



# Practical Guideline

**for the supply/provision and use  
of working and protective scaffolds**

Facade scaffolds made of prefabricated  
components as well as tube and fittings

Edition April 2016

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Editor:

Union Europäischer Gerüstbaubetriebe UEG  
Rösrather Straße 645  
51107 Cologne  
Phone: +49 (0)221 870 60 20  
Fax: +49 (0)221 870 60 55 20  
E-mail: [generalsecretariat@ueg-eu.org](mailto:generalsecretariat@ueg-eu.org)

Drafted by:

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# 1 General information/introduction

In almost all the member states, scaffolds are erected using prefabricated components (scaffolding systems). In the UK, the majority of working scaffolds are erected with tube and fittings. The technical requirements regarding scaffolding are mainly based on European Standards (EN) that are transposed into national standards (e.g. BS EN, DIN EN) by the member states. It should be considered that there are national annexes and national standards.

In addition to the specifications laid down in the standards, occupational health and safety regulations must be complied with. These are mainly based on the EC framework directives, regarding requirements for the use of work equipment such as 89/391/EEC, 2001/45/EC, 2009/104/EC. These are transposed into national law by the member countries.

It should also be considered that there are/may be additional and supplementary provisions in individual member countries.

This guide is intended for working and protective scaffolds. It contains information regarding planning and proper erection of scaffolds, taking into consideration regulations, standards, and work instructions that are suitable for the intended use.

## 1.1 Scope

This guide shall apply to the assembly, alteration, dismantling and use of working and protective scaffolds. The guide provides information to be considered during risk assessment.

The guide shall not apply to falsework, horizontally movable platforms including mobile access towers, encapsulation construction and similar design types such as suspended or cantilevered scaffolds.

## 1.2 Definitions and explanations

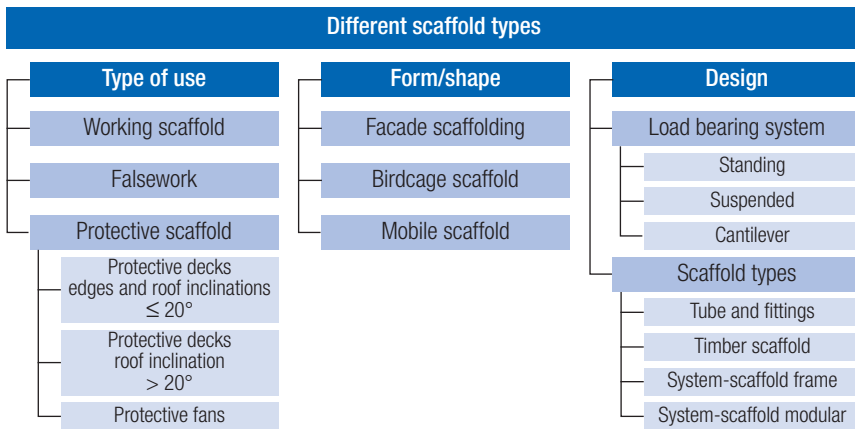
In scaffolding standards, scaffolds are categorised on the basis of three essential features (see figure 1). The categorisation is based on the type of use, e.g. working scaffold, on the form of scaffolding, e.g. facade scaffold and on the design, e.g. frame scaffold. A frame scaffold can be a facade scaffold used as a working scaffold. The type of use describes the base function of the scaffold, i.e. it describes whether the scaffold is used for work, for protection or for falsework.

The description of the scaffold must also indicate whether it is to be installed as a facade scaffold with longitudinal working areas or as a tower scaffold with surface-oriented working areas.

Both can be either stationary or movable.

We also distinguish between freestanding scaffolds, suspended scaffolds and cantilever scaffolds. The scaffold can be a tube and fitting design, a timber or a system design, e.g. as a frame scaffold or a modular scaffold.

Figure 1: Different scaffold types



For the purpose of this guide, the following terms are defined and explained as follows:

1. Protective and working scaffolds are temporary constructions of variable length and widths that can be assembled from scaffolding components on site, perform their intended function and subsequently be dismantled.
2. Working scaffolds are used to execute work from the scaffold. The scaffolds must not only carry the persons and tools, but also the working or construction materials required for the work.
3. Protective scaffolds are used as protection against falls from a height and to protect persons, equipment etc. from falling objects.

### 1.3 Legislation/provisions, standards and guidelines

In all the UEG member countries the EN standards are transposed into national standards and the main standards for working and protective scaffolds are:

EN 39 Loose steel tube and coupler scaffolds – Technical delivery conditions

EN 74-1 Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 1: Couplers for tubes – Requirements and test procedures

EN 74-2 Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 2: Special couplers – Requirements and test procedures

EN 74-3 Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 3: Plain base plates and spigot pins – Requirements and test procedures

EN 12810-1 *Facade scaffold made of prefabricated components - Part 1: Products specifications*

EN 12810-2 *Facade scaffold made of prefabricated components - Part 2: Particular methods of structural design*

EN 12811-1 *Temporary work equipment - Part 1: Scaffolds – Performance requirement and general design*

EN 12811-2 *Temporary work equipment - Part 2: Information on material*

EN 12811-3 *Temporary work equipment - Part 3: Load testing*

EN 12811-4 *Temporary work equipment - Part 4: Protection fans for scaffolds - Performance requirement and general design*

EN 1991-1-4 *Eurocode 1 - Actions on structures - Part 1-4: General actions - Wind actions*

EN 1993-1-1 *Eurocode 3 – Design of steel structures - Part 1-1: General rules and rules for buildings*

EN 1995-1-1 *Eurocode 5 – Design of timber structures - Part 1-1: General rules and rules for buildings*

EN 1999-1-1 *Eurocode 9 – Design of aluminium structures - Part 1-1: General rules and rules for buildings*

CEN/TR 15563 *Temporary works equipment – Recommendations for achieving health and safety*

Additional and supplementary provisions in individual member countries

*Table 1: Comparison of legislation, provision, standards and guidelines*

Country	Legislation - provision	National standards	Guidelines for scaffolding and safety regulations
<b>Finland</b>	<ul style="list-style-type: none"> <li>- Occupational Safety and Health Act</li> <li>- Government Decree on the Safety of Construction 205 / 2009</li> <li>- Government Decree on the inspection and the safe use of tools</li> </ul>		<ul style="list-style-type: none"> <li>- RIL 142-2010-guide</li> <li>- Occupational Health and Safety authorities' interpretations and practices (mandatory)</li> </ul>
<b>Germany</b>	<p><u>Gesetze:</u>                      Arbeitsschutzgesetz                      Bauordnung                      Produktsicherheitsgesetz</p> <p><u>Verordnungen:</u>                      Betriebssicherheitsverordnung</p> <p><u>Regeln und Vorschriften:</u>                      Technische Regeln für Betriebssicherheit, z.B. TRBS 2121-1                      Unfallverhütungsvorschriften der Deutschen gesetzlichen Unfallversicherung (DGUV)</p>	DIN 4420 Service and working scaffolds Part 1: Service scaffolds Part 3: Selected types of scaffolding constructions and their basic versions DIN 4074 Strength grading of wood Part 1: Coniferous swan timber	FRG 1 Standgerüste FI-PSA Persönliche Schutzausrüstung für den Gerüstbau Fachinformation: Gerüste für Arbeiten an Fassaden mit Wärmedämm-Verbundsystemen (WDVS) BGI/GUV-I 663/LV 37 Handlungsanleitung für den Umgang mit Arbeits- und Schutzgerüsten



Country	Legislation - provision	National standards	Guidelines for scaffolding and safety regulations
<b>Holland</b>	Legislation NL 1. ARBOWET This is the framework of the complete legislation. 2. ARBOESLUIT This is the development of the ARBOWET. Employees and employers have to take this to themselves to avoid risks 3. ARBOREGELING Developing up to concrete regulations.	Also for scaffolds, various NEN standards apply: - NEN 6700 and -6702 Technical principles for building structures - NEN 6770, -6771 and -6772 Technical principles for building structures. - NEN 2718, mobile scaffolding	VSB and Construction Netherlands present the Directive Scaffolding, where the state of the art is displayed on building and working on mostly steel, standing scaffolding in the construction industry and many other sectors. The Directive takes the form of a guideline and website <a href="http://www.richtlijnsteigers.nl">www.richtlijnsteigers.nl</a> .
<b>Luxembourg</b>	Vorschriften der ITM Luxembourg Alle DIN/EN Regeln im Bereich Gerüstbau Hinweise der AAA (Unfallkasse = Gleich wie BG Bau BGI Gerüstbau)	As Germany	AAA Unfallkasse (= BGI Handlungsanleitung für den Umgang mit Arbeits- und Schutzgerüsten)
<b>Norway</b>	Working Environment Act Regulation 1357: Regulation concerning the Performance of Work	NS 9700 Scaffold	No guidelines
<b>Poland</b>	Requirements of the assembly and use of scaffolds (2003 No. 47 pos. 401) Qualifications of a scaffolding fitter (2001 No. 118 pos. 1263) Regulation on the use of machines (2003 No. 178 pos. 1745) - Requirements of the Directive 2001/45/EC General health and safety regulations (2003 No. 169 pos. 1650 with changes)	PN-M-47900:1996 Working metal scaffolds Part 1 Definitions, classification and principal parameters Part 2: Building and mounting scaffolds Part 3: Frames scaffolds PN-B-03163:1998 Timber structures – Scaffolds Part 1: Terminology Part 2: Requirements Part 3: Acceptance tests	
<b>Sweden</b>	AFS 2013:12 Ställningar AFS 1999:03 Bygg och anläggningsarbete		„Rörställningar – Utvärdering av typefall“ (SP Arbetsrapport 2006:58) Säkra ställningar - Vägledning till Arbetsmiljöverkets föreskrifter om ställningar, AFS 2013:4, H456.

Country	Legislation - provision	National standards	Guidelines for scaffolding and safety regulations
<b>Switzerland</b>	Bundesgesetz über die Produktesicherheit (PrSG). SR 930.11 Verordnung über die Produktesicherheit (PrSV). 832.311.141 Verordnung über die Sicherheit und den Gesundheitsschutz der Arbeitnehmerinnen und Arbeitnehmer bei Bauarbeiten	SIA 118/222 SIA 177 SIA 260 SIA 261 SIA 263 SIA 265 SIA 462 SIA 465	Swiss Accident Insurance Fund (SUVA) Different themes see website.
<b>United Kingdom</b>	The Work at Height Regulations 2005 No. 735 The Construction Design and Management Regulations 2015	BS 1139 Part 1-6 Metal Scaffolding BS 2482: 2009 Specification for timber scaffold board BS 8437: 2005 Code of practice for selection, use and maintenance of personal fall protection system and equipment for use in workplace BS 8454: 2006 Code of practice for the delivery of training and education of work at height and rescue	TG 20:13 Operational Guide TG 20:13 Design Guide SG4:10 Preventing Fall in Scaffolding

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

## Chapter 1:

Requirements regarding the completed scaffold  
(scaffold classification, dimensions and components)

# 2 Scaffold classification

## 2.1 General information

Every area for access and working scaffold shall be arranged to provide a convenient working place, and to:

- protect people from the risk of falling,
- provide safe storage of materials and equipment,
- protect those below from falling objects.

## 2.2 Classification

In accordance with EN 12811-1 the classification is based on width, height and load classes. The cantilevered portion must be of the same load class as the main working area. If there is a difference in height of more than 0,25 m between the working area and the cantilevered portions, they may be of different load classes.

The width and load classes of the working areas must be suitable for the type of work to be executed (also see sections 2.3 and 2.4).

