MANUAL

– WORKING ENVIRONMENT FOR BUILDING AND CONSTRUCTION

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Manual – working environment for building and construction

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FOREWORD

This manual is a guide to good practice concerning the working environment in the building and construction sector. It provides guidance on how to comply with the regulations of the Working Environment Act.

This manual is published by the Sector Working Environment Committee for Building and Construction (BAR Bygge & Anlæg, with specialist assistance from the building and construction experts at the Working Environment Authority. First and foremost, this manual has been prepared for corporate working environment organisations, but it can also be used by project planners, advisors, coordinators working for developers, safety managers, trainers, suppliers and anyone else with an interest in working environment conditions in the industry.

The latest update of this manual is available from www.bar-ba.dk. The electronic edition of the manual also includes links to other useful websites.
You can download other BAR Bygge & Anlæg documents from the website, too.

We issue a newsletter when our websites include new working environment information. To register for our newsletter, please go to www.bar-ba.dk.

Contact BAR Bygge & Anlæg if you would like more information on the manual or have any advice on how we should formulate it. Send an e-mail to: sekr@bar-ba.dk.

This edition (2010) has been updated to include the latest knowledge since the previous edition in 2008.

The Working Environment Authority has reviewed the manual and found that its contents are compliant with working environment legislation. The Working Environment Authority has merely evaluated the manual as it stands and has not made any decision on whether it covers all relevant topics in the field in question. Moreover, we disclaim liability for changes due to technological development.

THE WORKING ENVIRONMENT ACT AND SAFETY WORK

WORK STRESSES

SITE LAYOUT

WORK PROCESSES

PROTECTIVE EQUIPMENT

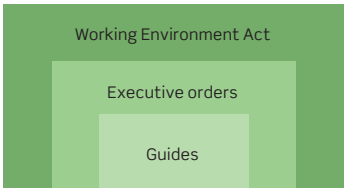
KEY TERMS/NOTES

THE DANISH WORKING ENVIRONMENT ACT (ARBEJDSMILJØLOVEN)

Working environment legislation includes rules specifying requirements for the working environment which must be observed by enterprises and on building sites. The objective is to ensure that the working environment is safe within all enterprises and on all building sites

The working environment legislation comprises the Working Environment Act and a number of executive orders which expand upon and detail the regulations in the Act.

The regulations in the working environment legislation say something about the objective for working environment efforts, but nothing about the means and methods used to achieve this objective. Therefore, it is the responsibility of enterprises to choose what should be done and implemented in order to remain compliant with the regulations in the working environment legislation.



Executive orders

A more detailed description of the requirements for the working environment can be found in the executive orders. These include the executive order on asbestos, the executive order on building sites, the executive order on noise, the executive order on the use of technical aids and the executive order on the use of personal protective equipment.

Employers, managers and employees must comply with the Working Environment Act and the executive orders, irrespective of whether or not they have received enforcement notices from the Working Environment Authority.

It is an offence to fail to comply with the Working Environment Act and executive orders, and violations may lead to fines or imprisonment.

Guides

At guides
At guides, At instructions and At notifications are issued by the Working Environment Authority and provide guidance on interpretation and understanding of the regulations laid down the Working Environment Act and executive orders and what practice is applicable in terms of compliance with the regulations. These guides do not contain binding requirements; they merely recommend and provide information. If the recommendations and methods of the At guides are followed, this will also lead to compliance with the working environment legislation; however, a different method may also be selected, where reasonable.

You can find the Working Environment Act, the executive orders, the At guides and other information from the the Working Environment Authority on www.at.dk.

Industry guides
Industry guides describe good industry practice and include specific recommendations for enterprises. They are compiled by BAR Bygge & Anlæg (Sector Health and Safety Committee for Building and Construction) or one of the other sector health and safety committees and reviewed by the Working Environment Authority. If the recommendations of the industryguide are followed, this will also lead to compliance with the working environment legislation for the field described in the guide.

Use them as a guideline to help to select expedient practice for the working environment. Industry guides for building and construction can be found at www.bar-ba.dk.

THE WORKING ENVIRONMENT SYSTEM

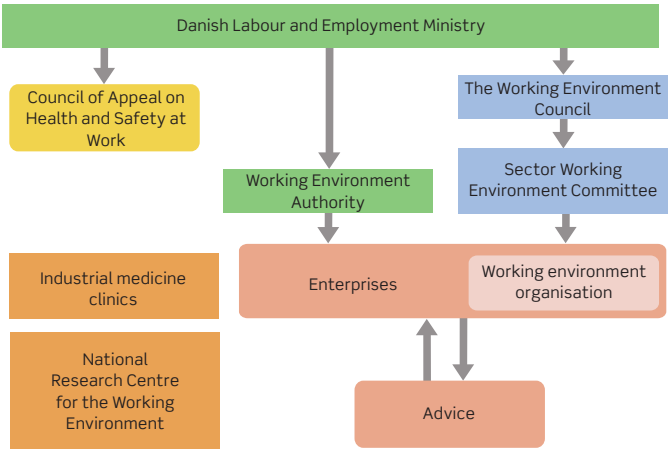
There are three important players which are able to influence the development of new regulations and the interpretation of the Working Environment Act and applicable regulations. The Working Environment Act describes these as:

- *Authorities* (the Labour and Employment Ministry and the Working Environment Authority) which administer the Act and supervise enterprises to ensure compliance with the Act.

- *The industrial partner system* (the Working Environment Council and the eleven sector health and safety committees), comprising representatives of the trade unions and the management and employer organisations. The industrial partner system is involved in amendments to working environment legislation and promotes good working environment practice among enterprises' managers and employees.

- *The Council of Appeal on Health and Safety at Work,* which deals with complaints relating to Working Environment Authority decisions. This Council is independent. Its chairman is appointed by the Labour and Employment Minister, while its members are from the organisations.

According to the Working Environment Act, other institutions may also assist enterprises with preventing working environment problems.



- Working environment organisations are enterprises' own working environment units which become involved in preventive working environment initiatives at the instigation of the management.

- Industrial medicine clinics and wards at hospitals can examine whether ailments or illnesses are caused by work. These clinics can also work in cooperation with enterprises to help prevent injury.

- The National Research Centre for the Working Environment (NFA) implements research and development projects which may assist authorities, industial partners and enterprises in examining and documenting working environment problems and developing better prevention methods.

- Authorised working environment advisors, approved by the Working Environment Authority, can help enterprises to document and resolve working environment problems.

WORKING ENVIRONMENT AUTHORITY

The job of the Working Environment Authority is to help promote safe, healthy workplaces that promote personal development. Specifically, this involves:

- Inspecting enterprises.

- Preparing regulations.

- Providing information on the working environment.

The Working Environment Authority undertakes supervisory visits to ensure that enterprises are working in compliance with the Working Environment Act. If enterprises fail to comply with the regulations, the Working Environment Authority issues enforcement notices and provides guidance to enterprises on how best to comply with the regulations.

Enterprises may not deny the Working Environment Authority access to a workplace or building site.

Employees may contact the Working Environment Authority and submit complaints about their working environment without their managers or colleagues finding out. Staff at the Working Environment Authority must not indicate whether they are makeing a supervision visit to an enterprise on account of a complaint.

Response by the Working Environment Authority

If the Working Environment Authority establishes violations of the working environment legislation when inspecting the working environment at enterprises, it may issue enforcement notices with deadlines, immediate enforcement notices and prohibitions. If the violations of the regulations are merely minor, the Working Environment Authority may provide verbal or written guidance.

The Working Environment Authority's enforcement notices with deadlines, immediate enforcement notices and prohibitions are provided in writing. Guidance may be provided both verbally and in writing. This may take place on the basis of the following:

- *Enforcement notices with deadlines* are issued in the event of non-compliances which do not have to be resolved immediately at the time of the visit. The enforcement notice is sent to the enterprise within 14 days of the supervisory visit. The problem must be resolved within the given deadline.

- *Immediate enforcement notices* are issued in the event of non-compliances where:
  1. the hazard is so serious that it must be dealt with immediately, but not so serious that a prohibition is issued.
  2. the purpose of the decision will have no effect unless arrangements are made immediately.
  3. given the hazard, it is necessary to make temporary arrangements here and now until the final arrangement has been established.

4. an enforcement notice may actually be complied with straight away or within a short period.

Immediate enforcement notices are issued by making a decision on the spot.

Resolution of the problem must commence immediately.

- *Prohibitions* are issued in the case of non-compliances whereby the hazard is imminent and significant, and whereby no further work may be carried out until the problem is resolved. Prohibitions are issued by making a decision on the spot.

- *Guidance* is issued in instances where it is relevant to provide the enterprise with guidance on applicable regulations; in connection with minor violations of the working environment legislation, for example. This is not a direct demand on the enterprise, merely guidance on the regulations in the field.

Any enterprise which has received an enforcement notice with deadline, immediate enforcement notice or prohibition must report back to the Working Environment Authority on how it has complied with the enforcement notice, and this feedback must be signed by the working environment organisation.

The Working Environment Authority may also issue what are known as advisory enforcement notices. This means that the enterprise has to use an authorised working environment advisor to assist with resolution of the problems and to underpin preventive working environment efforts within the enterprise.

The Working Environment Authority must always be able to provide grounds for its enforcement notices and prohibitions with reference to the Working Environment Act or executive orders.

Enterprises wishing to appeal against the Working Environment Authority's enforcement notices must send their appeals to the Council of Appeal on Health and Safety at Work at the latest within four weeks of receiving the decision of the Working Environment Authority.

Screening and consultancy notices

All enterprises must be screened by the Working Environment Authority, unless they hold working environment certification or there are no employees within the enterprise.

Screening involves an unannounced visit by a Working Environment Authority inspector, who assesses whether there is a need for a more thorough inspection.

The Working Environment Authority checks - among other things - the enterprise's workplace assessment (APV) and working environment organisation and reviews the enterprise's workshops, offices, stores, vehicles and 1-2 building sites where the enterprise's employees work.

If the enterprise's working environment is in order, the Working Environment Authority does nothing more until the next screening visit.

If the enterprise contravenes regulations on formal working environment conditions, the Working Environment Authority may issue an enforcement notice without a subsequent inspection. This may, for example, take place if the enterprise has an unsatisfactory APV or working environment organisation. The enterprise must report back to the Working Environment Authority when everything has been put in order. The Working Environment Authority will not bother with consultancy notices when other working environment conditions are under control.

If the screening shows that the regulations concerning material working environment conditions have been violated, the enterprise will be selected for a consultancy notice. Selection for consultancy notices may also take place if there is a justified suspicion of such violations of material working environment conditions. Material working environment conditions may, for example, include exceeding noise limits or inadequate scaffolding or technical aids.

In the event of consultancy notices, the Working Environment Authority undertakes a more thorough review of the enterprise.

