

# Construction works

Coordination and Fall Protection



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+43 1 71100 630

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## Preface

Employees working in construction are exposed to an especially high health and accident risk compared with other industries. With more than 1,000 accidental deaths each year, the construction industry is the sector with the highest accident risk in the European Union. For workers in the construction sector, the risk of a fatal accident at work is over three times as high and the risk of injury is twice as high, compared internationally with other occupations. More than 99% of Europe's construction companies are small and medium-sized enterprises (SMEs). Consequently, SMEs are the firms in the construction sector most often affected by accidents at work. The most common cause of construction accidents throughout Europe is falling from elevated sites.

At Austrian construction sites, accidents occur at a rate of twice the average for all sectors of the economy. In Austria, over one fifth of all accidents at work and more than one third of all fatal accidents at work involve construction. Special risk situations arise at construction sites especially where workers belonging to different employers do their jobs simultaneously or in sequence. Studies done in all of Europe have revealed that a substantial share of construction accidents can be attributed to poor organisation and faulty coordination of work activities and the protective measures required.

The European Union consequently agreed on a Europe-wide campaign for worker safety at construction sites in 2003. A related, broad-based information campaign was also held both in Austria and at EU level, which, aimed particularly at SMEs, focused on coordination of construction work and on fall protection. The EU construction site campaign was accompanied by focused inspections, carried out by the labour inspection authorities of all Member States in accordance with principles harmonised Europe-wide. The results of the construction site campaign were evaluated by the European Union. A

European Week on the topic of safety at construction sites was subsequently held in all Member States in October 2004.

This booklet is intended to provide information on two key issues: coordination of construction works and fall protection.

## Coordination of construction works

A study commissioned by the European Union revealed that two thirds of all construction site accidents can be attributed to planning errors and to poor organisation of construction sites and coordination of the firms involved; such deficiencies result from decisions taken before construction begins.

To improve this situation , the EU has adopted 'Temporary or mobile Construction Site' Directive 92/57/EEC, which has been transposed into national law through the Law on the co-ordination of building Work (Bauarbeitenkoordinationsgesetz, BauKG), Federal Law Gazette I no. 37/1999.

An attempt to summarise in one statement the content of the BauKG would inevitably result in a motto similar to this one:

### **Organisation and coordination instead of improvisation**

To put this notion into practice, the BauKG appeals primarily to clients, in keeping with the principle of holding liable the party responsible. The client is responsible for ensuring that health and safety at work are given equal attention during the preparatory stage of the project and that the principles of occupational health and safety are included in planning and enforced through the construction contract.

## What are the client's responsibilities?

The client ensures compliance with all general principles of risk prevention in the designing, planning and preparation of the construction project, and when estimating the duration of works.

- The client commissions the planners to implement the general principles of risk prevention in the design, planning and preparation of the construction project;
- the client submits preliminary notice, including the most significant details of the building project, to the Labour Inspectorate (except with minor building projects)
- and also appoints an experienced construction expert to coordinate worker safety and health for the planning stage (planning coordinator) and the building stage (construction site coordinator) when workers of more than one firm will be working simultaneously (or consecutively) on the construction site;
- the client ensures that planning coordinators prepare a safety and health plan (except with minor building projects involving no special risks);
- the client ensures that planning coordinators prepare the document for later works;
- the client ensures that the firms performing construction implement the safety and health plan and the document – by including this item in the construction contract;
- when the construction site coordinator draws attention to any changes required in the safety and health plan or the document, the client ensures that the modified plan or document is implemented;;
- when the construction site coordinator draws attention to any risks to workers, the client ensures that the firms performing construction eliminate those risks.

To carry out the building project, the client, who is usually not a construction expert, will make use of trusted construction supervisors (project supervisors) and delegate the responsibilities specified in the BauKG to project supervisors. The client alone decides on whom to appoint as project supervisor.

Where a client is apparently not familiar with the BauKG, in accordance with general principles of law and with the rules applying to the practice of their individual professions, the master builders, engineering consultants, engineering firms and similar professionals commissioned by the client are obligated to inform the client of the requirement to appoint coordinators and of other obligations set out in the BauKG (obligation to warn and inform).

### **What are the planning coordinator's responsibilities?**

- Planning coordinators have the task of coordinating the planners in implementing the general principles of risk prevention;
- they additionally draw up a safety and health plan and compile a document for later works;
- they ensure that the client and/or project supervisor take consideration of the safety and health plan and the document – by including them in the invitation to tender.