Table 2: Width classes

Width class	$W$ in m
W06	$0,6 \leq w < 0,9$
W09	$0,9 \leq w < 1,2$
W12	$1,2 \leq w < 1,5$
W15	$1,5 \leq w < 1,8$
W18	$1,8 \leq w < 2,1$
W21	$2,1 \leq w < 2,4$
W24	$2,4 \leq w$

Figure 2: Width class W09

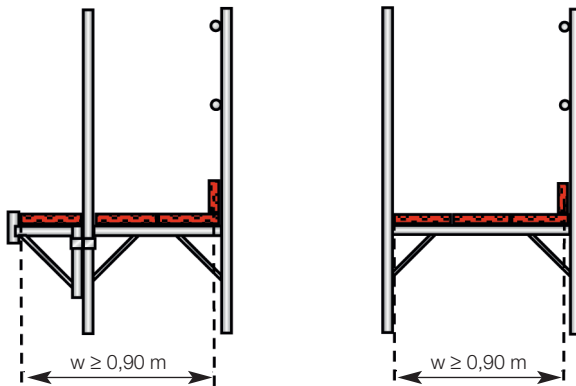


Table 3: Height classes

Class	Clear headroom		
	Between working areas $h_3$	Between working areas and transoms or tie members $h_{1a}$ and $h_{1b}$	Minimum clear height at shoulder level $h_2$
$H_1$	$h_3 \geq 1,90$ m	$1,75$ m $\leq h_1 < 1,90$ m	$h_2 \geq 1,60$ m
$H_2$	$h_3 \geq 1,90$ m	$h_1 \geq 1,90$ m	$h_2 \geq 1,75$ m

Table 4: Load classes

Load class	Uniformly distributed load $q_1$ kN/m <sup>2</sup>	Concentrated load on area 500 mm x 500 mm $F_1$ kN	Concentrated load on area 200 mm x 200 mm $F_2$ kN	Partial area load	
				$q_2$ kN/m <sup>2</sup>	Partial area factor $a_p$
1	0,75	1,50	1,00	-	-
2	1,50	1,50	1,00	-	-
3	2,00	1,50	1,00	-	-
4	3,00	3,00	1,00	5,00	0,4
5	4,50	3,00	1,00	7,50	0,4
6	6,00	3,00	1,00	10,00	0,5

### 2.3 Loads on platforms (working areas)

The admissible loads for the relevant scaffold systems are defined in the manufacturer's instructions for installation and use. For scaffolds made of tube and fittings, the permissible load data must be taken from the different countries standards or technical guidelines.

Usually, only one platform (working area) shall be used at a time. If the scaffold client wants to use more than one platform at the same time, this must be indicated on the order. Additional reinforcements may become necessary. In this case a proof or documentation of strength and stability is required.

The following points need to be taken into consideration when determining the service load:

- The sum of the uniformly distributed service loads on the individual platforms in a bay shall not exceed the value of the load per platform which has to be calculated on the basis of table 4, column 2.
- Each person shall be assessed at a load of 1,0 kN (equalling a weight of a mass of 100 kg).
- If hoists are used to place loads on scaffolds, these loads shall be multiplied with a factor of 1,2 according to EN 12811-1.
- Protective scaffolds shall be designed for load class 2 as a minimum.

In deviation from these rules, the load area for birdcage scaffolds can be restricted. It is possible to limit the uniformly distributed load  $q_1$  for the supporting components to an area of 6,0 m<sup>2</sup> on birdcage scaffolds. The remaining area of the supporting component shall be loaded with 0,75 kN/m<sup>2</sup>.

If this restriction is applied, the scaffold shall be marked accordingly (see section 7.2). The user shall be clearly and explicitly informed of these restrictions, e.g. by a handover report, by instructions for use and by proper marking.

In some countries, the following combinations between load and width classes have proven to be valuable:

*Table 5: Recommended combinations of load and width for system scaffolding*

Load class	1	2	3	4	5	6
Uniformly distributed load [kN/m <sup>2</sup> ]	0,75	1,50	2,00	3,00	4,50	6,00
Minimum width of frame scaffold [m]	0,6			0,9		
Minimum width of modular scaffold [m]	0,9					

## 2.4 Examples of use/best practice

Working scaffolds of load class 1 shall only be used for access, inspection and test activities.

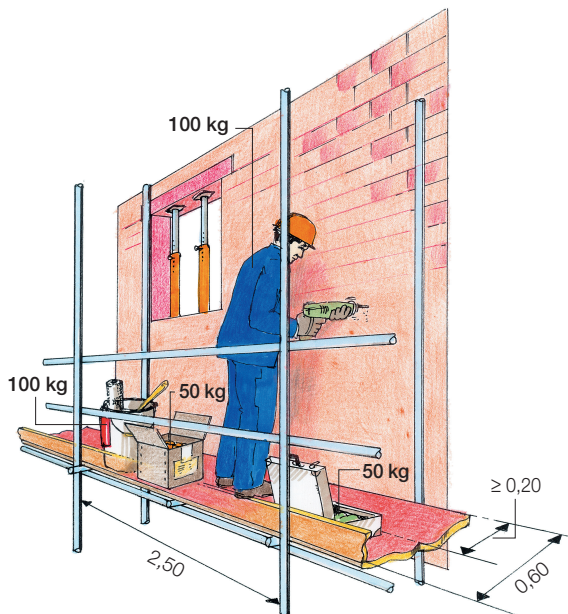
Working scaffolds of load class 2 shall only be used for work that does not require the storing of construction materials and components.

Working scaffolds of load class 3 shall only be used for work where the combined load from persons and materials does not exceed an evenly distributed service load of 2,0 kN/m<sup>2</sup>.

The following activities are allowed (non-exhaustive list):

- plaster and stucco work using machines,
- plaster and stucco work with only little material stored on the scaffold,
- roofing work,
- facade cladding work, light thermal insulation work (ETICS),
- painting activities,
- coating activities,
- grouting and jointing work,
- repair work,
- assembly work,
- electrical installations.

Figure 3: Scaffold load class 3 in Germany



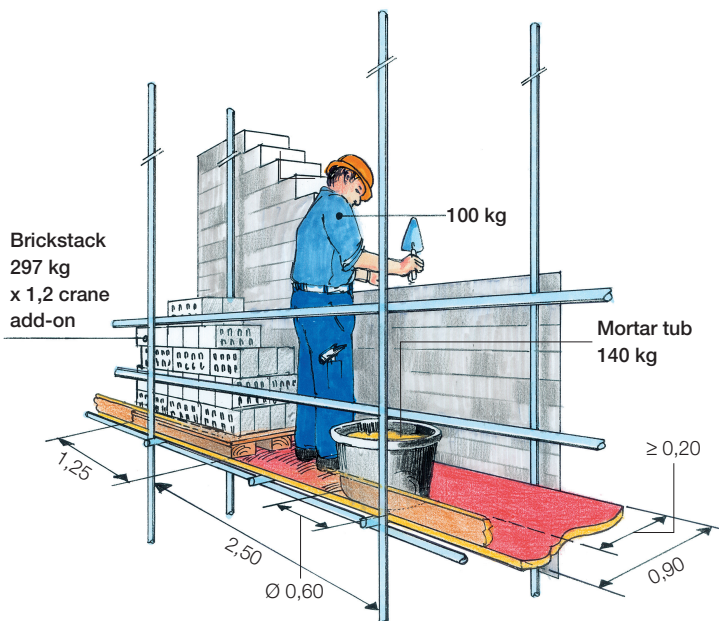
In Germany and some other countries a passage width of at least 0,20 m shall be left when materials are stored on the working platform. See table 6 for variations. Working scaffolds of load classes 4, 5 and 6 shall be used for work where more heavy materials or components are placed or stored on the platform. The permissible load as described in table 4, column 2 and the partial area load as described in table 4, column 5 must not be exceeded.

The following activities are allowed (non-exhaustive list):

- masonry work,
- plaster work, thermal insulation work (ETICS),
- reinforcement work,
- brick and natural stone installation,
- assembly work.

In Germany and some other countries a passage width of at least 0,20 m shall be left when materials are stored on the working platform. See table 6 for variations.

Figure 4: Scaffold load class 4 in Germany



## 2.5 National variations

Table 6: National variation

Country	Examples of use/best practice
<b>Finland</b>	Recommendations for minimum platform width depending on type of work carried out from the platform. See table 1; Legislations and Guidelines
<b>Germany</b>	In deviation to table 5 the minimum width of modular scaffolds can also be 0,6 m for load classes 1 – 3. Additional to figure 2 width class W 09 is also possible with a combination of working area and cantilevered portions
<b>Holland</b>	In deviation to table 5 the minimum width of modular scaffolds can also be 0,6 m for load classes 1 – 3. For typical Dutch work as bricklaying load class 4 on main area (min W12) and load class 2 on cantilever are used whereby it is allowed that the class 2 loaded cantilevers is on same level as main floor. The cantilever is an extendable hop-up 40 cm wide which can be extended to 70 cm wide for fall protection above the working level (See figure in Dutch guidelines)
<b>Luxembourg</b>	As Germany
<b>Norway</b>	In deviation to table 5 the minimum width of modular scaffolds can also be 0,6 m for load classes 1 – 3. Additional to figure 2 width class W 09 is also possible with a combination of working area and cantilevered portions
<b>Poland</b>	In deviation to table 5 the minimum width of modular scaffolds could be 0,6 m for load classes 1 – 3. The minimum width of tube and fitting scaffolding should be 0,9 m for each load classes.
<b>Sweden</b>	There are no restrictions regarding load class or width to type of scaffold. Section 2.3 or 2.4 does not comply with Swedish rules. The working space shall be 0,6 m without any material in it.
<b>Switzerland</b>	In deviation to table 5 the minimum width of modular scaffolds can also be 0,6 m for load classes 1 -3. Additional to figure 2 width class W 09 is also possible with a combination of working area and cantilevered portions
<b>United Kingdom</b>	

See UEG website: [www.ueg.eu.org](http://www.ueg.eu.org)



# 3 Scaffold dimensions

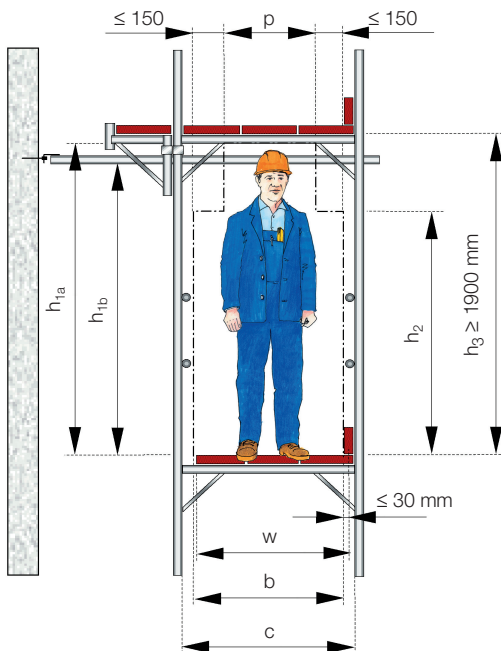
## 3.1 Working scaffold dimensions

The minimum width of the entire platform of a working area (working area included cantilevered portion) shall be

- 0,60 m for width class W06
- and
- 0,90 m for width class W09 (see table 2).

The width  $w$  of the working area shall be chosen in such a way that a space for work or access of 0,20 m (or more in many countries) is free when materials are stored in the working area. If no work is done at the corner/return, the width can be reduced to 0,50 m.