Enforcement notices concerning advice

The Working Environment Authority may issue enforcement notices stating that an employer or developer must use an authorised working environment advisor to assist with resolving the working environment problems noted within the enterprise or on the building site. The agreement between the developer or the enterprise and the advisor must be in writing and describe how compliance with the enforcement notice will be achieved.

The Working Environment Authority must be notified of the agreement at the latest within six weeks of the advisory enforcement notice being issued.

The enterprise's feedback on entering into an agreement with an authorised working environment advisor and on solutions must be signed by both the working environment organisation and the authorised advisor.

If the enterprise does not have a working environment organisation, the feedback must be signed by a representative of the employees.
If a developer has received an enforcement notice concerning advice, the agreement should not be signed by the working environ-

ment organisation.
The Working Environment Authority, the enterprise's managers and the employees must be given the opportunity to view the agreement.

Five types of enforcement notice concerning advice
The Working Environment Authority can issue four types of enforcement notice concerning advice to employers:

- In the case of complex and serious violations where it may be difficult to find a permanent solution to the working environment problem.

- When the enterprise contravenes the working environment regulations in five or more cases.

- In the event of repeated violations where there are 15 or more violations of the working environment regulations within the same field across the enterprise's production units (typical for larger enterprises).

- When the Working Environment Authority is of the view that the psychological working environment within the enterprise should be examined.

One type of enforcement notice concerning advice can be issued to developers:

- When the Working Environment Authority is of the view that the developer has failed to meet his obligation to produce a "Health and Safety Plan" or if there are significant flaws in the plan.

Enterprises wishing to appeal against the Working Environment Authority's advisory enforcement notices must send their appeals to the Council of Appeal on Health and Safety at Work at the latest

within four weeks of receiving the decision of the Working Environment Authority.

The Smiley system

Enterprises are given a green, yellow or red smiley when the Working Environment Authority has carried out a screening or inspection. The smiley is published on the Working Environment Authority website along with information on any enforcement notices which may have been issued to the enterprise.

- Smileys with crowns are for enterprises which have achieved a recognised working environment certificate. Enterprises must request their own smileys with crowns on the Working Environment Authority website.

- Green smileys are for enterprises which have no outstanding notices from the Working Environment Authority.

- Yellow smileys are for enterprises which have received immediate enforcement notices or enforcement notices with deadlines. The Working Environment Authority removes yellow smileys from its website once enterprises have complied with their enforcement notices and reported back to the Working Environment Authority. However, this can take only place after six months at the earliest. The feedback to the Working Environment Authority must be signed by the working environment organisation or a representative of the employees, if no working environment organisation is required.

- Red smileys are for enterprises which have received prohibitions or advisory enforcement notices - but not enforcement notices concerning advice to examine the psychological working environment.

The Working Environment Authority removes red smileys once enterprises are again compliant with the regulations and have notified the Working Environment Authority of this. However, this can take only place after six months at the earliest. The feedback to the Working Environment Authority must be signed by the working environment organisation or a representative of the employees, if no working environment organisation is required. The authorised working environment advisor must also sign the feedback if an advisory enforcement notice is involved.

WORKING ENVIRONMENT OBLIGATIONS AND LIABILITIES

Employers

The employer is responsible for ensuring that the enterprise is compliant with the Working Environment Act. In purely general terms, the Working Environment Act demands that employers must plan, arrange and carry out work in a manner which is fully responsible in terms of health and safety.

Employers are obliged to ensure, among other things, that:

- the workplace is correctly fitted out, e.g. for preventing falls and the risk of collapse,
- the enterprise trains and instructs its staff so that they can carry out their work without risk,
- they supervise staff effectively to ensure that they are carrying out their work correctly and are following instructions,

- the necessary safety equipment is in place and that this equipment can be used safely for the given work,
- the work can be carried out legally using personal protective equipment,
- the enterprise creates written workplace assessments,
- the enterprise creates a working environment organisation when it has ten or more employees,
- the enterprise creates a working environment organisation (working environment representative for the employees, one supervisor and the employer) on building sites and other temporary and changing workplaces outside the enterprise's permanent workplace, whenever five employees work on the site for more than 14 days.

Employers may be punished if an enterprise fails to comply with an enforcement notice with deadline, an immediate enforcement notice or a prohibition or otherwise acts in gross contravention of the Working Environment Act. This may, for example, include working in hazardous excavations or on poor scaffolding, a risk of falling during work on roofs, or failure to provide machine protection.

Business managers

If you are a director or otherwise part of the top management, you have the same obligations as your employer.

Supervisors

If you primarily manage or supervise work at a site, you are a supervisor. This is also applicable even if you take part in practical work as well.

As a supervisor, you are obliged to assist in ensuring that working conditions are entirely responsible in terms of health and safety. You are also obliged to attempt to prevent hazards which may occur in the event of errors or shortcomings.

You must immediately notify your employer of any working environment problems if it is not possible to resolve them immediately.

Employees

Employees share responsibility for ensuring that the working environment is good. You are obliged to help to ensure that:

- working conditions are entirely responsible in terms of health and safety within your own work area,
- safety arrangements operate as intended, e.g. by using the personal protective equipment you have been supplied with,
- you put back any safety arrangements which you have removed temporarily, e.g. temporary removal of guard rails when placing materials on scaffolding,
- you notify the enterprise's working environment organisation, supervisor or employer if any faults and shortcomings arise which you and your colleagues are unable to correct yourselves,
- you cooperate with the other enterprises and people working in workplaces (e.g. building sites) where several enterprises are all working at the same time,

- you work according to the regulations applicable to health and safety when working on a site belonging to a different enterprise.

As an employee, you may be punished if you deliberately or with gross negligence breach the terms of the Act. This is applicable to the following areas:

- Use of personal protective equipment.
- Use of extraction arrangements.
- Use of protective equipment or safety arrangements.
- Use of responsible working methods.
- Lacking certificates for cranes and fork lift trucks.

In these instances, the employer may escape punishment if he has complied with his obligations in accordance with the Working Environment Act.

Suppliers

As a vendor or hirer of machinery and other technical aids or a vendor of chemicals and other substances and materials, you are responsible for ensuring that what you supply can be transported, stored and used with no risk to health and safety.

As a supplier, you must ensure that:

- machinery has the necessary protective equipment and is CE-labelled,
- easy to understand user instructions in Danish are supplied which explain how to set up, use and maintain the aid,

- technical aids supplied, e.g. scaffolding, are legal and suitable for the work for which they have been ordered,

- chemicals and other substances and materials can be used as intended without posing a hazard to safety or health, and that user instructions in Danish are supplied.

Project planners and consultants

As project planner of building and construction work, you have to ensure with your project instructions that the regulations in the working environment legislation can be complied with in connection with implementation of the project and the operation and maintenance of the completed construction.

As project planner and consultant, you must:

- ensure that it is possible to comply with the working environment regulations when the completed construction or facility is to be serviced and maintained, and to prepare a log relating to this.

- ensure with your descriptions that the contractor is able to carry out the individual work elements or phases in a sequence that is responsible in terms of health and safety. It is necessary to take into account the time necessary for completing individual work elements or phases.

- ensure with your project instructions that suitable technical aids can be used when handling heavy loads during project implementation and during subsequent maintenance.

- describe particular risks and other special conditions for your building and construction project which are of significance for the health and safety of tradesmen and construction workers.

- ensure that the project does not involve substances or materials which can be replaced with less hazardous substances and materials.

- notify the developer of his obligations under the Working Environment Act in the project in hand, e.g.:
  - if it can be expected that there will be more than one enterprise on the building site at the same time,
  - if it can be expected that there will be more than ten people at work on the building site at the same time,
  - what preliminary surveys should be undertaken, e.g. searching for contaminated soil and asbestos.

- ensure that during preparation of the building project, the developer's health and safety coordinators are involved in the project planner's considerations and are given access to the relevant parts of the project documentation.

Developers

The developer is the party which pays for building and construction work to be carried out.

The Working Environment Act describes building and construction work as:

- Work in connection with the erection and alteration of buildings and structures, including assembly work.

- The construction and alteration of roads, tunnels, bridges, harbours and similar facilities.

- Excavations and earthworks in connection with building and construction projects.

- Laying pipelines and cables.
- Repair and maintenance of building and construction projects.
- Demolition and dismantling of building and construction projects or parts thereof.

Before starting planning the building and construction work, the developer must clarify whether the building phase will involve more than one enterprise working on the building site at the same time. If this is the case, the developer is also obliged to ensure that:

- The boundaries for safety arrangements are defined in the shared areas in which employees of several enterprises work or spend time.
- Health and safety are coordinated during both the project phase and the implementation phase.
- A health and safety plan is compiled if there are more than ten people at work at the same time.
- The building site is notified to the Working Environment Authority if the building work is of a certain size and/or extent.

Furthermore, developers are responsible for helping to ensure that enterprises and their employees can carry out their work on the building site in a fully resposible manner in terms of health and safety.

If it is anticipated that more than one enterprise will be working at the same time on the building site, the developer must appoint a coordinator for the project phase – a working environment coordinator (P), and a coordinator for the implementation phase – a working environment coordinator (B). This could be the same person.

The developer's coordinator(s) must meet the expertise and training requirements applicable to coordinators, depending on the size of the site.

If the developer himself or persons within the developer's enterprise do not wish to act as coordinators or do not meet the expertise requirements to do so, the developer may allow other persons or enterprises to do these tasks However, the developer may not transfer responsibility for his obligations. Therefore, the Working Environment Authority will approach the developer directly if violations of one or more of the requirements to which the developer is subject under the developer regulations are deemed to be present.

Boundaries of safety arrangements in shared areas

Shared areas are all the locations on the building site where several enterprises are working at the same time.

When more than one enterprise is to carry out work on the building site at the same time, the developer must agree with the employers who is responsible for establishing, maintaining and removing scaffolding and work platforms, traffic and access routes, guard rails and covers, etc. on roofs and orientation lighting, etc. in shared areas. This also includes responsibility for e.g. snow clearance, cleaning and various inspections.

If more than ten persons will be employed on the building site at the same time, the agreements must be specified in the building site's Health and Safety Plan.

If, during work, it turns out that there are more shared areas, or different shared areas to those assumed or if, for example, there is a change of the enterprises responsible for arrangements in the shared areas, a new definition of boundaries and new agreements with the individual employers must be compiled.

Examples of shared areas may include:

- Work areas in which several enterprises will be working at the same time.
- Traffic and access routes.
- Site huts.
- Material locations.
- Waste locations.
- Walkways.
- Scaffolding.
- Fencing and signs.
- Orientation lighting.
- Building power with switchboards and subsidiary switchboards, plus a water supply to the building site and site hut area.

Notification of the building site to the Working Environment Authority

Before work commences, the developer must notify the building site to the nearest Working Environment Authority Centre. However, this is applicable only if the building site is expected to be functional for more than 30 days and more than 20 employees will be working there at the same time. The building site must also be notified if the anticipated amount of work on the building site exceeds 500 man-days.