With the inclusion of the safety and health plan and the document for later works in the invitation to tender, the firms carrying out construction are obli-



gated by contract to implement in practice the safety and health plan and the document (experience shows that any measures not already stipulated in the invitation to tender are usually able to be implemented only at additional expense to the client, specifically in relation to later claims raised by the construction firms).

## What is the safety and health plan??

A safety and health plan is required in these cases: any 'major building project' for which preliminary notice must be submitted to the Labour Inspectorate (where construction works entail a total of more than 500 person-days), or when works are performed that involve special hazards for workers' safety and health (e.g. underground construction work, blasting work, work in compressed air, work with heavy prefabricated elements, work near high tension lines, etc.).



The safety and health plan must contain these specific items:

- the most important details of the building property and the surroundings of the construction site, such as any existing structures;
- a complete list of works including a timetable for carrying them out, which will usually be a project schedule – most often in the form of a Gantt chart;
- the rules required for the specific construction site, such as special measures required to secure the excavation area due to a road in immediate proximity;

- measures and facilities to prevent mutual hazards, in other words hazards arising to the workers of one firm through the activities of another company's workers, such as avoiding situations where personnel work above one another;
- the collective facilities, protective devices and measures used by several firms, such as a fall arrest scaffold to protect all firms working on the roof or collective sanitary installations for all firms working on the site;
- specification of the firm responsible for carrying out each of the measures listed above.

### What is the document for later works?

A document for later works is additionally required for each construction project. This document can be consulted for the specific measures and facilities that are required for later use, maintenance, remodelling and even demolition. Examples of the specific details the document must contain include:

- available load anchoring points (e.g. hooks for window cleaners or roof workers);



- the building materials used that might be related to hazards for safety and health during later work on the building;
- instructions for mounting and removing any prefabricated or system building components used;
- facilities for bridge maintenance or for cleaning glass roofs;
- access to workplaces in exposed areas;
- position of power and gas lines.

## What are the construction site coordinator's responsibilities?

- Construction site coordinators are responsible for coordinating the firms carrying out construction, to ensure that they comply with the general principles of risk prevention and with the safety and health regulations applying at the construction site and that they monitor work procedures to ensure proper application.
- They also adapt the safety and health plan and the document to reflect changes arising in practice.
- They ensure that the firms carrying out construction adhere to the principles of risk prevention and to the safety and health plan as well as install the facilities specified in the document for later works.



- They manage the site to ensure that the construction firms cooperate and coordinate their activities and ensure that the firms mutually provide one another with information.
- They are also required to take the necessary measures to ensure that only authorised persons access the construction site.
- Where construction site coordinators identify any risk to worker safety and health, they immediately inform the client or project supervisor and the firms affected. If such deficiencies are not corrected at their request, the construction site coordinators are entitled to appeal to the Labour Inspectorate.

To avoid any misunderstandings:

Construction site coordinators have only the obligation to inform the firms carrying out construction and are not entitled to enforce regulations – unless the client has authorised the coordinators accordingly and the construction firms have recognised such authorisation by signing the construction contract.

As misunderstandings sometimes arise concerning the role of construction site coordinators, please note: Construction site coordinators are not comparable to labour inspectors who verify that the firms carrying out construction comply with the law.

As the name suggests, construction site coordinators are especially responsible:

- for attending to matters concerning more than one firm;
- they are to manage the facilities that serve several firms;
- they are responsible for any potential mutual risks posed by workers from different firms;
- they are especially responsible for ensuring that the safety and health plan is implemented and modified if necessary.

### **What are the responsibilities of firms carrying out construction?**

- Where a client is apparently not familiar with the BauKG, in accordance with general principles of law and with the rules applying to the practice of individual professions, the master builders, engineering consultants, engineering firms and similar professionals commissioned by the client are obligated to inform the client of the requirement to appoint coordinators and of other obligations set out in the BauKG (obligation to warn and inform).
- In carrying out construction works, firms are required to comply with the occupational safety and health regulations that apply to those works (including the Safety and Health at Work Act –ArbeitnehmerInnenschutzgesetz, Regulation on Work Equipment – Arbeitsmittelverord-

nung and in particular the Regulation on protection of building workers – Bauarbeiterschutverordnung).