Figure 5: Requirement for headroom and width of working areas



- $b$  = free walking space, which shall be at least the greater of 500 mm and  $(c - 250)$  mm
- $c$  = clear distance between standards
- $h_{1a}, h_{1b}$  = clear headroom between the working areas and transoms or tie members respectively
- $h_2$  = clear shoulder height
- $h_3$  = Clear headheight between working areas, ( $h_3 \geq 1.90$  m)
- $p$  = clear headheight width, which shall be at least the greater of 300 mm and  $(c - 450)$  mm
- $w$  = width of the working area according to table 2

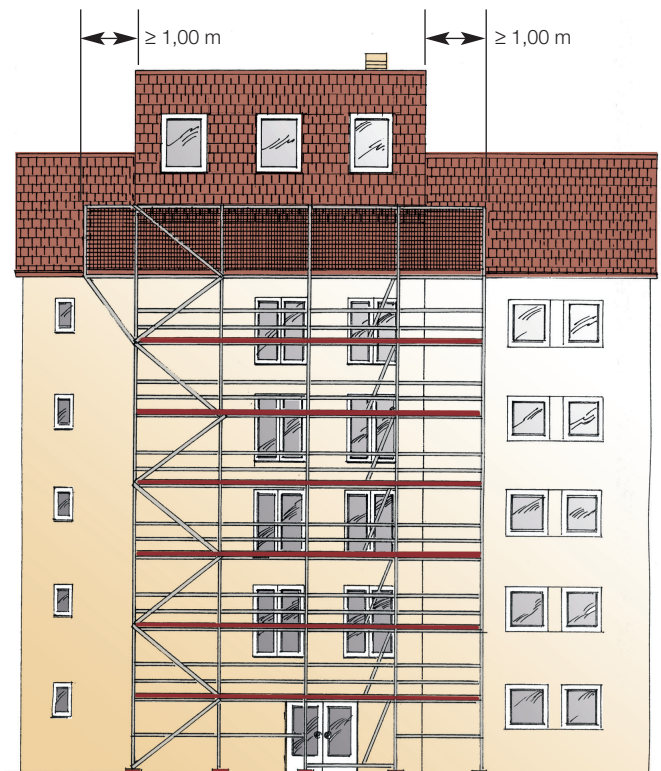
### 3.2 Protective scaffold dimensions

On the side, protective scaffolds shall be at least 1,00 m wider than the area to be protected measured from the unprotected edge.

Depending on their design and their intended use, protective scaffolds are classified as follows:

- protective decks for edges and inclined roof  $\leq 20^\circ$  (see section 3.2.1)
- protective decks for inclined roof  $> 20^\circ$  (see section 3.2.2)
- protective fan (see section 3.2.3)
- working scaffolds with cladding (see section 3.2.4)

Figure 6: Lateral overhang of a protective scaffold

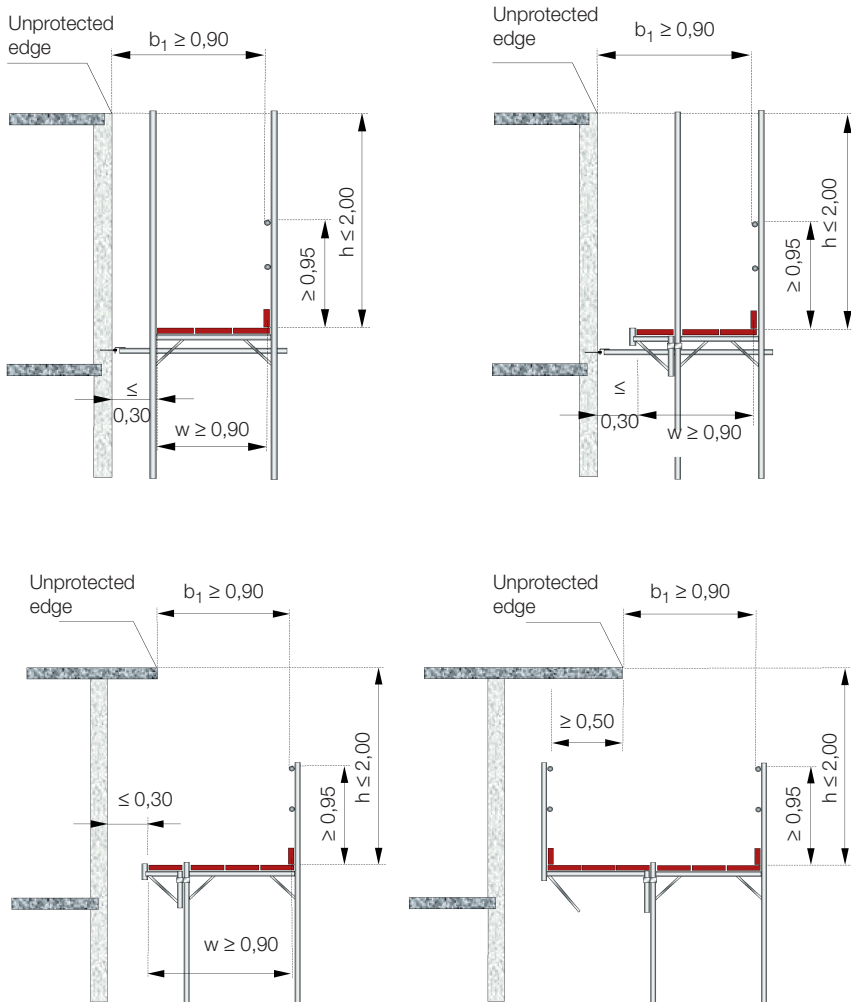


#### 3.2.1 Dimension of protective decks for edges and roof $\leq 20^\circ$

The vertical distance between the unprotected edge and the arresting surface shall not exceed 2,0 m.

The horizontal distance between the protection deck and the building shall not be larger than 0,30 m

Figure 7 a-b-c-d: Protective decks for edges and inclined roof  $\leq 20^\circ$



The width  $w$  of the fall-breaking surface shall be at least 0,90 m.

Distance  $b_1$  between the inner side of the side protection or protective barrier and the unprotected edge shall be at least 0,90 m. If the distance  $b_1$  or  $w$  is less than 0,90 m, the side protection must be a protective barrier (see section 3.2.2). The height of the barrier must be 0,80 m above the unprotected edge.

These examples of protection decks can be used with roof inclinations up to  $20^\circ$ .

### 3.2.2 Dimensions of protective decks for inclined roof > 20°

The arresting surface of the protective deck shall not be more than 1,50 m below the unprotected edge (e.g. the eaves).

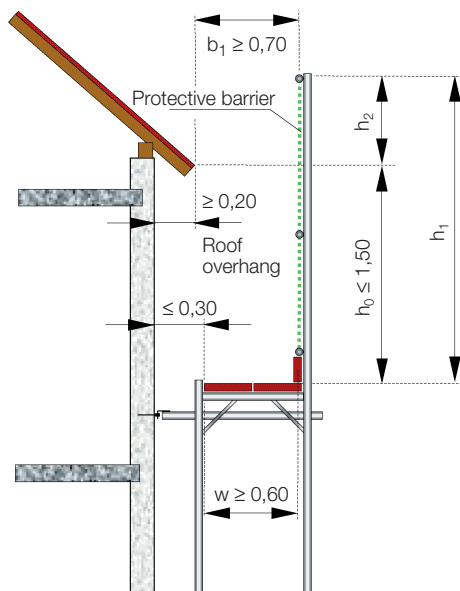
The width  $w$  of the arresting surface shall be at least 0,60 m.

The horizontal distance between the protective deck and the building shall not be larger than 0,30 m.

The distance  $b_1$  between the inner side of the safety barrier and the unprotected edge (e.g. eaves) shall be at least 0,70 m.

The protective barrier shall be higher than the unprotected edge (e.g. the eaves) by at least  $1,5 - b_1$  (in meters). The height  $h_1$  of the protective barrier, however, shall be at least 1,0 m.

Figure 8: Protective decks/barriers for inclined roofs > 20°



Protective barriers shall be fastened to load bearing components and shall comply with EN 13374.

They shall be erected according to the manufacturer's instructions, and the impact load due to falling persons shall be considered for the tie as well as the protective barriers.

The infill of the protective barrier may be made of

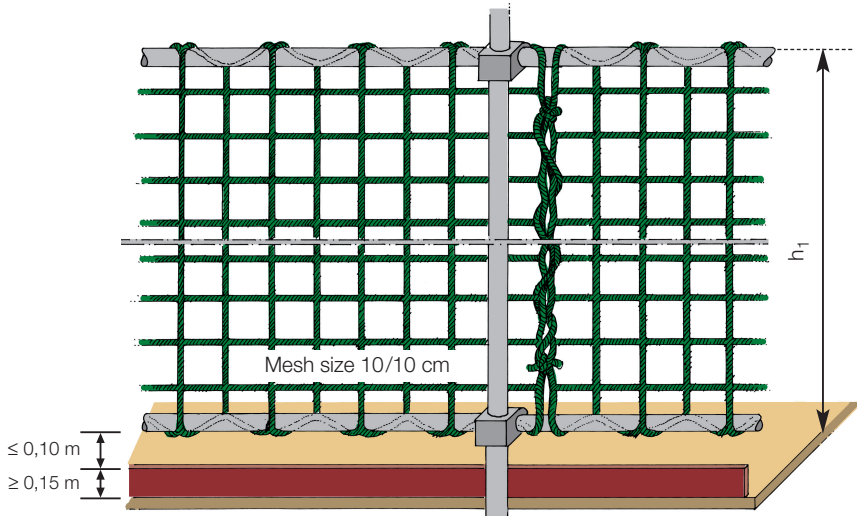
- safety net with mesh of 100 mm or lower in accordance with EN 1263-1 or
- a wire mesh with square meshes and a nominal diameter of wire of 2,5 mm. Only wire with low content of carbon may be used.

Safety nets and wire meshes shall be fixed on all sides using steel tubes with a wall thickness of at least 3,2 mm, or aluminium tubes with a wall thickness of at least 4,0 mm, with an outer diameter of at least 48,3 mm.

Safety nets shall be fixed to the steel or aluminium tubes threading mesh by mesh or to every single border mesh with karabiners (EN 1263-1).

The mesh for mesh threading is not required if the safety net is fixed to the tube by the border rope at least every 0,75 m. If the nets overlap by at least 0,75 m, no threading of the net joints is necessary.

Figure 9: Fencing structures/net



Safety nets shall only be used for a period of 12 months after manufacturing without testing the test yarn. If older safety nets are to be used, it is necessary to prove that the breaking strength of the tested rope not is lower than the minimum breaking strength specified by the manufacturer.

### 3.2.3 Dimensions of protective fan

Protection fans for system scaffold should be according to EN 12811-4, and the designation of a scaffolding system shall consist of three classes; shape, load and width.

The total arresting surface of protective fan shall be at least 1,50 m measured in horizontal direction.

The decking shall exceed the outer standard of the scaffold by at least 0,60 m in horizontal direction.

In the case of facade scaffolds, the decking shall exceed the scaffold on the end walls by at least 0,60 m in horizontal direction.

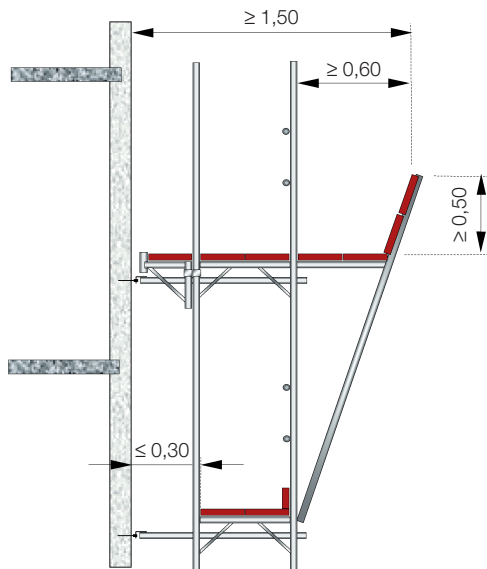
The protective fan shall have a toe board at the outer side if the inclination of the fan is  $\leq 30^\circ$ . The vertical or inclined upstand at the edge shall have a height of not less than 0,50 m.

The arresting surface of the protective fan shall be designed to touch the building.

The use of protective fans as scaffold or storage area for tools, equipment or materials is forbidden.

If the protective fan bends around a corner of the building, the deck shall have the same width all the ways.

Figure 10: Protective fan dimensions



### 3.2.4 Working scaffolds with cladding

Contrary to section 3.2.3 and in accordance with EN 12811-1, covers or claddings made from nets, textile, tarpaulins or panels may be installed close to the working scaffold standards instead of protection fans.