The developer must notify the building site on a special form in electronic or hard-copy format. The notification form can be downloaded from www.at.dk or www.virk.dk. A copy of the notification must be placed in a visible location on the building site so that everyone can see that the building site has been legally notified.

Notification to the municipality

The developer must also notify various tasks and facilities to the municipality before work commences.

This is applicable to e.g.:

- Façade renovation, e.g. sandblasting.
- Surface treatment of freestanding structures.
- Demolition of buildings and other noisy and dusty activities.
- Asphalt facilities.
- Facilities for treatment of contaminated soil.
- Facilities for crushing building materials.

Coordination during planning

The developer must ensure that a working environment coordinator (P) is appointed when it is expected that more than one 1 employer will be working on the building site at the same time.
The working environment coordinator (P) must work on behalf of the developer to compile a Health and Safety Plan (PSS) if it is expected that there will be at least two enterprises employing more than ten people will be working at the same time at any given time during the building phase.

The developer is responsible for ensuring that the project planners and the working environment coordinator (P) cooperate on working environment coordination in the planning phase. Coordination must ensure that the project documentation takes into account health and safety over the building phase and during servicing and maintenance of the completed construction.
However, the project planner holds full responsibility for ensuring that the project documentation is formulated such that it is possible to comply with the Working Environment Act.

The coordinator works on behalf of the developer to produce a Health and Safety Plan (PSS) and a log of working conditions, servicing and maintenance of the completed construction. Coordination must help to ensure that:

- sufficient time is allocated in the building project for carrying out the various work elements or work phases,
- appropriate planning takes place with the various tasks in the right sequence, given the selected architectural, technical and organisational solutions,
- the various work processes can be carried out using suitable technical aids and appropriate working positions, and

- necessary descriptions are available relating to routes for vehicles and pedestrians on the site irrespective of the weather, e.g. drainage and snow clearance.

One example of technical selection may be when a decision is made for a roof structure to be complete before wall cladding is fitted. This will require special planning and agreements on what aids and access routes must be present on site at a given time.

One example of organisational selection may be the developer's selection of contract form (total, principal or individual trade contract) or the working environment organisation in the building project. The developer may, for example, himself decide to carry out all tasks relating to coordination in shared areas. Otherwise, the developer may hand over these tasks to the developer's consultant or the project planner.

Construction log for operating conditions

Where relevant, the working environment coordinator (P) must prepare a log of special working environment conditions relating to servicing and maintenance of the completed construction.

The project planner must compile a similar list. The log and the list may be formulated in one and the same document.

Coordination on building sites irrespective of size

The developer must ensure that a working environment coordinator (B) is appointed if more than one 1 employer will be engaged on the building site at the same time at any given time throughout the building phase.

The working environment coordinator must ensure that collective coordination and planning of health and safety take place in relation

to all the enterprises engaged on the building site, particularly in respect of work and traffic in shared areas.

The coordinator must also coordinate:

- The cooperation of the various enterprises with regard to working environment work on the building site. This also applies to enterprises which follow one another on the building site.

- Enterprises' use of the health and safety plan (PSS), if a PSS is required.

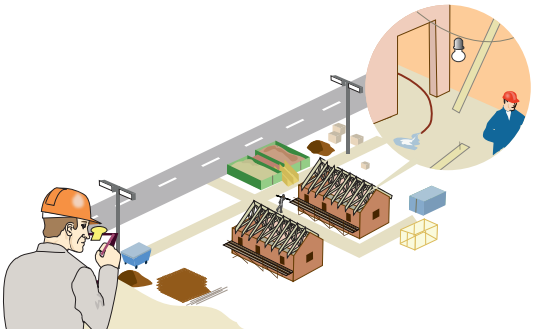
- Enterprises' checks that work processes are being implemented in accordance with the instructions.

The working environment coordinator (B) must thus coordinate the enterprises' checks that work processes are being implemented in accordance with the agreed guidelines in, for example, the following areas:

1. Order and cleanliness on the building site.
2. Good access to workplaces.
3. Handling of various building materials. E.g. ensuring that there are no cranes over work areas where people are present.
4. Ensuring that enterprises maintain electricity cables and other installations on the building site and check them before they are commissioned, and then regularly thereafter.
5. Ensuring that enterprises define and set up storage sites and locations for materials, particularly if hazardous substances or products are to be stored.
6. Hazardous waste.
7. How waste and rubble are stored and removed.
8. Ensuring that enterprises adapt to the actual time to be spent on the various types of work or work phases as work on the building site progresses.

9. Cooperation between employers and self-employed tradesmen.
10. Interaction with the activities taking place on or close to the building site. For instance, residential or business properties may be inconvenienced by noise, dust, etc.

Coordination of safety on larger building sites during the implementation phase (more than 10 people at the same time)



The developer must ensure that a working environment coordinator (B) on building sites with more than one employer and more than ten employees at the same time carries out the following:

- Coordinates the employers' arrangements which promote the health and safety of the workers in the shared areas. This is done in part at the safety meetings which the coordinator convenes, inviting the employers and the members of the working environment organisations on the building site. All subcontractors must be asked to attend and take part in the safety meetings.

- Holds regular safety meetings at least once a fortnight, ideally in connection with the site meetings. The working environment co-

ordinator may convene extraordinary meetings as required, e.g. following serious accidents, poisoning incidents or near-accidents or poisoning.

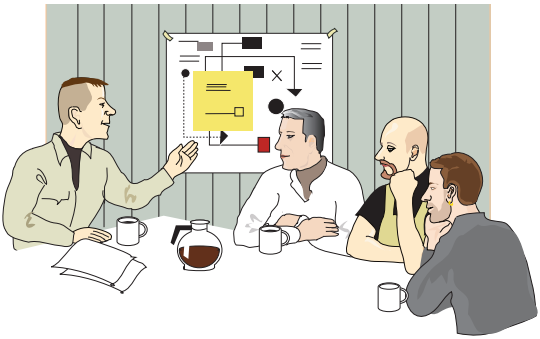
- Chairs the safety meetings and is responsible for ensuring that the minutes are sent to the meeting's participants, the developer, all supervisors, the enterprises involved, the members of the working environment organisation and any shop stewards.

The working environment coordinator (B) must check, by personal contact and presence on the building site, that there is compliance with the agreements between the developer and the employers, and that cooperation on safety in shared areas is working.

The coordinator must also check that employers and others are complying with decisions from the safety meetings.

Employers on the building site must take into account the instructions of the working environment coordinator. For example, if the employer uses noisy machinery in a shared area, the coordinator may ask him to use less noisy machinery in order to reduce the noise. However, the employer can choose another way of reducing noise. Therefore, he does not need to follow the method specified by the the coordinator. Such special risks must be discussed regularly at the safety meetings, so - for example - noisy and dusty work is planned and organised such that other people on the building site are not subjected to unnecessary stresses or health risks.

The working environment coordinator (B) must ensure - and check - that only the enterprises and people who are working on the building site (cf. the approved schedule) have access to the building site.



Health and Safety Plan (PSS)

A Health and Safety Plan (PSS) must ensure that everyone on the building site has a good working environment. At the same time, the plan can act as a handy control tool for the construction management team.

The developer must always prepare a PSS if there are more than ten people from more than one enterprise working on the site at the same time.

If there are several enterprises on site, but fewer than ten people at the same time, it may suffice for the developer to compile a PSS for the hazardous work. The developer's working environment coordinator helps to ensure that all all employers cooperate to achieve a safe working environment.

The PSS must be complete before work on the building site begins. The developer is responsible for ensuring that the PSS is updated regularly as work on the building site progresses. This is particularly true of the organisational plan, building site drawings and time schedule. Everyone on the building site must have the opportunity to see the PSS, which must always be available on the building site.

The PSS must include:
1. an organisational plan,
2. building site drawings,
3. a time schedule,
4. an indication of the traffic areas,
5. an indication of the areas in which work will be carried out by several employers and their employees,
6. an indication of the joint safety arrangements which are established in the shared areas,
7. the boundaries of the areas in which work involves particular risks,
8. a procedure for ongoing checks of installations, safety arrangements, any particular risks, etc.,
9. an indication of who is to carry out any planned regular inspection and coordination of emergency, evacuation and emergency exercise plans,
10. specific arrangements relating to any particularly hazardous work.

The organisational plan should include, as a minimum, an overview of all enterprises working on the building site, with relevant information on contact persons/the supervisor responsible and a summary of their working environment organisations on the building site.

The building site drawing must show where the risks are, and what these risks are, on the site, including the positioning of:
1. access, transport and escape routes,
2. crane, hoist and scaffolding,

3. the designated location for material depots, temporary workshops and waste containers,
4. the designated location for welfare arrangements,
5. connections to electricity, water and drains, and
6. alarm, fire, rescue and first aid equipment.

The time schedule must specify:
1. when the individual employer has tasks on the building site and how much time is allocated for the individual tasks or work phases,
2. the periods over which work is to take place which is particularly hazardous (see the list of particularly hazardous work).

Shared areas and boundaries
There must be a description of where shared areas are. The boundaries for responsibility for the safety arrangements in the shared areas must be described.

There must be a specification of the shared safety arrangements. For example, a list can be compiled of the individual arrangements over the period to which the responsibility applies and which enterprise holds responsibility.

On all building sites on which more than one enterprise is working at the same time – including building sites with fewer than ten people employed at the same time – a PSS must be compiled for the work elements included in the list of particularly hazardous work.

List of particularly hazardous work

Accident risks
Work where employees run a particularly serious risk of being buried, sinking or falling.

Chemicals
Work which exposes employees to chemical or biological substances which pose a particular health and safety risk, or where the Act requires a health check.

Radiation
Work which exposes employees to ionising radiation and which makes it necessary to define controlled and monitored areas as defined in Article 20 of EU Directive 80/836/Euratom.

Other
- Work in the vicinity of high voltage lines.
- Work which involves a risk of drowning.
- Work in gullies and tunnels and underground work.
- Work underwater using diving equipment.
- Work in pressure chambers.
- Work which involves using explosives.
- Installation and removal of heavy prefabricated elements.

It is also a good idea to create a PSS when working in the vicinity of areas with heavy traffic (roads and railways).

Download the PSS guide on www.bar-ba.dk

WORKING ENVIRONMENT ADVICE

In special cases, the Working Environment Authority may require an enterprise to use an authorised working environment advisor.

- Consult the working environment organisation, both when selecting an advisor and in the actual process together with the advisor.
- Select the correct advisor. Some advisors are authorised in specific areas, while others are authorised to be able to provide working environment advice within all areas.

It is also possible to seek assistance elsewhere. This may include, for example:

- Advice in connection with the purchase of machinery and tools.
- Advice on replacing hazardous substances with less hazardous ones.
- Suppliers of technical aids.

WORKING ENVIRONMENT ORGANISATIONS WITHIN ENTERPRISES

There must be health and safety cooperation at all enterprises.