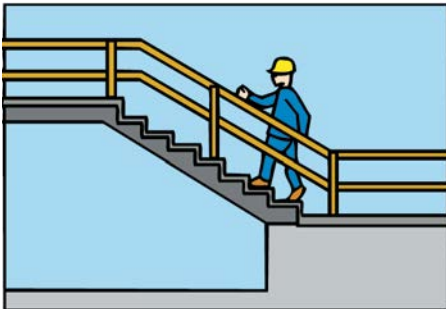
- The firms carrying out construction implement the measures defined in the safety and health plan and in the document, to which they agree by contract.
- The firms carrying out construction cooperate mutually, coordinating jobs and protective measures so as to avoid putting their own employees at risk through the activities of other firms.
- The firms carrying out construction take consideration of the information provided by the construction site coordinator.

## Preventing fall accidents

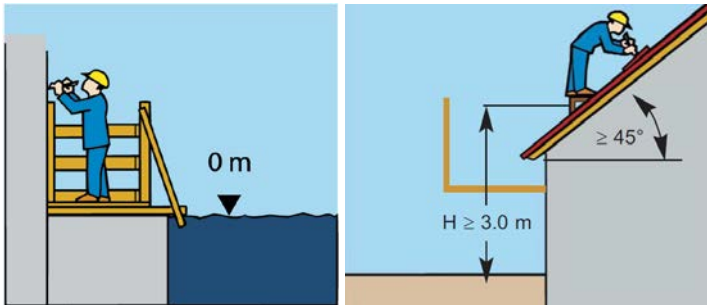
The most common cause of serious and fatal construction accidents is falling from elevated positions.

### When are measures to prevent falling required by law?

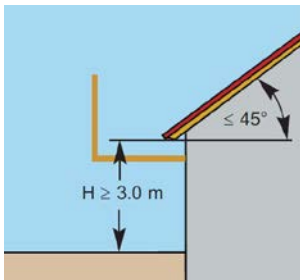
- At openings in ceilings and floors (openings for pipes and cables, and rooflights, shafts, ducts, etc.)
- At stairs and openings in walls at a fall height of more than 1 m



- At workplaces and traffic routes next to or above bodies of water (or substances in which persons could sink)



- When doing roof work at a fall height of more than 3 m



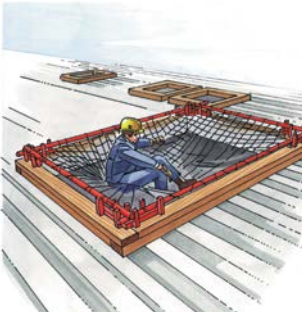
- All other workplaces and traffic routes at a fall height of more than 2 m.

## What measures to prevent falling exist?

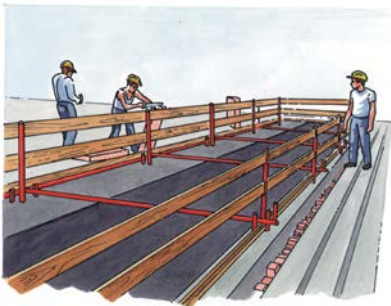
### Primary fall protection systems

Prevent workers and objects from falling:

- Coverings over openings; coverings must be designed to reliably support loads and not shift



- Top rails: at a height of at least 1 m (except for window openings, where a parapet height of 85 cm is sufficient). Toe boards: the upper edge must be at least 15 cm above the standing surface; the lower edge must be flush with the standing surface. Intermediate rails: between top rail and toe board; the inside distance must be no more than 47 cm

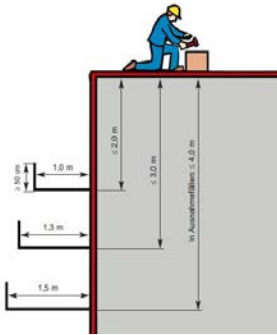


Barriers in the form of top rails at a height of 1.00 m to 1.20 m Barriers are required to be mounted at openings accessing loggias and balconies or otherwise generally at a distance of 2 m from the unprotected edge.