In some countries, such as Germany, protective fans can be replaced by covers or claddings made from nets, textile, tarpaulins or panels installed close to the standards of the working scaffolds (see EN 12811-1). The meshes in nets and textiles must not be larger than  $4,0 \text{ cm}^2$ , and none of the sides exceeding 2,5 cm. This also applies to the areas around the joints of the net. The extra wind load from the cover or cladding must be considered. The cover or cladding material shall have a tensile strength of at least  $0,5 \text{ kN}/5\text{cm}$  and must be UV stabilised.

### 3.3 National variations

Table 7: Comparison scaffold dimensions and deviations

Country	Scaffold dimensions and deviations
Finland	Slight deviations with dimensions See table 1; Legislations and Guidelines
Germany	No differences to the dimensions were given in section 3.1 and 3.2.2, only in section 3.2.3: In accordions to 7.2.3.2 DIN 4420-1 the protection fan shall have a toe board at the outer side. The vertical upstand at the edge shall have a height of not less than 0,60 m.
Holland	Toe board on protection fan is necessary. No side protection necessary on facade side if space between platform and facade $\leq 15$ cm. During specific works a space of $\leq 30$ cm is <b>LOCALLY</b> accepted without side protection.
Luxembourg	As Germany
Norway	Maximum distance to fall-breaking surface 1,0 m if the platforms are not drop tested according to EN 12810-2. Extra platform in adjacent level. Maximum distance to fall-breaking surface 0,5 m if use of "wooden labank" Extra platform in adjacent level.
Poland	Distance between the scaffolding and the façade - 0,20 m. Use of side protection from the height of more than 1 m. Use of protective scaffolds if the angle of roof inclination is more than 20%. Use of protective fans at the height of at least 2,4 m. Protective fans with have an angle of inclination of 45°. Protective fans at least 0,5 m wider on each side than the width of the passage. Use of protective fans and safety nets by the scaffolds located by the passages.
Sweden	EN-13374 and the inclination of roof regulate all guard rails on protective scaffolds. If the scaffold is only used as protective scaffold the fall-breaking surface should be 30-40 cm below the unprotected edge. If the scaffold is used both as working scaffold and protective scaffold the fall-breaking surface should be at least 70 cm below the unprotected edge.

Country	Scaffold dimensions and deviations
<b>Switzerland</b>	Maximum distance to fall-breaking surface 1,0 m. The side protection ( $h_2$ ) shall always be $\geq 0,8$ m above the unprotected edge. The width of the scaffold ( $b_1$ ) shall always be $\geq 0,6$ m. For roof inclination $> 25^\circ$ the side protection shall be a protective barrier according to EN 13374.
<b>United Kingdom</b>	Maximum gap between working platform and facade/structure 225 mm.

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)



# 4 Scaffold components and structural design

## 4.1 General information

All materials shall fulfil the requirements given in European Standards, where design data are provided.

Materials for scaffolding components shall be sufficiently robust and durable to withstand normal working conditions, and shall free from any impurities and defects, which may affect their satisfactory use.

## 4.2 System-free components

System-free components are scaffolding components that can be used with frames or modular scaffolding irrespective of the scaffolding system in question. They are generally add-on parts for scaffolding systems.

### 4.2.1 Scaffold tubes

- Steel tubes shall have a wall thickness of at least 3,2 mm (EN 39:2011) and shall be corrosion-protected. Higher steel qualities may be used in different member countries.
- Aluminium tube shall have a wall thickness of at least 4,0 mm (EN 12811-1 /12811).
- In tube and fitting scaffold the tubes are made of steel and normally have a thickness of 4,0 mm (type 4 tube).
- Note: There are special regulations for the use of steel and aluminium tubes in system scaffolds (EN 12810-1).

### 4.2.2 Couplers

There are 4 classes of coupler (A-B-AA-BB). Couplers of classes AA and BB, used as single coupler have the same strength class as couplers of class A and B respectively, but they may be used to increase the load value if two identical couplers AA+AA or BB+BB are positioned touching each other.

- Couplers must be marked with class and reference to EN 74 or EN-74-1
- Couplers must be tightened to a torque of 50 Nm (or according to manufacturer's guideline).
- Wedge couplers must be fixed with a 500 g hammer up to the jarring blow.

### 4.2.3 Timber components

- The grade and strength requirements for timber materials should be according to EN 338 (strength class C24, table 1).
- Boards shall have a thickness of at least 3,0 cm and shall not be split at the ends.
- Marking indicating the strength class and standard.
- Marking indicating the year of production.

Table 8: Couplers; Permissible slipping load in kN (EN 74-1)

Coupler type (class)	A	B	AA	BB
Right-angle coupler (RA) (single coupled)	6,1	9,1	6,1	9,1
Right-angle coupler (RA) (double coupled)	6,1*	9,1*	9,1	15,2
Right-angle coupler (RA) (cruciform bending moment in kNm)		0,48		0,48
Swivel coupler (SW) (slipping force)	6,1	9,1		
Swivel coupler (SW) (center bolt)	3,6**	5,5**		
Parallel coupler (PA)	6,1	9,1		
Half coupler (EN 74-2)	6,1	9,1		
Friction type sleeve coupler (SF)	3,6	5,5		

\*) No extra load

\*\*) According to failure force EN 74-1, but SW couplers should not be used as load bearing couplers.

### 4.3 Platforms

#### 4.3.1 Platforms in working scaffolds

To the extent possible, systems components shall be used following the instructions manual for installation and use. The gap between platforms shall not exceed 2,5 cm. If the platforms are interrupted by standards, the gap shall not exceed 8 cm.

System-free boards shall only be used:

- if they are installed close to each other,
- if they can neither twist nor move beyond stated tolerances and
- if required they are protected from being lifted by wind loads.

Scaffold boards used in working scaffolds in Germany shall comply with the span values specified in table 9 indicating the minimum cross section as a function of the load class and span.

#### 4.3.2 Platforms in protective scaffolds

Prefabricated platforms in protective decks shall be drop tested according to EN 12810-2 to meet the requirement in section 3.2.1 and 3.2.2 in this guideline.

System free boards (strength class C24 in EN 338) in protective decks in Germany shall comply with the span values specified in table 10.

Figure 11: Examples of overhangs and overlapping for system free boards in Germany

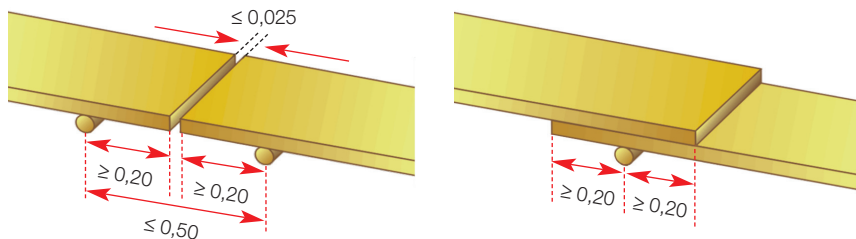


Table 9: Maximum span for scaffold boards in working scaffolds in Germany

Load class	Board width cm	Maximum span Board thickness in cm				
		3,0	3,5	4,0	4,5	5,0
1, 2, 3	20	1,25	1,50	1,75	2,25	2,50
	24 und 28	1,25	1,75	2,25	2,50	2,75
4	20	1,25	1,50	1,75	2,25	2,50
	24 und 28	1,25	1,75	2,00	2,25	2,50
5	20, 24, 28	1,25	1,25	1,50	1,75	2,00
6	20, 24, 28	1,00	1,25	1,25	1,50	1,75

Note: Strength class C24 according to EN 338

Figure 12: Scaffold platforms, gap size

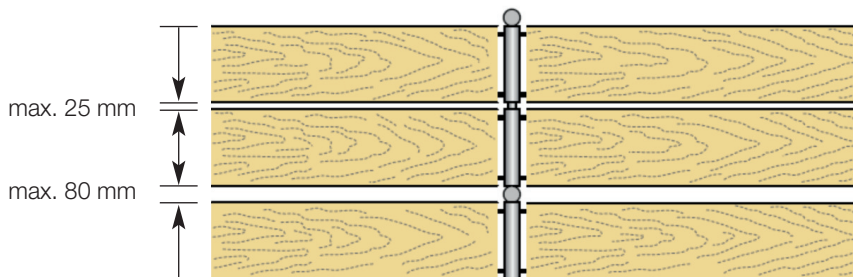


Table 10: Maximum span for boards used in protective decks in Germany

Board width cm	Max drop height in m	Maximum span in m for double laid boards with thickness				Maximum span in m for single laid boards with thickness			
		3,5 cm	4,0 cm	4,5 cm	5,0 cm	3,5 cm	4,0 cm	4,5 cm	5,0 cm
20	1,0	1,5	1,8	2,1	2,6	–	1,1	1,2	1,4
	1,5	1,3	1,6	1,9	2,2	–	1,0	1,1	1,3
	2,0	1,2	1,5	1,7	2,0	–	–	1,0	1,2
24	1,0	1,7	2,1	2,5	2,7	1,0	1,2	1,4	1,6
	1,5	1,5	1,8	2,2	2,5	–	1,1	1,2	1,4
	2,0	1,4	1,6	2,0	2,2	–	1,0	1,2	1,3
28	1,0	1,9	2,4	2,7	2,7	1,1	1,3	1,5	1,7
	1,5	1,7	2,0	2,5	2,7	1,0	1,2	1,4	1,6
	2,0	1,5	1,8	2,2	2,5	1,0	1,1	1,3	1,4

The cover in protective fans shall consist of tightly laid platforms or boards that as a minimum shall comply with the load class 2 specified in EN 12811-1. Platforms or boards in protective fans must be designed to touch the building.

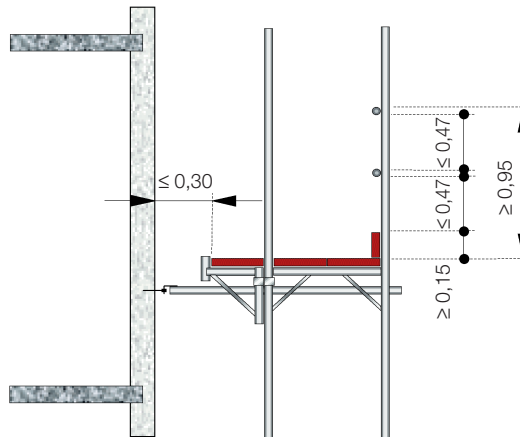
#### 4.4 Side protection

Working and access areas shall be safeguarded with a side protection consisting of at least

- a principal guardrail (maximum distance from the intermediate guard rail 0,47 cm),
- intermediate guardrail (maximum distance from the toe board 0,47 cm) and
- a toe board (minimum height 0,15 cm).

The side protection shall be secured against unintended removal.

Figure 13: Side protection dimensions



No side protection is required if

- the working and access area is less than 2,00 m above a sufficient and stable level.
- The space between the edge of the platform and the façade or building is less than 0,30 m.

A principal and an intermediate guardrail are not necessary if the fencing structures are used as part of the scaffold system.

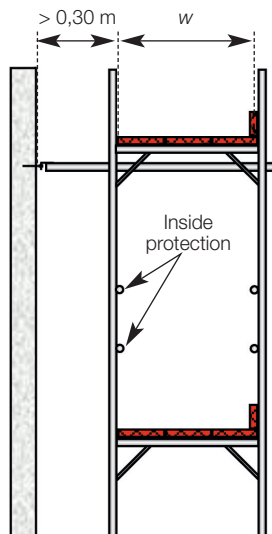
No toe board is required

- if the scaffold act as a support structure for the protective area.
- In scaffold bays that are exclusively used for access (e.g. access ladder).
- At the scaffold end if the platform and the longitudinal toe board are at least 0,30 m beyond the end protection.

The intermediate guard rail is not required if a side protection frame is used in accordance with section 5.5.3 EN 12811-1.