All enterprises with ten or more employees must have a working environment organisation.

The working environment organisation may have representatives of both employees and the management.

In enterprises with working environment organisations, a discussion must take place every year on how cooperation on the working en-

vironment is working and on working environment plans for the year to come.

Composition of the working environment organisation

The number of members and working environment teams in the working environment organisation are established in cooperation with employees and supervisors on the basis of the principle of subsidiarity. There must be at least the same number of working environment representatives and supervisors within the working environment organisation.

The supervisors within the working environment organisation must have the necessary knowledge of the enterprise's production and different work areas.

It is necessary to ensure that all employees can come into contact with their working environment representatives within employees' working hours, and employees must be able to discuss working environment conditions with the working environment organisation within employees' working hours.

All employees – including part time employees – who are not business managers or supervisors are included in the determination of the number of people employed. Therefore, this applies to all staff who work full time or part time on building sites or other changing/temporary workplaces outside the enterprise's permanent workplace.

People who have been employed to work on a specific building site and who will only be working there are not normally included in the number of employees in the home enterprise. If they continue working at a new building site, they will be counted from this time.

Working environment work in enterprises with one to nine employees

Enterprises with one to nine employees are not obliged to create a working environment organisation. However, the employer must ensure that health and safety cooperation takes place by direct contact and dialogue between the employer, supervisors and other employees.

In enterprises without a working environment organisation, discussion must take place every year on how cooperation on the working environment is working and on working environment plans for the year to come. It is also necessary to discuss whether the necessary specialist knowledge on the working environment is present within the enterprise.

In enterprises without a working environment organisation, the employer must ensure that employees receive all necessary information on health and safety. Employees must also be involved in the planning and introduction of new technology and on the consequences for health and safety of the selection of equipment, personal protective equipment and technical aids, etc.

However, on building sites there is an obligation to create a working environment organisation if five or more people are employed by the same employer over a period of more than 14 days.

Working environment organisations in enterprises with ten to 34 employees

In enterprises with ten to 34 employees, it is necessary to establish a working environment organisation which consists of supervisors and elected working environment representatives, and with the employer or business manager taking the chair.

The working environment organisation must carry out both strategic – general – tasks and operational – daily – tasks.

Working environment organisations in enterprises with more than 35 employees

Enterprises with 35 or more employees must have a working environment organisation established with:

- one or more working environment teams and
- one or more working environment committees.

A working environment team consists of one supervisor and one working environment representative.

A working environment committee consists of supervisors and working environment representatives from one or more working environment teams, with the employer or the business manager taking the chair.

Working environment committees within enterprises

The working environment committee consists of the members of the working environment teams. If there are more than two working environment teams, the working environment representatives choose two of their members, and the supervisors in the working environment teams choose two of their members to sit on the working environment committee. The employer or business manager takes the chair.

The members of the working environment committee and their deputies are elected for two years. Enterprises may agree on a term of office for working environment representatives of a maximum of four years.

The working environment committee must plan, manage and coordinate health and safety work within the enterprise, including the work of the working environment teams, and carry out the annual working environment discussion.

The committee must also advise the employer on resolution of working environment issues and on how the working environment can be integrated into the enterprise's strategic management and day to day operations. The committee must help to establish the size of the working environment organisation and provide advice on the enterprise's skills development plan.

The committee checks working environment work and must ensure that the working environment teams are notified about the working environment and given guidance on it.

The committee must take part in preparation of the enterprise's workplace assessment.

Once a year, the working environment committee must prepare a collective summary of accidents, poisoning incidents and health damage within the enterprise.

Furthermore, the committee must establish principles for training and instruction which are adapted to suit the working conditions at the enterprise and the needs of employees.

A plan must be compiled concerning the structure of the working environment organisation, with information on members, and employees must be informed of the plan.

If members of the working environment organisation are not present, the members present within the enterprise or at the workplace will select the necessary working environment arrangements. This must then be reported to the members of the working environment organisation as quickly as possible.

At the annual discussion, the working environment committee must decide on the form of cooperation for the committee and the number of annual meetings.

Tasks of the working environment team

The working environment team deals with day to day working environment tasks within the part of the enterprise or the building site covered by the working environment team.

The working environment team must participate in the planning of health and safety work and the preparation of the workplace assessment.

The team must check that the working conditions are fully responsible in terms of the working environment, and whether effective training and instruction suited to the needs of employees is being provided.

The team must also take part in the examination of accidents, poisoning incidents and health damage, or near-accidents, etc.

It is also important for the working environment team to regularly inspire other employees to behave in a way which promotes good working environment practice.

The working environment team forms the point of contact between the employees and the working environment committee and therefore must pass on working environment queries to the working environment committee, unless the working environment team is able to resolve the problems itself.

If a supervisor and working environment representative are not present at the same time, the member present takes over the tasks of the working environment team. Arrangements which are organ-

ised in the absence of the other must be reported to the absent party as soon as possible.

If there is no time to contact the chair of the working environment committee or the management team for the enterprise, the working environment team may stop work or the work process on its own initiative when there is a considerable risk to employees' safety or health.

If work is stopped, the working environment team must immediately contact the management team for the enterprise and explain why it was necessary to stop the work.

Meetings of the working environment organisation within the enterprise

Besides the annual working environment discussion, the working environment team and the working environment committee will hold meetings as required so that it is possible to carry out the tasks assigned to the team and the committee.

The working environment committee will normally hold meetings if serious accidents, damage to health or near-accidents and damage take place.

Tasks of the working environment committee within the enterprise

The working environment committee must plan, manage and coordinate health and safety work within the enterprise, including the work of the working environment team.

The job of the working environment committee is to ensure systematic working environment work. This may include, for example:

- A working environment policy with a clear objective for working environment work.

- Clear working environment requirements for both employees and subcontractors.
- Examining and documenting any accidents.

On agreement, the employer and employees may opt to arrange the working environment organisation differently. However, this assumes that there is also an agreement at organisational level.

SAFETY MEETINGS ON BUILDING AND CONSTRUCTION SITES

Responsibilities of the developer:
On larger building or construction sites, the developer's working environment coordinator (B) must hold safety meetings. The purpose of these is to coordinate the safety work of the individual employers in the shared areas.

Building or construction sites are regarded as large when more than one employer at the same time employs more than ten people on the building site. Everyone working on the building site is taken into account, including supervisors and building site managers.

The developer's working environment coordinator (B) convenes the meetings and ensures that written minutes are kept on topics and decisions at the meeting. All employers (including subcontractors and sole traders) or their representatives take part in these meetings together with enterprises' working environment organisations at the workplace.

The coordinator must hold regular safety meetings at least once a fortnight. Extraordinary meetings are held as required or following serious accidents and near-accidents.

Safety council

Responsibilities of the developer:
If there are more than 100 people working on site for at least four weeks, the developer may set up a safety council in cooperation with the enterprises. This council will take over the tasks and frequency of the safety meetings, although the council must also meet with the working environment organisations of all enterprises on site at least once a quarter.

The working environment coordinator acts as the chair of the safety council on behalf of the developer. The site's working environment representatives choose two members between them, and the employers and supervisors each choose one member of the safety council.

The Working Environment Authority may demand that working environment work be coordinated with general working environment meetings instead of a safety council.

WORKING ENVIRONMENT WORK ON BUILDING AND CONSTRUCTION SITES

The enterprise must set up a working environment organisation on building sites and other temporary and changing workplaces outside the enterprise's permanent workplace whenever five employees work on the site for the same employer for more than 14 days. Also remember to include in the figures the number of any contract staff.

This is applicable irrespective of how many people are employed within the enterprise, and irrespective of the fact that the employees on the building site are at the same time covered by a working environment organisation within the home enterprise.

The working environment organisation on the building site consists of an employee (working environment representative) elected by and from employees on site, the supervisor on site and the employer or his representative.

BAR Bygge & Anlæg recommends that the employer, working environment representatives and supervisors within the working environment organisation participate in startup meetings, safety meetings and safety rounds which are convened by the developer or the working environment coordinator.

Working environment committees on building and construction sites

If there are 35 or more employees from the same enterprise working on a building and construction site for at least four weeks, the enterprise must set up a working environment committee.

The working environment committee is made up of members or representatives from the working environment teams created on site.

The committee must actively assist with coordination of working environment work with other enterprises when they are all working on the same site.

Working in other enterprises' areas

Anyone working in an area operated by a different enterprise must work in compliance with the working environment regulations applicable to the enterprise in whose area they are working, as well as the regulations applicable to the work they have to do.

ELECTION OF WORKING ENVIRONMENT REPRESENTATIVES

In enterprises with ten or more employees and on building sites with five or more employees, the employees must elect a working environment representative to represent them within the working environment organisation.

It is important that employees play an active part in the working environment organisation to ensure that the working environment work proceeds satisfactorily. Therefore, the management team within the enterprise must make the effort to persuade employees to elect a working environment representative.

If they are unsuccessful, the supervisor will work alone on the working environment team until the employees have elected a working environment representative. The employer must regularly encourage employees to elect a working environment representative.

The working environment representative should be elected by all employees covered by the working environment team or the working environment organisation. The employer, business managers and supervisors do not take part in this election process.

The regulations on election of shop stewards within the collective agreement area in question normally define who can be elected.

Staff normally elect a working environment representative for two years at a time, but if the enterprise and the employees agree, the period of office can be extended to up to four years.

The working environment representative is protected from dismissal or deterioration of employment terms in the same way as shop stewards within the collective agreement area.

If there is disagreement on this protection, it must be decided by means of the industrial disputes procedure, i.e. by mediation meetings between the parties, and possibly the Industrial Court.

SUPERVISORS

If several supervisors could be included in the same working environment team, the employer will appoint the supervisor representative for the team.

The job of a supervisor is to manage or supervise work within an enterprise. Chargehands and contractors do not normally meet these conditions and so are not regarded as supervisors.

The enterprise cannot immediately dismiss a supervisor with reference to his work within the working environment team or working environment organisations, e.g. dismiss the supervisor for having demanded special safety equipment.

Attempts must be made initially to resolve these kinds of conflicts by means of negotiation or mediation.

WORKING ENVIRONMENT TRAINING

Working environment representatives and supervisors within the working environment organisation must undergo mandatory working environment training for three days at the premises of a provider approved by the Working Environment Authority. Working environment training must be completed within three months of the working environment representative or supervisor in question being elected or appointed.

Supplementary working environment training
The employer must offer working environment representatives and supervisors within the working environment organisation the opportunity to participate in two days' supplementary working environment training during their first year in office. This offer is given to people who have completed the mandatory working environment training.

The supplementary training courses covering a total of two days must be offered and be capable of commencement within the first nine months and be completed within the first 12 months following election or appointment.

Working environment representatives and supervisors within the working environment organisation must be offered supplementary training of a minimum of 1½ days for every year in office, i.e. for as long as they are in office within the working environment organisation. Training courses totalling 1½ days must be offered and be capable of commencement within the same year in office.

