but recommended to improve its rigidity (Fig. 31).



Anchoring the protective shelter 2.5.13.

l bay length(1.50 m, 2.00 m, 2.50 m, 3.00 m)

o short scaffold retainers fastened at inner upright only

acc. to 2.4.7.1 (Fig. 11)

• long scaffold retainers fastened at outer and inner upright
or triangular tie when using inner brackets

acc. to 2.4.7.2 (Fig. 12)

acc. to 2.4.7.3 (Fig. 13)

Figure 32: Free-standing scaffold tiers over the last anchoring

3. Dismantle scaffolds

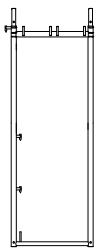
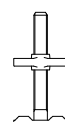

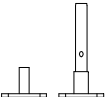

Dismantle scaffold in reverse order to that described in 2.1 to 2.5


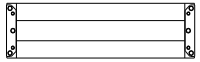

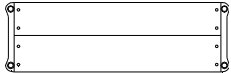

4. Use of scaffold system

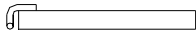
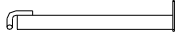
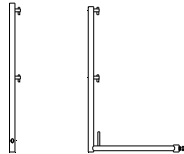
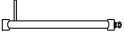
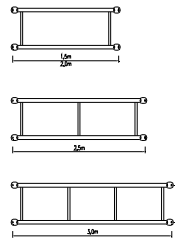

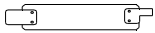
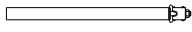
The scaffold may be used in accordance with the indicated scaffolding group 3 and the provisions of the operational safety regulations (BetrSichV). The scaffold constructor has to inspect the scaffold after completion. Any unfinished scaffolds or scaffold sections have to be barred from service, cordoned off and the prohibitory sign "No Access" put up.

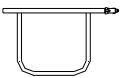
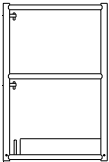
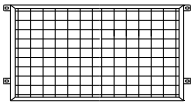

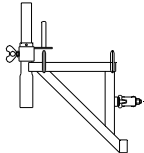
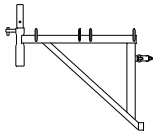
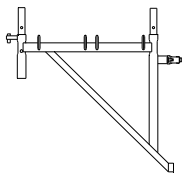
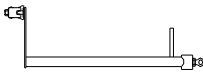
5. System components



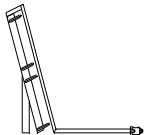
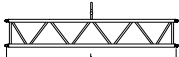
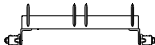




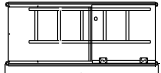
The overview below lists the components used in standard versions.


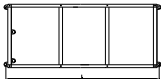
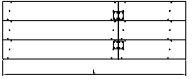

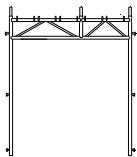
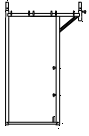


Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
1	Vertical frame A H=2,0m H=1,5m H=1,0m H=0,5m	20,0 16,4 12,4 8,8	1, 53 1, 53 2, 53 2, 53	
2	Vertical frame A, former design		3	
3	Foot spindle 0,35m 0,50m 0,66m	3,4 4,1 4,7	4	
4	Foot spindle, former design		5	
5	Lower diagonal brace fastening	0,7	6, 60	
6	Foot plates	0,7	7	
7	Foot plates SL	2,3	7	
8	Vertical diagonal brace 1,0 x 1,5m 1,0 x 2,0m 1,0 x 2,5m 1,0 x 3,0m 1,5 x 1,5m 1,5 x 2,5m 1,5 x 3,0m 2,0 x 1,5m 2,0 x 2,0m 2,0 x 2,5m 2,0x x3,0m	5,5 6,8 8,2 9,6 6,5 8,9 10,2 7,6 8,6 9,7 10,9	8, 59	
9	Vertical diagonal brace, former design		9	

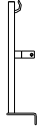
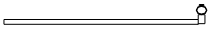

Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
10	Guardrail brace (rear guardrail) L=0,74m L=1,06m L=1,50m L=2,00m L=2,50m L=3,00m	1,3 1,8 2,6 3,4 4,2 6,4	8, 59	
11	Guardrail brace, former design		9	
12	Solid wooden deck L=0,74m L=1,06m L=1,50m L=2,00m L=2,50m L=3,00m	6,8 9,8 13,8 18,4 23,0 27,7	10, 55	
13	Solid wooden deck, former design		11	
14	Steel deck L=0,74m L=1,06m L=1,50m L=2,00m L=2,50m L=3,00m	7,0 9,9 13,8 17,8 20,6 24,4	12, 54	
15	Alumide deck L=1,50m L=2,00m L=2,50m L=3,00m	7,7 10,2 12,6 15,1	13	
16	Aluminium deck, former design		14	
17	Aluminium deck with plywood L=0,74m L=1,06m L=1,50m L=2,00m L=2,50m L=3,00m	5,9 8,3 11,6 14,8 18,1 21,4	15, 56	

Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
18	Scaffold retainer L=0,40m l=0,50m L=1,10m L=1,30m L=1,50m	1,7 2,1 4,3 5,0 5,7	16	
19	Scaffold retainer with fork	3,7	16	
20	Guardrail support	4,9	17, 61	
21	Single guardrail support	6,6	17, 61	
22	Deck retainer	2,1	17, 65	
23	Guardrail frame L=1,50m L=2,00m L=2,50m L=3,00m	6,6 8,2 10,6 15,7	18	
24	Double guardrail, former design		19	
25	Toeboard L=0,74m L=1,06m L=1,50m L=2,00m L=2,50m L=3,00m	2,1 2,9 4,1 5,5 6,8 8,2	20, 64	
26	Front face toeboard	1,4	20, 64	
27	Front face guardrail brace	2,2	21, 62	
28	Front face guardrail brace, former design		22	

Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
29	Front face double guardrail	3,9	21, 62	
30	Front face double guardrail, former design		22	
31	Front face guardrail frame b=0,74m b=1,06m	14,4 17,2	23, 63	
32	Front face guardrail frame, former design		24	
33	Safety meshguard L=1,50m L=2,00m L=2,50m L=3,00m	14,5 18,0 21,5 25,0	25, 68	
34	Guard system support b=0,74m b=1,06m	12,6 13,5	26, 67 26	
35	Extension bracket 32	5,5	27, 66	
36	Extension bracket 32, former design A		28	
37	Extension bracket 32 former design B, C		29	
38	Extension bracket 64,	8,0	30	
39	Extension bracket 74	13,1	31	
40	Deck retainer	2,7	30, 65	

Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
41	Outrigger bracket for bracket 74	8,3	32	
42	Transition deck for bracket 74 L=1,50m L=2,00m L=2,50m L=3,00m	8,0 10,8 13,3 16,0	33	
43 44	Protective shelter, protection device against dislodgement	6,7	34	
45	Bridge bearers L=4,00m L=5,00m L=6,00m	42,4 50,8 59,9	35	
46	Landing cross arm	4,6	36	
47	Landing cross arm, former design	4,4	36	
48	Cross arm for intermediate standing heights		37	
49	Cross arm for intermediate standing heights, former design		37	
50	Deck retainer for Cross arms 70	3,3	38	
51	Foot cross arm 70	3,3	39	
52	Diagonal cross brace for vertical frame	7,6	40	
53	Aluminium hatch-type access with plywood L=2,50m L=2,00m	23,0 26,0	41, 57	

Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
54	Aluminium hatch-type access with aluminium deck (ADT) L=2,50m L=3,00m	13,3 16,0	43	
55	Steel deck end fitting L=1,50m L=2,00m L=2,50m L=3,00m	14,7 17,1 21,7 32,4	46	
56	Steel ladder frame, former design		50	
57	Wooden deck with hatch-type access L=1,50m L=2,00m L=2,50m L=3,00m	16,9 22,1 27,2 24,5	47	
58	Inner ladder	11,7	48	
59	Passageway frame	38,0	49	
60	Roof safety frame	21,9	51	
61	Tilting pin coupler	0,6	52	
62	Locking clip	0,1	52	

Pos.	Bezeichnung	Gewicht (kg)	Z-8.1-847 Anlage A Seite	Abbildung
63	Advanced double guardrail	11,7	-	
64	Advanced end guardrail	1,4	-	
	Telescopic guardrail 2,00-3,07m	7,0	-	

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