If the space between the edge of the platform and the façade or building exceeds 0,30 m in a scaffold used as working area, an inner side protection (principal and intermediate guardrail) shall be provided.

Figure 14: Inside protection



#### 4.5 Ground, foundation, and bracing

If possible, scaffolds shall be installed on a level and stable ground.

The size of the foundation, sole plate or board is defined by the stability of the ground, but the area beneath any one standard shall be at least 1000 cm<sup>2</sup>. As an alternative to two individual sole boards, a single sole board may be provided under a pair of adjacent standards, provided that the area of the sole board supporting each standard is no less than if two individual sole boards were used.

The sole plate can also be laid down parallel to the building wall, but this, however, is only permissible on firm ground.

When using sole board on inclined ground, terraces shall be formed.

If necessary it is possible to stack sole boards up to 0,4 m according to EN 12812 (section 7.5.4), see figure 16.

It is not allowed to install scaffold standards on fragmented foundations.

Figure 15: Sole boards

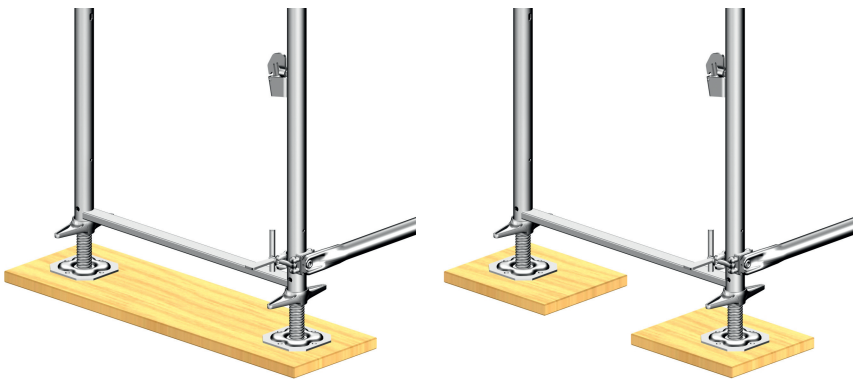
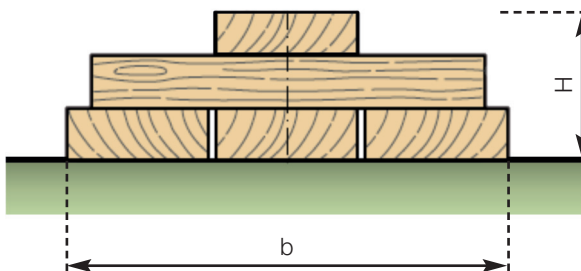


Figure 16: Stacked members for height adjustment



In addition to the sole plate foundation the amount of spindle extension also have a crucial effect on the permissible standard load. If long spindle extension is unavoidable, spindle bracing can be fitted to increase the load capacity,

*Figure 17: Spindle bracing*



Bracing should be provided to stiffen the scaffold, and in free standing towers it is normal to brace all four sides. In system façade scaffolding it is normal with longitudinal braces over the entire height of the scaffold, but in perpendicular direction the bracing occurs through the vertical frames. Plan bracing is not necessary due to the stiffness of the platforms in system scaffolding.

The bracing options shall be described in the instructions manual for installation and use published by the manufacturers.

The perpendicular bracing in tube and fitting scaffolding would be slightly different if couplers in use are class A or class B. In some country, e.g. in Sweden, use of class B couplers strengthens the vertical frame.

#### 4.6 Ties and anchors

Ties to the facade of a building have two primary functions of equal importance:

- to provide restraint to the standard and limit its effective length,
- to prevent movement of the scaffold away from the façade.

Information of anchor loads and arrangement of ties (ties pattern) shall be defined in the instructions manual for installation and use, the assembly plan or based on the structural analysis.

The ties shall be installed as the scaffold is erected. Protective decks and protective fans shall always be properly tied.

Eye bolts or expansion bolts with a minimum diameter of 12 mm can be used as anchors. (Some countries allow diameter less than 12 mm depending on the steel quality of the bolts).

The anchoring loads shall be transferred to a sufficiently stable building structure through the tie members and anchors. Evidence of load-bearing capacity of the anchors shall be available (design approval, calculation, proof load). If  $F_{\perp} \leq 1.5$  kN (masonry) or  $F_{\perp} \leq 6,0$  kN (concrete) no evidence of the load-bearing capacity is required in Germany. In all other cases it is necessary to apply a proof load that is 20% higher than the calculated anchor loads.

The scaffold shall not exceed the last tied lift by more than 2 lifts (3 – 4 m). The lifts (2 ea.) below (system scaffolding) shall be secured with gravity pins.

Any scaffold sections rising above the building or corners that are exposed to wind loads shall be additionally tied. The anchoring loads should be defined in the instructions manual for installation and use, or based on a structural analysis.

It is also possible to have freestanding, unanchored scaffolds. These scaffolds should not be higher than 3 times the smallest base, and the safety factor against overturning shall be  $S \geq 1,5$  in all directions.

For system scaffolding follow the tie pattern described in the instructions manual for installation and use published by the manufacturers.

Figure 18: Example of tie in pattern for working scaffolds

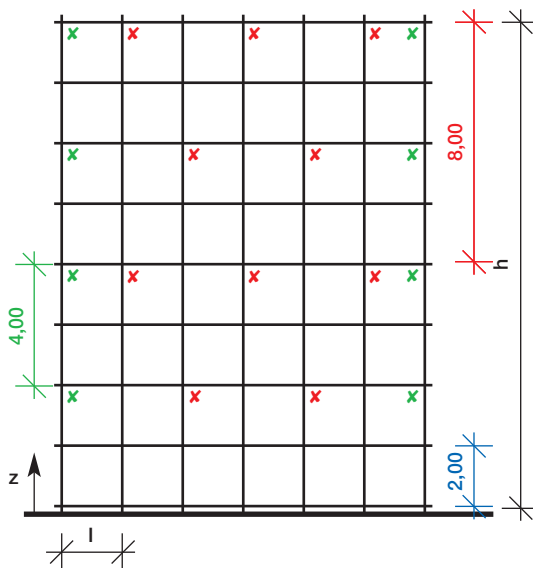
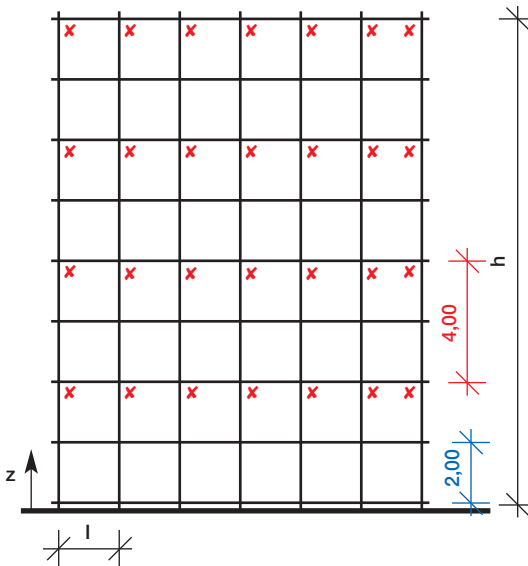




Figure 19: Example of tie in pattern for net clad working scaffolds



#### 4.7 Access

Work areas on scaffolds must have access and regress by safe access routes or ladders, e.g.

- stairs cases
- inclined ladders

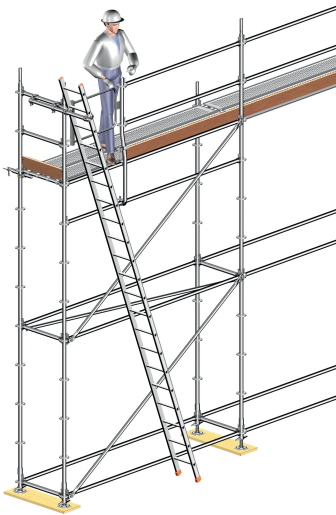
Preferential stairways or stair towers shall be used to access scaffolds, and the scaffolding company shall comply with the instructions manual for installation and use published by the manufacturers.

If ladders are used to access the scaffold, system ladders or ladders according to EN 131-1 and EN 131-2 can be installed inside scaffold, or in separate ladder tower fixed to the outside of the main scaffold. If access ladders pass through unused platforms that are not fully equipped with platforms and side protection, the access ladder shall at least be protected by a principal and an intermediate guard rail.

If leaning ladders in accordance with EN 131 are used outside scaffold, the ladders should have an inclination of 68° to 75°, the mounting height shall not exceed 5,0 m, and it should protrude at least 1,0 m above the landing place.

Service lifts and material hoists may be used to access the scaffold if they are approved for transport of persons and if they are properly secured.

Figure 20: Access types



Leaning Ladder



System Ladder



Stairway or Stair tower

#### 4.8 National variations

Although the member countries use the same strength class (EN 338) and Eurocode 5 (EN 1995) for timber design, they use different span tables for timber boards. The reason for this is national standards for dimensions, or that some countries use safe span values from older design standards. See the web page from the different countries. See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

Table 11: Comparison scaffold components and structural design

Country	Scaffold components and structural design
Finland	See table 1; Legislations and Guidelines
Germany	In accordance with German Bauordnung and Bauregelliste A, timber components, scaffold tubes and couplers must be marked with Ü-Zeichen (Überwachungszeichen).
Holland	<p>A ledger should be mounted in the 80 mm gap between scaffold platforms interrupted by standards,                      Min strength for wooden scaffold planks = C18; thickness 3,2 or 5 cm; (different span as shown in the table 9).                      Wooden boards are not allowed on modular scaffold without use of a 3e guardrail at 1,45 m above standing level.                      Proof load for anchor is 50% higher than design load. Standard configuration in Dutch guideline gives a 5 kN perpendicular load-bearing capacity for masonry (in good condition) and 7,5 kN for concrete.                      Free standing scaffolds not higher than 2 times the smallest bay without static calculation.</p>
Luxembourg	
Norway	Slightly differences.
Poland	<p>Gap between the boards in platforms of tube and fitting scaffold up to 15 mm.                      Each scaffold should have working and protective platform.                      Load-bearing capacity of the ground not lower than 0,1 MPa.                      If the inclination of the ground exceeds 6°, the scaffold must be equipped with additional horizontal braces parallel to the inclination of the ground.                      Perpendicular load-bearing capacity of one anchor not lower than 2,5 kN.                      Distance from last anchorage: height of the scaffold – 3 m;                      location of platform –1,5 m.</p>
Sweden	<p>Couplers shall be of class B or BB, and no wedge coupler is allowed. All joints to be done with sleeve coupler.                      In tube and fitting scaffolding tubes shall have minimum yield stress 300 N/mm<sup>2</sup>, and thickness of 3,2 mm.</p>
Switzerland	See table 1; Legislations and Guidelines Switzerland uses the SIA 265 for timber design.
United Kingdom	Scaffolding board should be 225 mm wide and have a thickness of at least 38 mm. The end of the board shall be protected with a steel band or a nail plate.

## Chapter 2:

# Requirements regarding the planning and execution of scaffolding work

# 5

## 5 Planning and work organisation

### 5.1 General information

When planning the scaffolding work, the selected equipment and processes as well as the planning, structural and organisation measures intended by the client shall be taken into account. This shall include a review as to whether the selected scaffold is suitable for the intended use, especially taking into account the specified load and width classes (also see chapter 1, section 2).

*Possible measures are for example:*

- *ensure that ground conditions are suitable,*
- *the provision of anchoring systems, e.g. in the case of curtain facades, glass facades, facades with a composite thermal insulation system (ETICS),*
- *the removal of construction materials and components that are not part of the scaffolding work from the working area,*
- *the covering of ceiling openings making sure that any covering cannot be moved and is stable enough for foot traffic,*
- *the installation of side protection components at unprotected edges,*
- *the protection from falling objects.*

If there are any doubts regarding the intended design, especially with a view to the prevention of accidents, these shall be communicated to the client in writing and without delay – if possible even before the work starts.