Supplementary working environment training must ensure relevant updating and underpin the expertise of working environment representatives and supervisors within the working environment organisation.

In enterprises with working environment organisations, a skills development plan must be compiled for the supplementary training courses to be offered to working environment representatives and supervisors within the working environment organisation. This skills development plan must take into account the needs of the enterprise's working environment.

BAR Bygge & Anlæg will work in cooperation with various course providers to constantly develop and offer courses relevant to the industry in connection with supplementary working environment training.

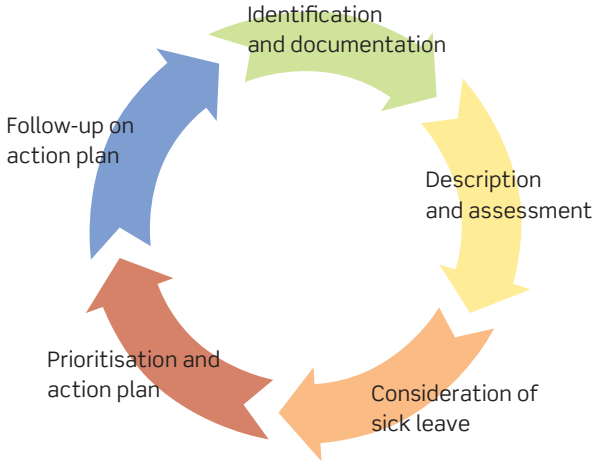
A summary of courses and providers can be found at www.bar-ba.dk.

WORKPLACE ASSESSMENT

All enterprises with employees must create a written workplace assessment (APV). The APV ensures that working environment work is systematic, thereby helping to prevent accidents and injuries.

The enterprise must ensure that the APV includes the following five elements or phases in its APV work:

- Identification and documentation of the enterprise's overall working environment.
- Description and assessment of the enterprise's working environment problems.
- Consideration of the enterprise's sick leave.
- Prioritisation of solutions to the enterprise's working environment problems and preparation of an action plan.



- Guidelines for action plan follow-up.

Enterprises themselves can select the method they want to use to create an APV, but the contents are specified in the Working Environment Act. As a minimum, an APV must assess:

- Physical effects (e.g. noise, cold and draughts).
- Chemical effects (e.g. sealants).
- Biological effects (e.g. risk of infection).
- Ergonomic effects (e.g. working positions and heavy lifting).
- Psychological effects (e.g. time pressure).
- The risk of accidents (e.g. working at heights).

Building and construction enterprises often carry out work outside the home enterprise. Therefore, when you are to work with the APV, it is important to assess whether there are particular working environment problems at changing or temporary workplaces that need to be included in the assessment. In such instances, the APV may be based on the general work functions. If there are special conditions at one or more of the workplaces which are of significance to how work is carried out, this must be specified in the APV.

The APV may be based on the enterprise's typical tasks. There may be special conditions in place at individual building sites. These special conditions may, for example, be specified in the tender documentation or the developer's plan. The enterprise must alter the APV if there are special conditions on the building site. It is important for you to agree guidelines on how the APV will be adjusted to suit the special conditions.

The part of the enterprise's APV which deals with work on the specific building site must be available to employees on the building site.

If anyone within the enterprise works with hazardous substances and materials, you must create a special chemical APV.

If there are minors under 18 employed within the enterprise, the risks which young people may face must be described separately within the enterprise's APV.

The APV must be in writing and accessible at the enterprise to employees, business managers and the Working Environment Authority.

When the working environment changes, you must revise the APV; if you introduce new work processes, buy new machinery, or if there is an accident, for example. The APV must be revised at least every three years. The management team and employees must work together on the entire APV process.

The employer holds overall responsibility for involving the working environment organisation and employees in planning, implementation and follow-up of the APV.

Find out more about APVs within building and construction enterprises at www.bar-ba.dk or from authorised working environment advisors and the Working Environment Authority.

MINORS UNDER 18

There is a long list of special regulations and provisions which apply if minors under 18 are employed within an enterprise. The regulations cover age limits, working hours, types of task and technical aids, etc.

Some of the most important regulations in respect of the working environment for minors are described here. These are also described in connection with the individual items of machinery and tools in this manual.

Minors under 18 are generally not permitted to work with:

- Hazardous substances and materials (hazard labelled) or in spaces in which these products are in use and the minor may be affected.
- Lifting of loads in excess of 12 kg.
- Pulling and pushing which may damage the health of the minor.
- Monotonous work that places a strain on the body over longer periods.
- Hazardous machinery and technical aids, e.g. cutting tools, chainsaws, transporters, cranes and other lifting gear, welding equipment, vibrating hand tools, excavation and loading machinery.
- Work which involves a risk of falling or collapse.

APV
If there are minors under 18 employed within the enterprise, the risks which young people may face within the enterprise must be described separately within the enterprise's workplace assessment (APV). However, the APV requirement does not include family enterprises or work in the employer's private household.

Training and instruction
The employer must ensure that minors receive thorough training and instruction so that they can carry out their work in a fully responsible manner. While working, minors must be under the effective supervision of a person aged over 18 and who has the necessary insight into the work.

Contact with parents
Employers employing minors under the age of 15 or who are of school age must notify the minor's parents or guardians of their employment; that is to say, information on working hours, any risk of accidents and illness, etc.

Minors and students on vocational training
Many of the general prohibitions cited which are applicable to minors are not applicable to minors over the age of 15 if this work forms a necessary part of vocational training aimed at giving them skills. Typically, this covers the traditional apprentice courses, as well as students doing practical training as part of a basic vocational course (EGU students). Or if minors have completed their vocational training before they reach the age of 18.

Irrespective of whether or not minors under 18 are undergoing training, there are still prohibitions preventing their employment for:

- Work processes which involve a risk of explosion.
- Work which involves handling pressurised cylinders.
- Work under high air pressure, e.g. in pressure chambers or diving work.
- Work which may involve a risk of suffocation in an oxygen-poor atmosphere.

- Work in which minors would be subject to physical loads which in the short or long term would be harmful to their health or development; similarly, unnecessary physical strain and inappropriate working positions or movements must be avoided. This means that:

  - minors must not do work where the tempo is determined by a machine.
  - Lifting of heavy weights must normally not exceed 12 kg.
  - The total load during manual pulling or pulling must not constitute a risk to health and safety.
  - Work which involves requirements for constant manual handling which involves force or causes physical strain must be restricted to short periods.

INDUSTRIAL INJURIES

Industrial injuries is the collective term for industrial accidents, short-term effects which are detrimental to health and work-related injuries and diseases.

Industrial accidents
An industrial accident is a sudden, unexpected event which causes injury and which happens in connection with work, injuring a person.

For example, an employee, supervisor or contractor could fall from a roof where he is working: this constitutes an industrial accident. If this person is at work when the accident happens, it does not matter what the work involves and where it happens.

If a traffic accident happens to an employee while this person is at work, this also constitutes an industrial accident.

Work-related disease or injury
A work-related disease or injury is an occupational disease or injury occurring after a fairly long time as a result of work or the conditions under which work is carried out.

This may, for example, include lung cancer where it has been ascertained that the cancer was caused by exposure to asbestos fibres.

In some instances, it may be difficult to define clearly what constitutes an accident and what constitutes a work-related disease or injury. Hearing damage following an explosion is an accident, for example, while hearing damage following long-term exposure to loud noise is a work-related injury.

A back injury following a fall is an accident, while a back injury following long-term work in an incorrect working position is a work-related injury.

Reporting accidents

Industrial accidents, including sudden lifting injuries, must be reported by the employer to the Working Environment Authority within nine days of the injury happening.

This obligation to report is applicable to all industrial accidents where there is at least one day of absence besides the day on which the injury happened.

When the day(s) of absence occur is not crucial. What is crucial is whether the absence is caused by the industrial accident.

Any person is entitled to report an accident at work. This includes the person who has been injured, or their organisation.

The Working Environment Authority must receive these reports so

that it has the opportunity to investigate the accident and prevent similar accidents in future.

The National Board of Industrial Injuries and the employer's insurance company must receive the reports so that the employee can receive compensation, where applicable.

Reports must be submitted electronically by using the EASY system operated by the Working Environment Authority and the National Board of Industrial Injuries. Find out more about the EASY system on the Working Environment Authority website: www.at.dk

The EASY system can also be used by individual enterprises to register near-accidents and accidents not leading to absence from work in connection with the enterprise's preventive working environment work. These reports can be viewed only by the enterprise itself and require access using a digital signature.

Reporting work-related injury and disease

Doctors and dentists must report to the Working Environment Authority and the National Board of Industrial Injuries if they find or suspect that a person is suffering from a work-related injury or disease or has sustained other harmful effects at work.

Other people may also report suspected work-related injuries or diseases.

Industrial injury insurance and industrial injury compensation

The employer is obliged to take out insurance as required by law which covers the consequences of industrial injuries among employees. This insurance covers certain charges for treatment, compensation for loss of ability to work, permanent injury and compensation to next of kin.

This insurance provides cover irrespective of who is responsible for the accident or injury.

It does not cover loss of earnings or pain and suffering. As a rule, these are covered by the employer's industrial liability insurance, which should be taken out even though it is not required by law.

Accident analysis/learning from accidents

The enterprise must systematically investigate accidents and occupational illnesses in order to prevent similar injuries in future.

The working environment organisation must ensure that the causes of accidents, poisoning incidents and damage to health and near-accidents, etc. are investigated so that arrangements can be put in place to prevent similar accidents or incidents happening. Once a year, the committee must prepare a collective summary of accidents, poisoning incidents and health damage within the enterprise.

The purpose of this investigation of accidents is not to identify liability or blame. Instead, this method must clarify what options there are for preventing similar injuries in future.

It is often necessary to correct the workplace assessment (APV) in the light of the new knowledge gained during this analysis.

Start preventive work as quickly as possible following an accident. This gives an important signal to indicate that prevention is high on your list of priorities.

Procedure
This method is divided into three stages:

1. Documentation of facts.
2. Investigation of the accident.
3. Ensuring that preventive solutions are devised.

Documentation of facts
Collect as much information as possible on what happened, and the circumstances under which the chain of events took place.

Also remember to look at underlying causes, such as time pressure or a lack of instructions.

Start documentation as quickly as possible while the incident is still fresh in people's minds and any witnesses are still on site.

Carry out a thorough collection of facts, opinions, experiences and observations relating to the accident in question. Take photos where applicable, or draw a sketch.

Speak to all relevant individuals, such as the building management team, who may be able to shed light on underlying causes of the accident.

Think broadly when documenting. Back strain following a sudden injury caused by lifting may, for example, be due to the body cooling down on account of rain. This indicates - among other things - that winter covers may need to be added to the safety arrangements.

Analysis of the accident
When all essential information on the accident has been described, you can start your analysis.

Do this step by step so that you can find out both what happened and why it happened.