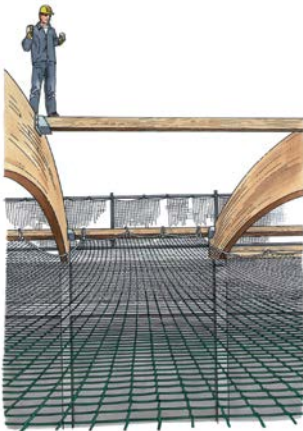
### **Secondary fall protection systems**

Where primary fall protection systems cannot be used for technical reasons, secondary fall protection systems must be employed; such systems are designed to arrest the fall of workers and objects:

- Fall arrest scaffolding: In the form of projecting scaffolding or a truss-out scaffold or in combination with façade scaffolding,

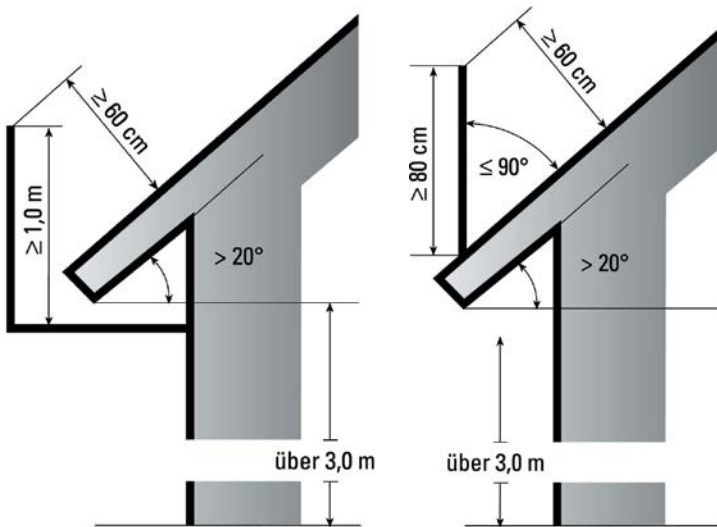


- Safety netting,



- Fall arrest scaffolding on roofs,
- Roof edge protection





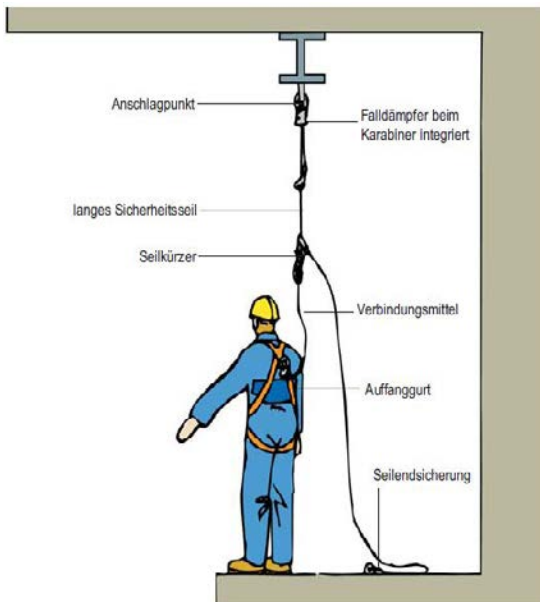
### Personal protective equipment

It is not necessary to mount primary or secondary fall protection systems if this would require an inordinate amount of effort relative to the job to be performed. (Personal protective equipment provides adequate safety when doing small jobs on a roof such as repairs or painting that require no more than one day and when working on the edge of the roof or in the vicinity of the gable.)

## Fall arrest system

Fall arrest systems must have energy-absorbing components or functions, so that it is ensured that the impact forces corresponding to be dampened, like energy absorber, safety ropes or fall arresters. Basically are restraint systems to fall arrest systems preferred. A restraint system is a personal fall protection system that prevents crashes by restricting the range of motion for the user. It is not intended to catch falls.

Personal fall protection equipment should be inspected once a year by qualified personnel.



# Scaffolding

## When are scaffolds compulsory?

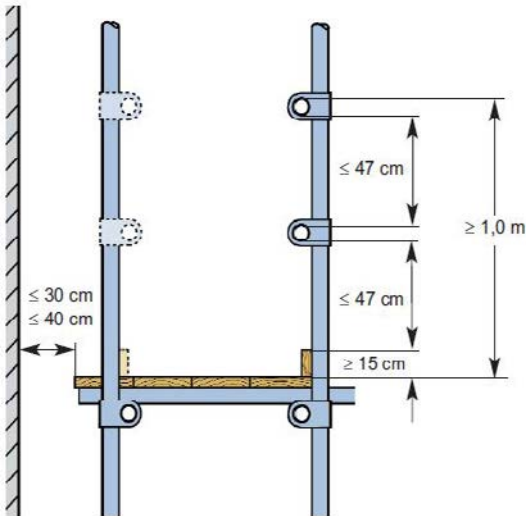
- Working scaffolds: When an elevated position is required to accomplish work, e.g. façade scaffolds (ladder scaffolds, metal scaffolds), mobile scaffolds, trestle scaffolds, suspended scaffolds. The proper scaffold to use depends on the work to be done.
- Fall arrest scaffolding: To protect persons from falling further, e.g. truss-out scaffolds, projecting scaffolds.