If the scaffolding work might imply risks for persons, relevant protection measures shall be taken (e.g. protection of third parties).

### 5.2 Design

If the structure deviate from a standard configuration then a bespoke design is required.

### 5.3 Qualifications required for the execution of scaffolding work

#### 5.3.1 General information

By appointing competent persons to plan, monitor and execute scaffolding work, the scaffolding company shall ensure:

- the safe erection, alteration and dismantling of scaffolds,
- and

- the inspection of the scaffold after installation.

*Safe erection, alteration and dismantling of scaffolds can be assumed if the measures taken follow the information contained in the risk assessment and method statement.*

*Suitable instructions include work instructions and explanations regarding the place of work/task, work processes, work environment and equipment to be used. This shall include the following topics (non-exhaustive list):*

- *understand the assembly instructions (plan to erect, alter and dismantle) for the actual scaffold,*
- *safe erection, alteration or dismantling of the scaffolding including,*
- *material transport and storage,*
- *measures to prevent workplace and equipment-related risks, especially to avoid a fall from a height and the risk of falling objects,*
- *safety precautions in case the weather conditions change and influence the safety of the scaffold and the persons affected,*
- *emergency measures*

and

- *information about the permissible loads.*

### **5.3.2 Competent persons**

Scaffolding work shall be supervised by competent persons. These persons shall supervise the safe execution of scaffolding work and the implementation of the measures defined on the basis of the risk assessment and method statement. They shall have the specialised knowledge required for these activities.

A competent person is defined as a person who – due to his professional training and experience – has sufficient knowledge in the field of scaffolding and is sufficiently familiar with the pertinent occupational safety and health regulations, directives and generally accepted engineering practices (e.g. standards) to assess the stability and safe installation of scaffolds.

### **5.3.3 Qualified employees**

Scaffolding work shall only be executed by employees who are sufficiently qualified and after having been instructed in accordance with section 5.3.1.

Sufficiently qualified employees for scaffolding work are persons who – due to their training or multi-year activities and experience in the scaffolding industry – have sufficient knowledge and skills and are sufficiently familiar with the pertinent occupational safety and health regulations and the generally accepted practices (e.g. standards) to execute scaffolding work in a safe manner.

If an employee finds that an installation, a process or the material is not suitable from a safety point of view, he shall immediately communicate this fact to the supervisor as described in section 5.3.2.

Depending on the scaffold to be installed, the minimum qualification is defined as the employee having appropriate experience, training and qualification including specific knowledge and skills regarding the following:

- types of scaffolds (working scaffolds, protective scaffolds),
- scaffold designs (e.g. permanent scaffolds, suspended scaffolds, horizontally movable scaffolds),
- scaffold components (e.g. tubes, couplers/fittings, platforms, system components),
- materials (steel, aluminium, timber),
- stability (e.g. foundation, anchoring, bracing and spans),
- structural design (e.g. side protection, wall spacing, platforms, cladding, access/regress routes, corner design),
- transport of scaffold components (manual transport, mechanic transport using cranes or hoists),
- stowage of scaffold components (e.g. securing for road traffic),
- storing scaffold components (e.g. use of truck or cranes),
- use of electrical systems and devices (machines and equipment).

### 5.3.4 National variations

Table 12: Comparison competent persons

Country	Competent persons, examples
<b>Finland</b>	- No essential differences.
<b>Germany</b>	Competent persons for the scaffolding industry are for example: <ul style="list-style-type: none"> <li>- persons who successfully completed their vocational training in the scaffolding industry and have gained sufficient practical experience,</li> <li>- scaffolding foremen (Gerüstbaumeister),</li> <li>- certified scaffolding installation experts (Geprüfte Gerüstbau-Obermonteure),</li> <li>- certified scaffolding shift leaders (Geprüfte Gerüstbau-Kolonnenführer),</li> <li>- certified foremen (geprüfte Poliere)</li> <li>- or persons who have similar technical knowledge and training in the construction industry as well as sufficient practical experience in the scaffolding business.</li> </ul>
<b>Holland</b>	Competent person for the scaffolding industry are for example: <ul style="list-style-type: none"> <li>- persons who successfully completed their vocational training in the scaffolding industry and have gained sufficient practical experience.</li> </ul>

Country	Scaffold dimensions and deviations
<b>Holland</b>	New detailed structure of and accredited competences and powers will be put in force in 2017.
<b>Luxembourg</b>	As Germany
<b>Norway</b>	<p>Competent person for the scaffolding industry are for example:</p> <ul style="list-style-type: none"> <li>- persons who successfully completed their vocational training in the scaffolding industry and have gained sufficient practical experience,</li> <li>- certificate of completed apprenticeship scaffolding (4 year).</li> <li>- certified scaffolder due to long experience (5 year experience and a theoretical and practical test).</li> </ul>
<b>Poland</b>	<p>Competent person in the scaffolding industry are for example:</p> <ul style="list-style-type: none"> <li>- specialist in supervision of the assembly and exploitation of scaffoldings (Polish Economic Chamber of Scaffolding),</li> <li>- civil engineer with education and qualifications,</li> <li>- construction technician with education and qualifications</li> </ul>
<b>Sweden</b>	<p>Competent person for the scaffolding industry are for example:                      For scaffolding worker you need "särskild utbildning" (special education) and "kompetensbevis" (worker certificate) from BYN or STIB (approx. 3 years as scaffolding worker).                      For a foreman you need at least the same level theoretical education in scaffolding as the workers have.</p>
<b>Switzerland</b>	<p>Competent persons for the scaffolding industry are for example:</p> <ul style="list-style-type: none"> <li>- persons who successfully completed their vocational training in the scaffolding industry and have gained sufficient practical experience,</li> <li>- certified group leader,</li> <li>- certified chief mechanic for group leaders,</li> <li>- certified foremen,</li> <li>- certified masters,</li> <li>- or persons who have advanced technical knowledge and training as well as sufficient practical experience in the scaffolding business.</li> </ul>
<b>United Kingdom</b>	<p>Competent persons for the scaffolding industry are for example:</p> <ul style="list-style-type: none"> <li>- persons who successfully completed their vocational training in the scaffolding industry and have gained sufficient practical experience.</li> </ul>

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

Table 13: Comparison qualified employees

Country	Competent persons, examples
Finland	- No essential differences.
Germany	Qualified employees are for example: <ul style="list-style-type: none"> <li>- employees who successfully completed their vocational training in the scaffolding industry,</li> <li>- employees who successfully completed their vocational training in the construction industry and have the required scaffolding knowledge or</li> <li>- employees with a similar qualification, and the employer taking a decision on their qualifications.</li> </ul>
Holland	See table 11.
Luxembourg	As Germany
Norway	Qualified employees are for example: <ul style="list-style-type: none"> <li>- depending on height and type of scaffold, employees who successfully completed their minimum training according to §§ 17-2, 17-3 or 17-4 in regulation nr. 1356.</li> </ul> In some oil refineries and offshore industry minimum 1/3 certified scaffolders.
Poland	Qualified employees are for example: <ul style="list-style-type: none"> <li>- scaffolding fitter – machine operator’s log-book with an entry “static scaffolds, metal, no class, installation” – minimum training 80 hours, according to § 23 in the regulation “Dziennik Ustaw 2001 nr 118 poz. 1263” – Institute of Mechanized Construction and Rock Mining;</li> <li>- helper – performs auxiliary work (transport of scaffolding elements etc.). Helper is not allowed to assemble the scaffolding.</li> </ul>
Sweden	Qualified employees are for example: <ul style="list-style-type: none"> <li>- depending on height and type of scaffold, employees who successfully completed their minimum training according AFS 2013:4 Bilaga 3.</li> </ul>
Switzerland	Qualified employees are for example: <ul style="list-style-type: none"> <li>- employees who successfully completed their vocational training in the scaffolding industry,</li> <li>- employees who successfully completed their vocational training in the construction industry and have the required scaffolding knowledge or</li> <li>- employees with a similar qualification, and the employer taking a decision on their qualifications.</li> </ul>



Country	Scaffold dimensions and deviations
<b>United Kingdom</b>	<p>UK Industry Accredited training and assessment programmes based upon off site training, on site time served experience, gathering of work based evidence, Skills testing and 3rd Party Health, Safety and Environmental testing exist for all within the sector from Scaffolding Labourer, New Entrant Trainee, Scaffolder, Advanced Scaffolder, to Scaffolding Supervisor, Scaffold Inspectors etc.</p> <p>For Further information go to <a href="http://www.cisrs.org.uk">www.cisrs.org.uk</a> or "relevant UEG webpage"</p>

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

#### 5.4 Hazard, risk assessments and method statements

The employer, or a competent person described in section 5.3.2, must identify the key hazards associated with the activities which have the potential to cause harm both to the employee and others who might be affected by the activities.

Listed below are a number of examples, which are regular causes of serious and fatal accidents or ill health:

- *falls from height of people and objects,*
- *electrical contact,*
- *striking by moving vehicles,*
- *contact with moving machinery,*
- *contact with hazardous substances,*
- *fire and explosion,*
- *structural collapse,*
- *slips, trips and falls,*
- *manual handling and*
- *noise.*

Having identified the existence of a hazard the employer shall assess its level of risk in order to identify and prioritise the control measures. Risk assessment is not a precise science and there are no specific rules or requirements as how to quantify the risk. Therefore the person undertaking the risk assessment needs to consider two major aspects of the activities;

- *the likelihood that someone could be injured during the erection, use or dismantling of the scaffold; and*
- *how severe the potential injury could be*

The greater likelihood and/or severity will result in an increased risk that someone could be injured.

As a result of risk assessments the employer shall define whether occupational safety and health measures are required and which measures are adequate. If the employer observes the need to act, measures shall be taken and their effectiveness shall be checked. If similar work conditions are affected, it is enough to assess one work place or one activity.

The risk assessment results must be communicated to the employees and the supervisors as well as documented appropriately (e.g. in an installation plan or method statement).

If work is done close to or above water, special precautions shall be taken.

These special precautions might include the provision of life vests, special protective suits, lifebelts, a manned safety vessel with trained staff, and others.

If work is done close to overhead power lines, there must be a minimum safety distance. When defining the safety distance, the movements of the electrical cables and the required working space for the employees including movement of the scaffolding materials shall be considered. If high voltage (more than 1 kV) the best practise would be to contact the owners or operators of the overhead line to agree on an installation plan (method statement). There are different demands on safety distances in the member countries. Table 14 shows minimum safety distances in Germany.

If conditions on site are found that were not known in the planning stage, the work shall not be started or shall be stopped immediately. The supervisor shall be contacted.

When protection is required preventing fall from height, the employer shall provide suitable PPE to the employees and define suitable anchorage points. Only anchorage points with sufficient load-bearing capacity should be used.

*For information on suitable anchorage points with sufficient load-bearing capacity in the system scaffolds check the instructions guide from the scaffold manufacturer's. Other anchorage points, e.g. at the building or the support structure shall be agreed with the client.*

*Table 14: Safety distances electric power lines in Germany*

Voltage (Volt)	Safety distance (Meter)
Up till 1000 V	1,0 m
Over 1 kV till 110 kV	3,0 m
Over 110 kV till 220 kV	4,0 m
Over 220 kV till 380 kV Or with unknown voltage	5,0 m

The use of PPE against falls from a height requires a specific risk assessment, operating instructions and training including practical exercises. The training shall also cover measures describing how the person affected can be stabilised and rescued in a case of an emergency.

### 5.5 Building site documents

Depending on the type, scope and structural design of the selected scaffolding, the company responsible for scaffolding work or a competent person assigned for this purpose shall draft instructions for assembly and a user plan.

The assembly instructions shall cover the measures defined in the risk assessment to prevent or minimise risks as well the required design information and method statement.

The user plan shall indicate the name and address of the scaffolding contractor, the date of inspection after erection, the load and width classes as well as any restrictions of use and general safety information for the user.