Remember that in the case of most accidents, there may be several causes. It is important to identify all these as this gives you the best chances of devising preventive measures within the enterprise. Use only the information you have collected during the documentation stage.

You will often see the best results if the working environment organisation works together to carry out the analysis and sets aside the time necessary for the analysis.

Devising preventive solutions
Review the individual stages of the analysis in order to identify what could have prevented the accident.

Then assess all suggestions for changes to work procedures and other preventive measures, and decide which must be implemented immediately and which are to be implemented at a later date.

Finally, decide who is responsible for implementing the preventive measures, when they have to be completed, and how you can use the results of the investigation in your APV.

The method outlined is described on the Working Environment Authority website at www.at.dk. See also the BAR website at www.forebyg.nu.

ERGONOMICS

Planning work correctly can minimise the risk of back injury and other injuries to muscles and bones by avoiding - among other things - heavy lifting and inappropriate working positions.

Planning involves three conditions in particular:

- The workplace must be laid out to suit individual employees.
- Tools and machinery must be suitable for both the work and the person doing the work.
- Use ergonomic devices, tools and technical aids. This enhances safety and reduces injury. Find out more at www.bygergo.dk.

Back injury and other injuries to muscles, joints and bones are known collectively as injuries to the musculoskeletal system.

Risk of back injury and other injuries of the musculoskeletal system

Heavy lifting, poor working positions and work involving repetitive strain are the most frequent causes of back injury and other injuries of the musculoskeletal system, as demonstrated by statistics relating to reports to the Working Environment Authority.

Heavy lifting
Heavy lifting may cause injury and problems in muscles, tendons and joints, particularly in the back. Pushing or pulling can cause the same problems. In particular, sudden or heavy strain can also cause acute injury.

Poor working positions
Poor working positions and incorrect movements can lead to myoses, arthritis and other problems in the muscles, tendons and joints.

Myoses and infiltrations in the neck and shoulders often occur when work is done with the arms above shoulder height, with static work and where the neck is bent forward for long periods.

Floorlayers, mason paviors and other people who do a lot of work kneeling run a greater risk of arthritis than other people. Standing or sitting in the same working position strains the circulation, and there is a risk of fluid accumulating in the legs.

Monotonous, repetitive work
Identical movements which are repeated often over the course of the day increase the risk of injury.

Tenosynovitis and pain in the shoulders, elbows and wrists are typical consequences of working using repeated, rapid movements or where a lot of force is used.
This may consequently also result in chronic problems in the form of elevated blood pressure, for example.

Heavy work
Heavy work may cause acute injury and arthritis in the joints in the body. The hips and knees are particularly vulnerable in people working with heavy work for a number of years.

Overloading of the muscles, joints and bones first shows itself in the form of tiredness and soreness, and pain which diminishes after a break.

If the break is not long enough, the pain becomes more constant and people find it harder to do their work. This requires treatment from a doctor or physiotherapist.

In the long term, there is a risk of chronic damage and problems. It is often the case that actual changes cannot be seen on X-rays or scans until very late.

External factors such as cold, draughts and vibration often enhance the effects mentioned.

Pulling and pushing

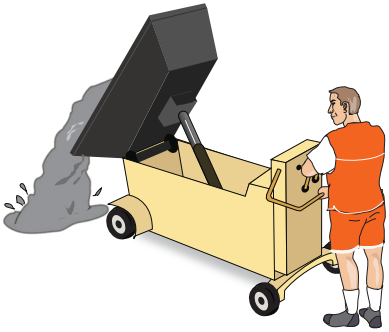
Using hand trucks, wheelbarrows and brick trolleys make it easier to move tools and materials around. However, pulling and pushing using the whole body may require a lot of physical effort; particularly on slopes, uneven ground, in enclosed spaces, where there is repeated starting and stopping, and similar.

Poor hub and wheel maintenance also help to increase resistance.

Your body may be subject to sudden strain when you pass over a kerb, in the event of a collision or if you undergo sudden harsh braking.

Poor visibility, slippery surfaces or skidding increase the risk of sudden major strain.

Use a crane or a self-propelled aid if the slope is too steep or if the ground is too uneven or slippery.



Wherever possible, push instead of pulling, and also try other ways of reducing the strain as much as possible. For example, try to select the most suitable trolley and make sure it has been maintained properly, moves freely and is clean.

The ground must be flat and even for moving around on, there must be no objects standing in the way, the lighting must be good, and there must be no holes. Also avoid changes of level or other obstacles.

There must be enough space to be able to turn around and manoeuvre.

Lifting and carrying

Lifting involves handling an object so that it is entirely or partly not resting on the ground. Carrying involves walking more than two metres with an object which you are lifting. Manual lifting involves one or more people lifting/carrying an object.

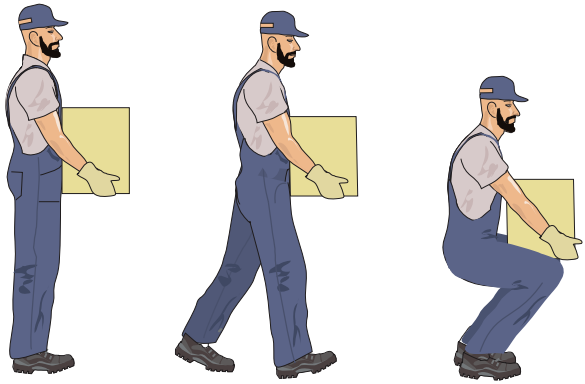
Lifting may place a strain on the body even if the object does not weigh a lot. Even light loads involve a risk of injury. Take particular care when lifting:

- Below knee height.
- Above shoulder height.
- From the side.
- With one hand.
- In enclosed spaces.
- On an uneven or slippery surface.

- On ladders and stairs.

Therefore, always try to use suitable technical aids when handling loads instead of lifting and carrying them.

If this is not possible, the load must be lifted and carried as close as



possible to the body. Make sure that you get a good grip of the load with both hands. Also choose a good working position for lifting, and make sure you have plenty of visibility and a secure surface to work on.

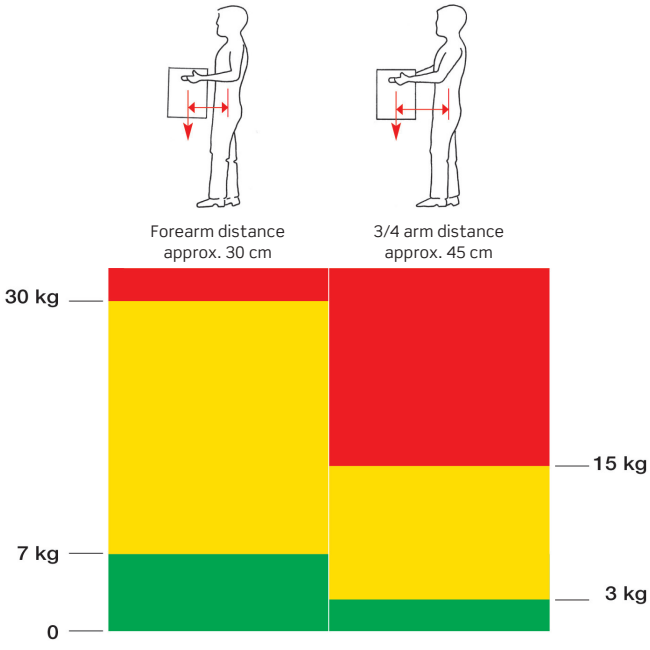
Assessment of lifting

Several things affect the extent to which the back is placed under strain when lifting and carrying.

Whether lifting is considered to be heavy and hence harmful to health is dependent in the first instance on an assessment of the

weight of the load and how far away it is from the body.

The red, yellow and green assessment model in the drawing (lifting diagram) shows weight limits for two different distances from the body. Lifting close to the body is rarely possible in practice unless slings are used, for example, and so this is not included in the assessment diagram.



Green area:
If lifting takes place in the green area in the assessment diagram, lifting will not in principle be regarded as harmful to health.

Red area:
Conversely, lifting in the red area in the assessment diagram will always be regarded as harmful to health and may present an acute risk of back injury. Therefore, arrangements must be put in place promptly to counter the risk.

Yellow area:
Lifting in the yellow area may also be harmful to health if other factors besides weight and distance make lifting more difficult.

Therefore, lifting in the yellow area must always be examined in greater detail.
In the first instance, it is necessary to examine whether the following aggravating factors are present:

- Bending the back forwards.
- Twisting or asymmetric strain on the back.
- Raised arms.

Unless at least one of the above aggravating factors is present on lifting, lifting will not normally be regarded as harmful to health.

If at least one of the above aggravating factors is present, the frequency and duration of lifting must also be included in the assessment.

This assessment is carried out in accordance with the table below:

Duration / Lifting frequency	Short duration 2.5 – 4 hours per week	Moderate duration 4 – 7.5 hours per week	Long duration more than 7.5 hours per week
Low lifting frequency (2 – 12 lifts per hour)			
Moderate lifting frequency (12 – 120 lifts per hour)			
High lifting frequency (More than 120 lifts per hour)			

If the frequency and duration are in this range, lifting in the yellow range of the lifting diagram will not normally be regarded as harmful to health.

If the frequency and duration are in this range, lifting in the top third of the yellow range of the lifting diagram will be problematic, and the Working Environment Authority may issue enforcement notices following a specific assessment.

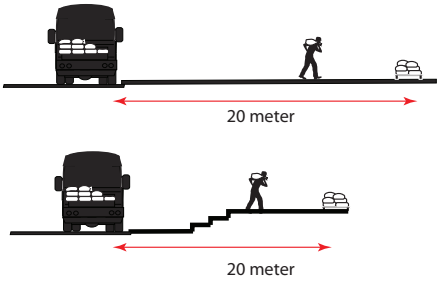
If the frequency and duration are in this range, lifting in the top half of the yellow range of the lifting diagram will be problematic, and the Working Environment Authority may issue enforcement notices following a specific assessment.

If the frequency and duration are in this range, lifting in the top two-thirds of the yellow range of the lifting diagram will be problematic, and the Working Environment Authority may issue enforcement notices following a specific assessment.

If the frequency and duration are in this range, lifting in the yellow range of the lifting diagram will be problematic, and the Working Environment Authority may issue enforcement notices following a specific assessment.

Carrying

Your muscles remain tense the whole time when you lift or carry an object for a long period, and so your muscles become tired relatively quickly. If you walk at the same time, your back will be twisted and under an uneven strain.



The size and shape of the load must not block your view or impair your posture when you carry something so that you risk bumping into something. If you trip, slip or bump into something while you are carrying something, your body is subject to major strain.

Repeated minor injuries increase the risk of longer-term problems. Avoid carrying anything other than small tools up ladders and stairs as this increases the risk of acute injury and accidents involving falls.

If it is not possible to use suitable technical aids to transport loads horizontally or vertically, you must take the following into account when carrying objects:

- The weight of the load must not exceed approx. 20 kg, and the transport route must not be more than approx. 20 m long. At the same time, the load must be held symmetrically and close to the body.