## What should be considered when setting up scaffolds?

- Scaffolding must only be set up, substantially modified or dismantled by workers familiar with these jobs (other workers may help under direction if they have been specially instructed);
- all scaffolding components to be used must be inspected by a qualified individual for any obvious faults;
- workers must comply with manufacturer instructions when erecting the scaffolding;
- scaffolding must not be only partially erected or dismantled;
- scaffold towers must be erected on a base that is capable of bearing the load without shifting (base plates, squared timbers, uprights); bricks, crates, pallets or similar objects are not permitted as a base;
- scaffolds must be adequately fixed – using (diagonal) braces or a framework; such braces – as well as the anchoring – must only be removed in an appropriate fashion when the scaffold is dismantled;
- façade scaffolds must be set up either as stable free-standing scaffolds (e.g. mobile towers, trestle scaffolds) or anchored securely (i.e. resistant to pressure and tension) on the object around which the scaffold is erected (ladder scaffolds, metal scaffolds); here attention should be

given to the greater susceptibility to wind when scaffolding is covered with nets, tarpaulins or protective panels.

- With working scaffolds:
  - platforms must be laid closely together over the entire scaffold width so as to prevent them from falling, tilting and shifting, and provide adequate protection against slipping; platform components must not sag by more than 2.5 cm when under load
  - platforms must be at least 60 cm in width
  - at a fall height of 2.00 m or more, platforms must be fitted with a top rail, intermediate rail and toe board for protection;
- the distance between the platform surface and the structure should be kept to a minimum and should be
  - no more than 30 cm as a rule with working scaffolds and
  - no more than 40 cm from intricately structured façades and protruding walls.



- It must be possible to ascend to and descend from every scaffold level via stairs or passageways that are safe for walking or climbing, e.g. via ladders/gangways, stairway towers, outdoor stairs;
- scaffolds near or in zones of pedestrian or vehicle traffic must be clearly marked (warning lights); protection from vehicle contact must be provided where necessary; priority must always be given to measures required by traffic authorities;
- fall arrest scaffolds must normally be a maximum of 3.00 m below the unprotected edge;
- platforms of fall arrest scaffolds must be fitted with a protective barrier at least 50 cm in height;
- where persons also walk on fall arrest scaffolds, the platforms must be fitted with top rails in addition to the barrier;
- after setting up the scaffold and prior to use, it must be inspected by qualified personnel employed by the party setting up the scaffold.

### **What should be considered when using scaffolds?**

- Prior to initial use, qualified personnel employed by the party using the scaffold must inspect the scaffold for any obvious fault, i.e. the party using the scaffold must not rely on the party setting up the scaffold to have done so properly;
- qualified personnel employed by the party using the scaffold must additionally inspect the scaffold for any obvious fault:
  - after every lengthy interruption of work, following storms, heavy rains, frost or bad weather periods;
  - at least once a month in the case of system scaffolding;
  - at least once a week in the case of other scaffolding.
- Scaffolds may be used without exception only:
  - after being set up completely;
  - after the inspections mentioned above have been completed;
  - after correction of any faults revealed by those inspections.

- A scaffold that is not completely erected or has been dismantled only partially must not be used.
- The scaffold must be modified or fitted with lifting equipment only with the consent of or by the party setting up the scaffolding.
- Jumping from or throwing objects from scaffold platforms is prohibited.