*If scaffolding systems are used, the manufacturer's instructions for erection and use shall apply, if required with additions detailing data for the specific scaffold or any deviations.*

The inspection record and the scaffolding sign/tag can be used as a user plan.

The instructions for erection and use and/or the instructions for assembly shall be communicated to the competent person supervising the scaffolding work and the employees affected. The instructions shall be available at the construction site.

## 5.6 National variations

Table 15: National variations

Country	Risk Assessments
<b>Finland</b>	Risk assessment is legally mandatory on construction site with all types of work. Slight deviations with figures and details to be noticed in assessment process
<b>Germany</b>	No differences
<b>Holland</b>	Scaffold needs grounding if built near high voltage area's.
<b>Luxembourg</b>	No differences
<b>Norway</b>	Best practice when working closer than 30 metres horizontally from power lines (> 1 kV) is to take contact with the owner or operator to establish method statements and safety distances.
<b>Poland</b>	Permissible distances from electrical lines are different in Poland (§ 55 in the regulation "2003 No. 47 pos. 401"). In all other cases electrical lines should be switched off or secured (insulated).
<b>Sweden</b>	Best practice when working closer than 30 metres horizontally from power lines (> 1 kV) is to take contact with the owner or operator to establish method statements and safety distances.
<b>Switzerland</b>	EKAS Richtlinie 6508 → GAV → Branchenlösung Gerüstbau → Kontaktperson Arbeitssicherheit (KOPAS)
<b>United Kingdom</b>	No person or part of any vehicle, plant or equipment may work in a position where they are liable to be within 10 meters of the OHL suspended from steel towers. Take contact with the local service provider.

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

## 6 Execution of scaffolding work

Manufacturers instructions for specific systems must be considered with the following conditions.

### 6.1 General requirements

#### 6.1.1

System scaffolds must be assembled, altered and dismantled in accordance with the Technical Instructions for Erection and Use or the Installation Instructions. The information contained in this practical guideline should be considered.

#### 6.1.2

Scaffolders must always wear the Personal Protective Equipment (PPE) required. Depending on the special characteristics and the progress of the work and the scaffolding system in use this also includes Personal Protective Equipment (PPE) protecting falls from height. An activity-based risk assessment may reveal that there is no need to use Personal Protective Equipment protecting falls in exceptional cases. Such as preinstalled guardrails or advanced guardrail system.

#### 6.1.3

Scaffold components must be visually inspected for apparent damage prior to installation. Damaged scaffold components must not be used. This also includes ladders incorporated into the scaffolding which are not subject to annual inspection.

#### 6.1.4

In system scaffolding where the platforms are part of the stiffening, the platform must be installed across the entire width and length of the scaffold and protected against lifting and slipping.

#### 6.1.5

Anchors and bracing members must be installed progressively while the scaffolding is erected.

#### 6.1.6

If anchors or bracing members must be removed prematurely, equivalent substitutes must be installed first. Special installation instructions are required.

#### 6.1.7

Scaffolding work must be executed in such a way that risks of falls from a height and the remaining risks are minimised and evaluated.

*Risks of falls from a height may occur in particular*

- *when working at higher levels,*
- *when the assembly frames, the standards and the guardrails are subsequently installed,*
- *when projecting and bridging components are installed (e.g. brackets, lattice girders),*
- *when platforms and passage areas are uneven and present trip hazards (e.g. decking, decking covers, material storage),*
- *in the area of unprotected adjacent areas of structures and building parts (e.g. window openings, wall distance or clearance of more than 0,30 m).*

### 6.1.8

If the risk assessment shows that proper safety measures must be taken in the respective assembly situation or for a certain activity, technical, organisational and personal safety measures must be evaluated.

### 6.1.9

To define appropriate safety measures collective protection must be given priority over personal protection.

- Protection against falls from a height

The falling risk can be prevented by the use of fall protection devices (e.g. step up system and advanced guardrails systems).

- Catching devices

The risk to fall from a height can be mitigated by using catching devices (e.g. safety nets, protective barriers and protective decks).

- Individual safety measures

The falling risks can be mitigated using appropriate Personal Protective Equipment preventing falls.

When using appropriate PPE preventing falls, the company must provide the employee with suitable PPE and define suitable anchor points. Anchor points can only be used if they are strong enough. For system scaffolding use the anchor points described in the instructions manual for installation and use published by the manufacturers.

### 6.1.10

In some countries (Germany) the assembly steps must be planned in such a way that side protection is installed immediately after the erection of the required frames or standards, so that the employees mostly work in a protected environment. Thus it is possible:

- to work without a toe board in bays used for manual vertical transport of material,
- to work without a toe board and an intermediate rail in scaffold levels that are exclusively used for horizontal transport of scaffolding components.

### 6.1.11

Different types of safety measures preventing falls may be combined. Depending on the scaffolding design, the scaffold system as well as the characteristics and the progress of the activities required.

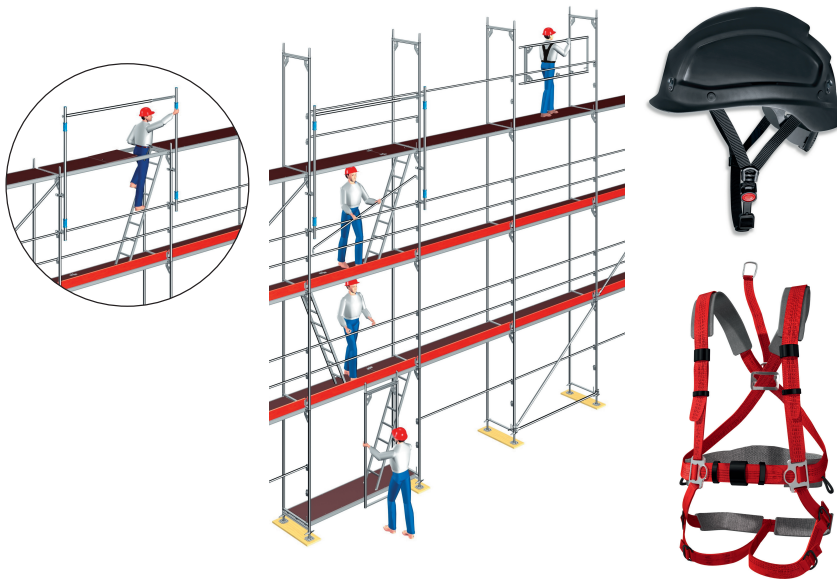
Section 6.2 describes method statements for frame and modular scaffolds.

## 6.2 Configuration Variants

### 6.2.1

When erecting a frame scaffold with vertical frames with spigots at the platform level, the bay of ascent must be protected by an advanced guardrail system before the employees climb to the topmost level. After the ascent to the provisionally protected bay, the first two vertical frames and the principal and intermediate guardrails must be installed. Further vertical frames must be installed starting from the bay used for vertical transport (see figure 21). The principal guardrail must be installed immediately once the required frame has been provided.

*Figure 21: Erecting frame scaffolding*



This scaffolding variant requires all the employees involved in the scaffolding work to wear PPE preventing falls.

### 6.2.2

When erecting a frame scaffold with vertical frames with spigots at the platform level, a suitable protective assembly guardrail/advanced guardrail system must be installed along the whole scaffolding length before ascending to the topmost level. Then it is possible to install the vertical frames starting with the most removed frame column moving towards the bay used for vertical transport. The organisational instructions must ensure that only one scaffolder is at the topmost level.

*This scaffolding variant requires the availability and use of appropriate assembly guardrails/advanced guardrail system for the relevant scaffolding system. It is possible to forego the use of PPE preventing falls if the façade is completely straight and the clearance between the edge of the platform and the building structure does not exceed 0,30 m.*

### 6.2.3

When erecting modular scaffolds with single standards as a facade scaffold, the bay of ascent must be protected by a handrail or an advanced guardrail system before the employee ascends to the topmost level. After the ascent to the provisionally protected bay, the standards must be installed starting from the bay used for vertical transport. The principal guardrails must be installed immediately after the required standards have been installed.

*This scaffolding variant requires all the employees involved in the scaffolding work to wear PPE preventing falls.*

### 6.2.4

When erecting birdcage scaffolds, the bay of ascent must be provisionally protected by a handrail or an advanced guardrail system before the scaffolder ascends to the topmost level. After having ascended to the provisionally protected bay, the scaffolder must install the standards starting from the bay used for vertical transport. The principal guardrails must be installed immediately after the required standards have been installed.

- The horizontal transport of scaffolding components can be done without toe board and intermediate guardrail if use of platforms with a width of at least 0,50 m.
- The horizontal transport of scaffolding components can also be done on platforms with a width of at least 0,50 m, without side protection if use of PPE preventing falls,



## 6.3 Handling of scaffolding components

### 6.3.1

If there is a risk of parts falling when scaffold components are transported, thus endangering third parties, the danger zone must be blocked off appropriately. In a member country (Poland) the area of the danger zone should be at least 1/10 of the height from which the objects may fall, but not less than 6 m from the outside parts of the scaffold.

In compact areas the danger zone can be reduced on condition of using other technical or organizational solutions which protect from falling objects.

### 6.3.2

At working platforms higher than 8 m (Germany) construction lifts must be used.

Construction lifts also include manually operated rope pulley lifts.

### 6.3.3

In bays used for manual vertical transport principal and intermediate guardrails are required. In the case of manual transport at least one employee are required at each scaffolding level depending on the components to be transported.

### 6.3.4

The use of side protection in bays which are used for receiving materials including assembly can be dispensed with if PPE preventing falls is used.

### 6.3.5

Scaffolding components must not be thrown down.

### 6.3.6

Scaffolding components must be stored properly.

## 6.4 National variations

Table 16: National variation

Country	Execution of scaffolding work
<b>Finland</b>	If the clearance between the edge on the platform and the building structure is wider than 0,25 m, side protection is needed also on the building side of scaffolding. See table 1; Legislations and Guidelines
<b>Germany</b>	5.2.6. FRG 1, S.32 An activity-based risk assessment may reveal that there is no need to use Personal Protective Equipment protecting falls in exceptional cases. But the work must be done by a technically qualified and physically capable person.
<b>Holland</b>	The advanced guardrail needs to consist of both principal and intermediate guardrail. Relationship between working height and safety zone (6.3.1) is recommended when working in a public area. See table in the Dutch guideline RS or on UEG web side.
<b>Luxembourg</b>	As Germany
<b>Norway</b>	No deviations
<b>Poland</b>	Lack of full three-part side protection results in the necessity to use PPE (fall arrest).
<b>Sweden</b>	Lack of two-part side protection (principal and intermediate guardrail) results in the necessity to use PPE (fall arrest).
<b>Switzerland</b>	Lack of two-part side protection (principal and intermediate guardrail) results in the necessity to use PPE (fall arrest).
<b>United Kingdom</b>	The assembly steps must be planned in such a way that side protection is installed immediately, so that the employees always work in a protected environment.

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

# 7 Inspections, barriers, signs/tags and handover

## 7.1 Inspection to be carried out by the scaffolding contractor

The scaffolding contractor shall ensure that the scaffold is inspected by a competent person

- before handover to the user
- and
- after any design changes.

The inspection result shall be documented and kept for at least three months after the scaffold has been dismantled.

Example of scaffold contractor inspection criterias is included in annex A (figure 24).

## 7.2 Barriers and signs/tag

If certain parts of the scaffold are not ready for use, especially during erection, alteration and dismantling, these parts must be marked with a sign "Access denied". Access to the danger zone must be restricted with appropriate barriers.