- One stairway step is equivalent to 1 metre. If the centre of gravity of the load is at forearm distance or 3/4 arm distance, the maximum weight of the load is reduced to 12 and 6 kg respectively.

Prevention of injury resulting from lifting and carrying

Planning, work site layout and the use of technical aids and correct working techniques can help to prevent overloading.

- Technical aids must be used for transporting and installation of heavy and unwieldy loads such as doors, windows, radiators, washbasins, beams, rafters, roof panels, plasterboard, formwork, kerbstones, precast concrete panels and panel supports, etc.

- Some handling can be reduced by supplying correctly packaged materials at the right time and to the right place.

- A truck-mounted crane should be used when loading and unloading heavy plant and materials.

- Delivery and storage must take place as close as possible to the point of use and in such a manner that objects can be transported/ installed unimpeded using the selected technical aids.

- Plasterboard, precast concrete panels and other structural components must always be supplied together with a user guide in Danish which includes a description of the weight of

the component together with information on how it should be handled and fitted/installed properly from the point of view of health and safety.

- Cranes, trucks, telescopic loaders, plaster trolleys, sack trucks, etc. are to be used as often as possible instead of carrying. Plasterboard, etc. can be supplied to the work site, packed in the order in which it is to be used and cut to size, which may save a certain amount of handling.

- There is equipment for lifting objects onto floors, trolleys and workbenches, with vacuum lifting fitted for installation, etc.

- Lifting below knee height and above shoulder height can be avoided by initially having the objects placed on a trestle or workbench/trolley at a suitable height.

Lifting and carrying techniques

Do not lift objects if you are in any doubt as to whether you can manage the load. Using the correct lifting and carrying techniques reduces the risk of injury.

- Get up close to the load. Stand facing the load in a walking/stride-standing position.

- Assess the weight of the load and the position of its centre of gravity.

- Make sure you get a good grip on the load.

- Bend your knees and hips and keep your back balanced by tensing your abdominal and back muscles.

- Lift the load by slowly straightening your knees and hips.
- Hold the load close to your body, with your elbows slightly bent.
- Lift and carry the load symmetrically, i.e. centrally to your body or carrying equal weight in both hands.
- Avoid twisting your back when you are holding a load. Hold your back straight and turn your feet.
- When setting down the load, use the same movements but in the opposite order.

The following rules also apply:

- The surface must be even and firm, and your footwear must be flexible and not loose.
- The transport route must be tidy, well lit and as flat as possible. It must not be slippery.
- The load or parts of it must not be able to fall down and strike the carrier or others.

WORKING POSITIONS

When your back or neck is twisted or bent, these are stressful working positions.

Working while lying down, crouching or kneeling and working above shoulder height are regarded as stressful work.

Stressful working positions are often caused by:

- Poor project planning or inadequate planning.
- Poorly designed work sites.
- Work areas which are too high or too low (e.g. when working on floors, walls and panels, installing electrics and HVAC units, ventilation ducts, etc.).
- Poorly designed tools.
- Incorrect equipment (for the task and the person).

Poor site conditions are often the cause of lopsided and stressful working positions which may cause back injury and tired muscles and joints.

Avoid or reduce working in a set position over long periods. This may be due to the layout of your work site or the design of your tools, for example. When working in a set position, the same muscles are under a static load for a long time, which results in muscle fatigue and hence a greater risk of injury.

The longer and more frequently you work in stressful working positions, the greater the risk of injury and pain. Quick, forceful movements increase the strain.

Work carried out horizontally or in a kneeling position

The position of the work site and conditions on site are very significant as regards strain on the back, neck, arms and knees For example, when there is too little headroom, work has to be carried out horizontally or in a kneeling position. Typical examples include working with insulation in roof spaces, when carrying out sealing and insulation work at low roof pitches, brickwork construction below overhangs, or when renovating pipes and cabling in existing crawl spaces.

Horizontal and kneeling working positions should be avoided by predicting them during planning; e.g. it is possible to select a type of roof tile which does not need to be pointed or sealed, and it is possible to establish service corridors with a minimum clearance of 190 cm and a width of 60 cm.

In existing crawl spaces, horizontal and kneeling working positions can be avoided or kept to a minimum by means of method substitution - i.e. by leading pipes and cables round them.

Always try to bring together and finish as much as possible while working under good conditions above ground level so that only the last connections have to be made in the crawl space. Shorter working days, supplemented with breaks and different work, help to reduce the risk of injury and harm. This will alleviate some of the strain on your body. Use a soft underlay or, alternatively, some insulating clothing.

Kneeling work should be limited, e.g. by using a stool instead. The employer must provide knee protectors or kneepads if longer-term kneeling work is unavoidable. Take care to ensure that the knee protectors do not stop the circulation in your legs.

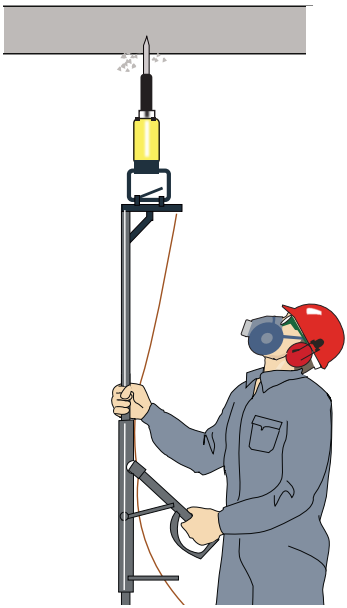
Prevent poor working positions by laying out the work site according to the task, and use ergonomic tools. Also make sure that you regularly switch between different working positions and movements. This will distribute your work over different muscles, so reducing the strain on

your circulation. Avoid working below mid-thigh height by laying out the work site according to the task or by using height-adjustable equipment. If this is not possible, you must make sure that you switch between different tasks and take regular breaks.

Floorlaying, fitting ventilation ducts, various forms of electrical work and painting are all typical tasks where this may be necessary.

Work site layout

Make sure you can stand and walk upright, that there is space for appropriate working positions and movements, and that you have the option of using good working techniques when you organise the work site.



Working height is dependent upon the nature of the work and the height of the individual doing it. Workbenches, benches, trestles, etc. should be adjustable. If the work site is to be organised to suit several people or for a range of tasks, it should be possible to adjust the working height easily without using tools.

When selecting a working height, elbow height is taken

as a starting point for both work carried out standing and work carried out sitting.

Use adjustable work platforms, work lifts, column scaffolding or similar when working at an inappropriate working height. This helps to reduce the strain on the arms and back.

Distance

Workpieces and tools must be positioned in such a manner as to allow work movements to take place close to your body. Scaffolding, work platforms, etc. should be set up as close as possible to brickwork, façades, etc.

In the case of design work, it must be possible to tilt the desktop in order to reduce strain on the muscles in the neck, and it must be possible to walk around a little to get the circulation going in the legs. If design or office work is needed for any length of time at the building site, this must take place on premises where the fittings are compliant with the rules on fixed work sites.

Ambulatory work

The surface must be even, firm, tidy and well lit if ambulatory work is to be carried out. Also avoid level differences, particularly when tools and materials are transported. Tools and means of transport must be long or tall enough to allow personnel to work standing upright. Footwear should not be loose, it should provide good support and have the necessary protective properties. It is also a good idea to have shock absorbing features in the heels as this reduces strain on the legs when walking on a hard surface.

Make sure that there is as little lifting and carrying as possible when transporting materials and tools. This can be achieved by using suitable technical aids.

Monotonous, repetitive work

When the same simple work operations or movements are repeated over and over and the same muscles are constantly under strain, this is what is known as monotonous, repetitive work. This work often takes place at a fast pace and requires concentration and attention, while at the same time involving strained working positions with monotonous use of specific muscle groups. Therefore, your muscles - particularly in your neck, shoulders and arms - are almost constantly tense. This is very tiring and stressful for your body.

Working in a poor and perhaps fixed position with a lot of use of force increases the risk of industrial injury. This risk is worsened when the work site and tools are poorly adapted to suit the work.

Greater specialisation means a risk of tasks becoming even more monotonous and stressful, e.g. painting , rebar work, chase cutting, screwing in of façade panels, roof panels or plasterboard, where the same tools are used every day. Monotonous, repetitive work can also occur during excavation and shovelling work or during bricklaying.
Make sure that you plan and vary your work in order to prevent muscle problems. It should be possible to set your own work pace and be able to switch between different types of task.

Ergonomic design and adaptation of the work site and tools to suit individuals can reduce the strain caused by monotonous, repetitive work if the work pace is not increased at the same time. Short, frequent breaks with options for other activities can also help to prevent injury.
Avoid monotonous, repetitive work by making fundamental changes to the planning and organisation of your work.

Monotonous work that places a strain on your body

Work which takes place in fixed working positions or in which an arm or leg is under particular strain, is defined as monotonous work that places a strain on the body. Static holding and carrying work, work requiring attention and unchanging sensory stimulation is also monotonous work that places a strain on the body.

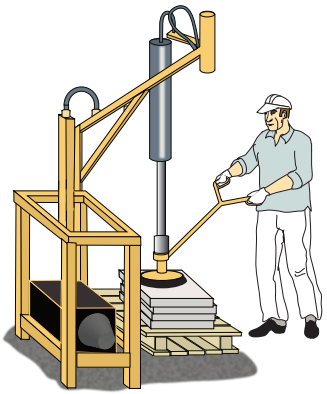
This is often caused by inappropriate design of the work site and poor design of tools, as well as a lack of variation in work. This places a strain on the musculoskeletal system and circulation in particular, but there may also be mental effects.

Make sure that you vary your tasks allowing you to move around when you are working standing or sitting still for any length of time. Avoid taking on too many tasks where you have to hold tools and workpieces in the same position for any length of time. Breaks can also help to reduce strain.

TECHNICAL AIDS

Always use technical aids if there is a risk of physical strain which is harmful to health. Technical aids include machinery, tools, plant and statio- nary or mobile transport equipment and lifting gear.

Find out more about choosing technical aids at www.bygergo.dk. Here are some examples of suitable technical aids



for different purposes and different fields.

Handheld machines

The strain on the user must not be too great when using handheld machines. This can be rectified by suspending the machine. In general, the weight and centre of gravity must be adapted according to the usage method and the time over which the machine is being used.

The correct placement and design of handles also helps to reduce strain on the user.

The grip surface must be large enough to achieve even distribution of pressure. Your hands work best when bent back slightly. It is an advantage if handles on handheld machines damp vibration and are heat-insulated.