## **What should be additionally considered with special types of scaffolds?**

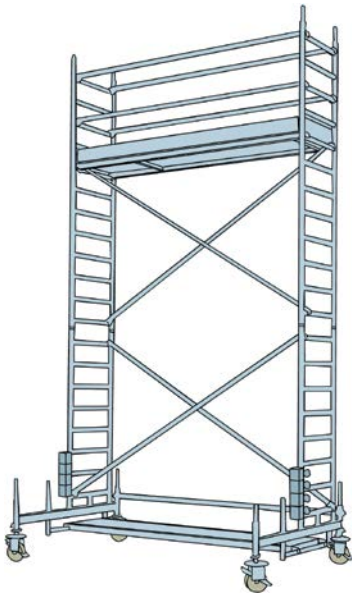
### **Façade scaffolds**

- Façade scaffolds must be anchored securely (i.e. resistant to pressure and tension) on the object around which the scaffold is erected (ladder scaffolds, metal scaffolds); here attention should be given to the greater susceptibility to wind when scaffolding is covered with nets, tarpaulins or protective panels.
- With system scaffolds, a certificate of structural stability must be issued prior to initial use; such a certificate is normally supplied by or can be requested from the manufacturer.
- Nets, tarpaulins and other coverings on scaffolds must be considered in structural stability (included in system stability or as shown by a special certificate).

### **Mobile scaffold towers**

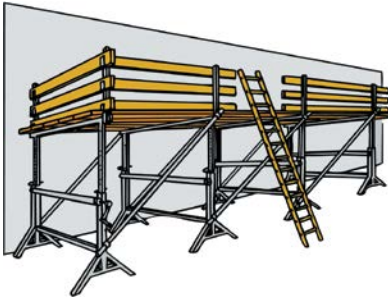
- Mobile scaffold towers are scaffold towers mounted on wheels or castors that can be moved horizontally.
- The wheels or castors must be secured against creeping, and the scaffold must have braking equipment to prevent any unintentional shifting.
- A mobile scaffold may only travel when there are no persons or unsecured loads on it.
- Ascents:
  - Preferably in the interior of the scaffold

- On the outside: only via ladders mounted vertically on the narrow side of the scaffold
- The use of leaning ladders is prohibited.
- The scaffold is (normally) not anchored, therefore qualified personnel must certify that it is secured against toppling. Such certification is not required under these conditions:
  - steel tubing is used for the structure and wooden posts are used for the platforms, or other similar materials with a comparable specific gravity;
  - the uppermost scaffold platform is no higher than 6 m above the surface where erected;
  - the width of the scaffold when erected is at least 4 m outdoors and at least 2 m in closed spaces.



## Trestle scaffolding

- Maximum scaffold height: 2.80 m
- Maximum distance between trestles: 2 m

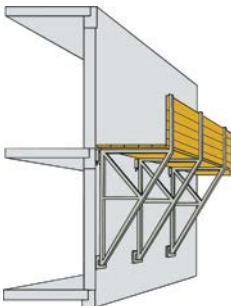


## Truss-out scaffolding

Brackets fastened using

- bolt connection, plug, etc. (certificate of structural stability required) or
- Slings:
  - Grade I steel S 235,
  - minimum 8 mm in diameter
  - arranged in pairs
  - must be hooked into the steel reinforcement on the underside of the ceiling.

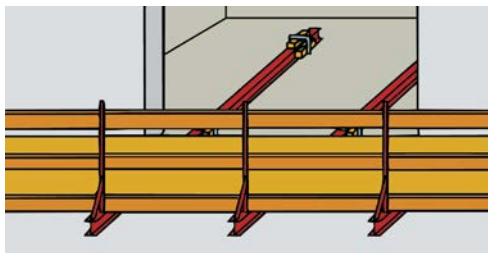
Load-bearing bridging components must be mounted at window openings and similar points.





## Cantilever scaffolding

- The platform rests on the structural components projecting from the building (cantilevers);
- each cantilever must be equipped with two independent fastenings to prevent separation from the surface and with another fastening to secure against lateral shifting.



## Fall arrest scaffolding on roofs

- scaffolding is used on roofs with a pitch of more than 20 °;
- Fall arrest scaffolding on roofs can be implemented
  - in the form of a cantilever scaffold
  - in the form of a truss-out scaffold
  - in conjunction with a façade scaffold
  - in the form of a mast climbing work platform, where the manufacturer specifies such use in the operating instructions and there are organisational measures to ensure that no worker is permitted to stay on the unsecured area of the roof while the platform is travelling.
- The protecting wall consists of posts, grids or netting (with a maximum mesh width of 10 cm) and must be at least 1.00 m high, whereas the upper edge of the protecting wall must be at least 60 cm from the roof surface;
- the wall must protrude by at least 2 m beyond the sides of the working areas to be secured.