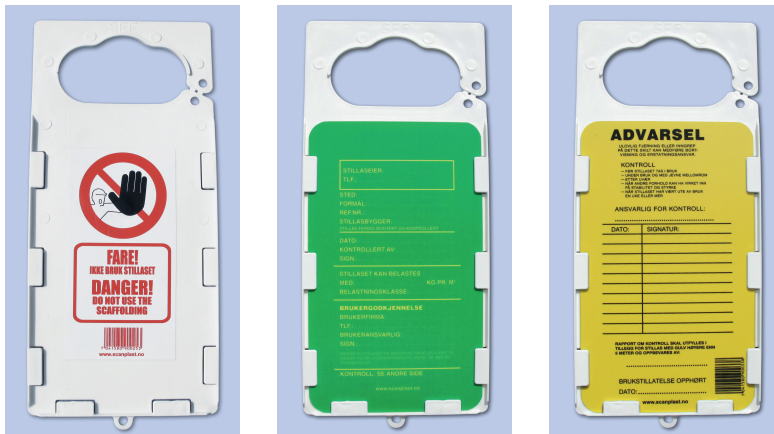
Figure 22: Examples of "Access denied" pictograms



User instructions must be available on site. Examples of user instructions are included in annex B.

In order to give evidence of the latest inspection, the scaffold can be clearly marked/tagged after completion and for the entire period of use. The inspection record and the sign can be summarised in one form sheet or a tag system as shown in figure 23.

Figure 23: Example of a scaffold tag system Norway



### 7.3 Handover

Once the scaffolding contractor has completed the erection of a scaffold and it has been inspected by their competent person, the scaffold contractor should issue a handover certificate to the client.

This will advise the client that, at the time of the handover, the scaffold has been erected to the agreed specification, has been left in a condition suitable to perform the duty for which it is intended, and complies with the requirements of statutory regulations. Example of handover certificate is included in annex A (figure 26).

### 7.4 Inspection to be carried out by the user

Once scaffolding has been erected, inspected and handed over to the client it becomes the client's responsibility to ensure it remains safe and continues to meet the requirements of statutory regulations.

The client that use or provide a scaffold for use must ensure that the scaffold is inspected by a competent person regularly, after design changes and after extraordinary events.

The form and inspection list shown in annex A (figure 25) can serve as a checklist to inspect working and protective scaffolds.

Extraordinary events are defined as accidents, longer periods where the scaffold is not in use, changes to the scaffold as well as special weather conditions.

Special weather conditions may include storm, strong rainfall, icing, and heavy snowfall when the snow on the scaffold exceeds the permissible uniformly distributed load.

If deficiencies are identified during inspection, the scaffold shall be prohibited from use in the deficient areas until remedied by the installer.

## 7.5 National variations

Table 17: National variation

Country	Inspections, barriers, signs/tags and handover
Finland	See table 1; Legislations and Guidelines
Germany	No deviations
Holland	Additional Inspection periods: <ul style="list-style-type: none"> <li>- In construction advised every 2 weeks.</li> <li>- In an industrial environment or when no changes have been made to the scaffold then a maximal interval of 3 months.</li> <li>- After any change to the direct surrounding that can have an impact on the integrity of the scaffold. (fire, strong wind more than 8 bf, explosion, excavating etc.)</li> </ul> Example of a checklist, see UEG website: <a href="http://www.ueg-eu.org">www.ueg-eu.org</a> .
Luxembourg	No deviations
Norway	All scaffolding, working platforms and edge protection should be inspected within fourteen days of the previous inspection, and the controller/inspector should update the sign/tag on the scaffold.
Poland	3 types of inspection during the use of scaffolding: daily, ten-day, extraordinary.
Sweden	No deviations
Switzerland	No deviations
United Kingdom	All scaffolding, working platforms and edge protection should be inspected within seven days of the previous inspection.

See UEG website: [www.ueg-eu.org](http://www.ueg-eu.org)

## Annex A; Examples of reports

Figure 24: Example of inspection criteria's from Germany

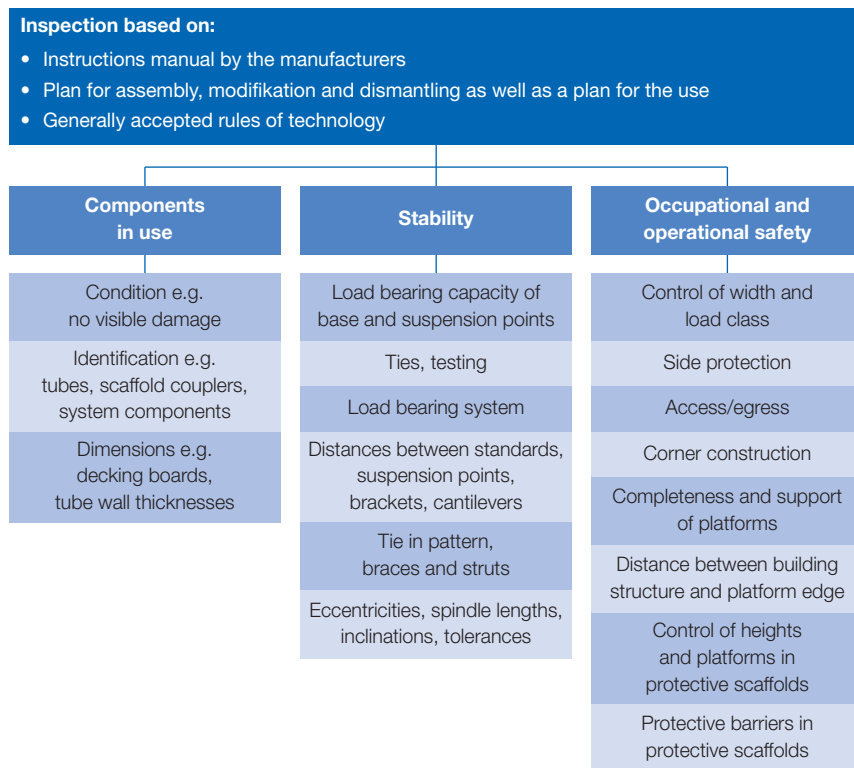




Figure 25: Example of inspection report from UK

Scaffold Specification Template

**APPENDIX A – SCAFFOLD INSPECTION REPORT SHEET (EXAMPLE)**

**Scaffold Inspection Report (in line with regulation 12 of The Work at Height Regulations 2005)**

<b>Company Name &amp; Address:</b>				<b>Sheet:</b>		
<b>Site Address:</b>						
No	Location and description of workplace inspected	Date & Time of inspection	Matters observed that give rise to any health and safety risks	Details of action taken at time of inspection	Details of any further action considered necessary	Name, signature & position of inspector

### User inspection (identifying unauthorised modifications in UK)

The user inspection should ensure the scaffold is not being misused and has not been interfered with by checking at least the following criteria:

- a. The foundations have not been disturbed or undermined. The standards are on base plates and placed centrally on sole boards (as necessary);
- b. Guard rails are installed at every lift with none removed;
- c. Toe boards have not been removed or displaced;
- d. Scaffold boards have not been removed, displaced or damaged;
- e. Transoms are suitably placed to support the boards and the maximum span and overhang have not been exceeded (tube and fittings);
- f. No scaffold ties has been removed;
- g. No bracing has been removed;
- h. The brick guard, debris-netting or sheeting, where fitted, are still in place and secure;
- i. The structure is not being overloaded;
- j. There are no other signs of misuse or interference.

If any signs of misuse or interference are identified they should be reported to the scaffolding contractor immediately.




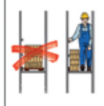



Figure 26: Example of handover certificate from UK

<b>Scaffolding handover certificate</b>				<b>NASC</b>		
Certificate number:		Scaffolding contractor:				
Client name and address:		Project reference:				
Site:		Scaffold reference:				
References to designs and other documentation:						
<b>Scaffold specification</b>						
Description of the section handed over:						
Maximum loading:		lifts @		kN/m <sup>2</sup>		
Inside board loading:		kN/m <sup>2</sup>				
Permitted cladding:	None	Brick guards	Debris netting	Sheeting		
Method of tying:						
Have the ties been tested?				Yes	No	N/A
<b>Handover</b>						
The scaffolding as described above has now been completed in accordance with client requirements. It is structurally sound and should only be used and loaded in accordance with this Handover Certificate.						
Have the requirements of the Work at Height Regulations 2005 and any other relevant legislation been complied with?			Yes	No		
The reason for non-compliance is:						
Details of any further action considered necessary:						
<b>Acceptance</b>						
Signature on behalf of the scaffolding contractor:			Acceptance on behalf of the client:			
Name:		Name:				
Signature:		Signature:				
Position:		Position:				
On-hire date:	Time:	Date:				
And/or:						
Certificate despatched to the client (post/fax/email):				Date:		
This scaffold must be inspected at intervals not exceeding seven days and after any event that may affect its adequacy. The scaffold must not be modified without authorisation under any circumstances.						

## Annex B; User instructions

Figure 27: Example of information in a user plan from Germany

	<b>Examples of information in a user plan</b>	Nr.: Project: Page: 1 of 1
Project: _____	Scaffold installer: _____	
Client: _____	Company: _____	
Date inspection/ handover : _____	Sign: _____	
<input type="checkbox"/> Working scaffold	Type of scaffold: _____	
<input type="checkbox"/> Protective scaffold	Access: <input type="checkbox"/> Ladder <input type="checkbox"/> Stairway	Quantity: _____
Load class: <input type="checkbox"/> 1 0,75 kN/m <sup>2</sup> <input type="checkbox"/> 2 1,50 kN/m <sup>2</sup> <input type="checkbox"/> 3 2,00 kN/m <sup>2</sup> <input type="checkbox"/> 4 3,00 kN/m <sup>2</sup> <input type="checkbox"/> 5 4,50 kN/m <sup>2</sup> <input type="checkbox"/> 6 6,00 kN/m <sup>2</sup>		
Uniformly distributed load: _____ kN/m <sup>2</sup>		
Width class: <input type="checkbox"/> W06 <input type="checkbox"/> W09 <input type="checkbox"/> W _____		
	<b>Proposal for permitting and directions for use.</b>	
	<b><u>ALTERATION SHALL ONLY BE CARRIED OUT BY A COMPETENT PERSON</u></b>	
	<ul style="list-style-type: none"> <li>▪ Each user of the scaffold is responsible for their use and their safety.</li> <li>▪ Each user shall ensure that the scaffold is inspected after visible deficiencies.</li> <li>▪ Visible deficiencies due to special weather conditions or misuse shall be reported immediately to the scaffold company so it could be remedied.</li> <li>▪ Working areas on scaffold shall only be accessed or regressed through safe access routes or ladders, e.g. stair cases or inclined ladders. The user is responsible for unauthorized access.</li> <li>▪ The trapdoors in access routes shall be left in closed position,</li> <li>▪ It is forbidden to jump or throw something onto the platforms,</li> <li>▪ It is forbidden to store materials onto protective fans or protective decks in protective scaffolds.</li> <li>▪ Scaffolds may only be modified by scaffold company. Removal of guard rails, toe board, braces and anchorages are forbidden.</li> <li>▪ Ties shall not be removed by scaffold user.</li> <li>▪ The scaffold company shall be informed immediately about any changes or damage to the scaffold.</li> <li>▪ Undermining of scaffold foundation by excavations is forbidden.</li> <li>▪ Welding or sawing onto the scaffold is forbidden.</li> <li>▪ The sum of the uniformly distributed load on the individual platforms in a bay shall not exceed the value of the load per platform according to load class for the scaffold.</li> <li>▪ Reduction of load in birdcage and suspended scaffolds if the load acts on more than 6 m<sup>2</sup>.</li> <li>▪ If the work procedure due to scaffold safety is not feasible, abstain from use, until the scaffold is perfectly designed or the work method statement is safely controlled.</li> <li>▪ The scaffold shall only be used in good visibility.</li> <li>▪ It is forbidden to install rubbish chute system, hoists, decking or signs to the scaffold. This must be completed by a competent person. The scaffolding company must amend the inspection/hand over.</li> <li>▪ Scaffold in public places gives higher risks which have potential to cause harm both to employee and others, and precautions must be taken.</li> <li>▪ The scaffold should be free from user materials before dismantling.</li> <li>▪ In general the regulations according to the valid legislation or standard shall be used..</li> </ul>	