Driver's seat

A good seat provides full support for the lumbar region and back without fixing the seating position. The following are also recommended for the driver's seat in cranes, fork lift truck and other contract machinery:

- The seat must support approx. 2/3 of the length of the thighs and have a rounded front edge. It must be padded and covered with a comfortable material which permits ventilation. It must be easy to set the height and tilt of the seat without tools. It should also be possible to move the seat backwards and forwards.
- It must be possible to adjust the springs, shock absorbence and vibration damping in the seat according to the weight of the driver.
- The backrest must provide the necessary support for the lumbar region and back, must not impede arm movements and must provide the necessary lateral support. Set the backrest so that the angle of the hips is 95-120° at a slight backward tilt.
- It should be possible to set the tilt of the seat and backrest independently of one another.
- It should be possible to adapt the tilt to the job being done (e.g. in cranes, given the direction of vision, it may be necessary to allow the seat and backrest to tilt both backwards and forwards, depending on whether work is taking place on the ground or high up).

NOISE

Noise may lead to permanently impaired hearing, which is an incurable injury to the inner ear. The risk of permanent hearing damage or hearing impairment is dependent on the strength and duration of the noise.

Hearing damage develops quickly over the first couple of years of exposure to noise. Therefore, it is important from the outset to protect your hearing by acknowledging the risk and attempting to reduce the noise. Many people do not find out that their hearing has been damaged until they become older.

Both tinnitus (ringing/buzzing in the ears) and hyperacusis (abnormal hypersensitivity to noise) often occur due to noise.

Noise can damage other things besides your hearing. Noise is also a stress factor and can cause elevated blood pressure and pulse, among other things. In the long term, it can contribute towards overloading and damage of the organism.

The limit for noise at work sites is 85 dB(A), measured as an average over an eight-hour working day. Unnecessary noise must be avoided, even if the limit is not exceeded. The noise must be as low as is technically reasonable, and acoustic conditions must be satisfactory.

If there are powerful impulses in the noise, e.g. from impact tools, measurement of the noise must be increased by 5 dB(A) so that a genuine comparison can be made with the limit. Powerful impulses are impulses peaking at more than 115 dB(C) and occurring at least once a minute.

If the peak value exceeds 130-140 dB(C), your hearing may be damaged even if these noises are short and fairly few in number. Nobody may be exposed to peak values in excess of 137 dB(C).

The employer must ensure that noise is attenuated using technical arrangements. If this is not possible, he must limit the amount of time to which individuals are exposed to noise or organise work in some other way, e.g. by carrying out noisy work separately from other work. A combination of attenuation and administrative arrangements may also provide a solution.

If the noise load exceeds 80 dB(A), or if the noise is harmful or extremely unpleasant, the employer must provide ear defenders.

In instances where the noise load is at 85 dB(A) or above, or the peak values are at 137 dB(C) or above, the employer must ensure that suitable ear defenders are work from the moment work begins.

BAR Bygge & Anlæg recommends under all circumstances that ear defenders be worn between 80 and 85 dB(A) to be sure of not damaging hearing.

Ear defenders are only an emergency solution; for more information, see the section on ear defenders.

Examples of technical arrangements:

- Attenuate the noise at source, e.g. by turning off or stopping equipment which is not being used, and by avoiding striking metal against metal.
- Attenuate noise from noisy machinery, e.g. by having sound-absorbing materials in the driver's cab in contract machinery, enclosing compressors, using sound locks, etc.
- Ensure that less noisy methods are used where possible, e.g. by blasting instead of using a pneumatic drill.
- Limit noisy work e.g. by creating recesses for holes in concrete

flooring instead of cutting them in afterwards, or by having steel bars supplied to set dimensions, thereby reducing noisy cutting.

- Choose quality tools and machinery which generate as little noise as possible.

Examples of other arrangements:

- Limit the amount of time spent in noisy areas. This can be done by having a number of people to carry out/share the work.
- As far as possible, always buy low-noise machinery.
- Plan work so that individual workers do not expose one another to noise unnecessarily.
- Developers and advisors can help to reduce noise considerably in the time schedule for the Health and Safety Plan.

Be aware that the supplier has to provide information on the machine's noise level if it generates noise in excess of 70 dB(A) at the operation site. Where relevant, the usage instructions must also provide information on setup and installation with a view to reducing noise. Relevant noise-attenuating arrangements (e.g. enclosure) and use of ear defenders must also be described.

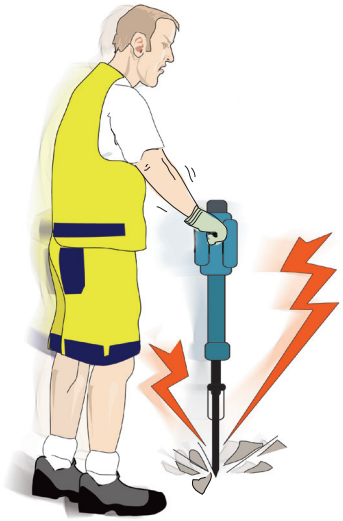
VIBRATION

Hand and arm vibration

Tingling or numb fingers are the first sign of harm caused by vibration. After a longer period, there is a risk of suffering from "white fingers", which manifests itself by making your fingers white, cold

and numb in cold weather. Only one or two fingers are affected initially, but if you continue to be exposed to vibration, more of your fingers will turn "white" – and possibly on both hands.
Stop work if you have an attack of "white fingers". There is a greater risk of industrial accidents if your fingers are numb. At the same time, it may be difficult to do work involving fine movements.

Other subsequent effects may include permanent loss of sensation and grip, constant tingling in the fingers, pain in the shoulders and joints and an increased risk of arthritis.



The risk of vibration injury is dependent upon how much vibration you are exposed to over an eight-hour working day. As a rule of thumb, injury can be avoided if your daily exposure to vibration does not exceed 2.5 m/s².

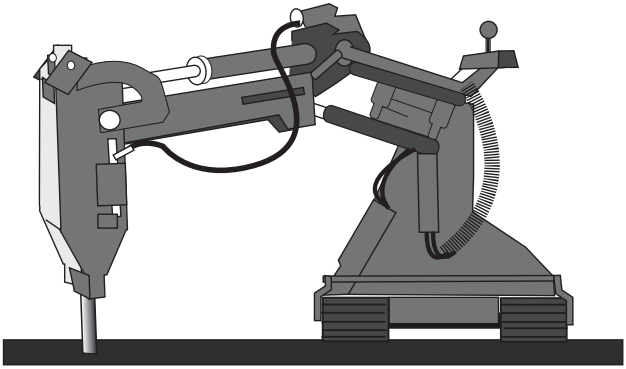
A vibration load of 2.5 m/s² is equivalent to you being exposed to a constant vibration level of:

- 2.5 m/² over 8 hours
- 3.5 m/s² over 4 hours
- 5 m/s² over 2 hours
- 7 m/s² over 1 hour
- 10 m/s² over 0.5 hour

The daily vibration load must not exceed 5 m/s². This limit is absolute and must not be exceeded. The action value indicates when the employer must act to reduce load. The action value is set to 2.5 m/s². Work may continue with a vibration load of between

2.5 and 5 m/s². However, the reason for the high load must be investigated, and attempts must be made to reduce it as much as possible. This can be achieved by means of planning and by using technical arrangements.

Work must be planned and executed so that nobody is exposed to harmful vibration. Technical arrangements must be used, or the exposure time must be limited.



The following arrangements may reduce the load:

- Use methods generating less vibration, e.g. blasting, diamond cutting and water jet cutting.
- Plan the work to generate as little vibration as possible.
- Where possible, replace handheld tools, e.g. by using remotely controlled tools/machinery.
- Apply a set maintenance procedure for tools.

- Bear in mind the vibration level when purchasing new machinery or tools.

The supplier must provide information on hand/arm vibration in usage instructions, sales documentation, etc. when 2.5 m/s² is exceeded.

Trial several different machines, or where appropriate use a working environment advisor when you want to assess a supplier's information on the vibration of a machine when you buy new machinery.

Gloves only damp high-frequency vibration. Therefore, they will take the sting from the impact of e.g. a pneumatic drill, but the risk of white fingers will remain the same. The same is true for most heavy tools in the field of building and construction.

Full-body vibration

Full-body vibration is vibration transmitted to the entire body, risking the health and safety of employees by causing pain in the lumbar region and injury to the spine

Full-body vibration is transmitted to the drivers of mobile machinery through the seat and floor.

The greater the intensity of the vibration and the longer it goes on for, the greater the risk of your body being affected. Rest periods may reduce the effect.

The daily vibration load describes how much vibration a person is exposed to over an eight-hour working day. The daily load is a combination of vibration intensity and the amount of time for which you are exposed to it.

Vibration acceleration is measured in m/s² in three perpendicular directions.

Avoid unnecessary vibration loads and ensure that the load is as small as possible. There is a full-body vibration limit of 1.15 m/s² which must not be exceeded, as well as an action value A(8) of 0.5 m/s².

The risk of injury increases in fixed working positions and with frequent twisting of your back. The same is true when your muscles are tired, or when your back is compressed following hard physical work. Jolts and unexpected movements caused by factors such as uneven surfaces or minor collisions also increase the risk of injury.

Purchasing machinery

It is important to ensure that the ergonomics in the driver's cab are in order, that what the operator must see is clearly visible, and that all controls and actuators are positioned in such a way as to allow the operator to do his job without having to twist and turn in his seat.

It is also important to understand that an inefficient machine with insufficient capacity for the job will result in longer exposure times. (In general, heavier machinery also vibrates less.)

- Choose machinery with a low vibration level, but only compare figures from different suppliers if the same measurement method has been used.
- If possible, buy vehicles with suspension.
- Where necessary, involve a working environment advisor in your assessment.

Suppliers of machinery are obliged to:

- Supply machinery with low vibration intensity.

- Supply vehicles with seats which limit vibration transmitted to the driver as much as is reasonably possible.

- Provide information on the vibration intensity. If it exceeds 0.5 m/s², the intensity must be stated.

Vibration intensity must be specified in the usage instructions, sales documentation and the technical documentation in general.

Reducing the risk of injury

- Drive at a speed which is not too high for the surface on which you are driving.

- Choose and mark out routes which do not have drain covers, holes, cobblestones, road plates, etc.

- If possible, even out the sections which are used often.

- Avoid using solid wheels where possible.

- Use a seat which is suitable for the vehicle, also taking into account the vibration frequency of the machine. The seat must offer good back support in relation to the movements involved in the work. It must be maintained, easy to adjust and adjusted to suit the driver. The driver must have received thorough instruction on how to adjust the seat.

- The seat should have settings for forward/backward movement, backrest tilt, the weight of the driver and any variable lumbar support. In particular, good lumbar support and adjustment related to the weight of the driver are particularly important with regard to vibration.

- Set the steering or controls to suit the driver, where possible.

- The tyres on the vehicle must be correct and at the right pressure. Make sure that the vehicle's suspension, shock absorbers, etc. are well maintained.

HEAT AND COLD

Cold, rain, wind and draughts cool your body and increase the stress on the circulation and metabolism. The muscles and ligaments stiffen, and the risk of local overload of the musculoskeletal system is greater. When the hands are chilled, the sense of touch and ability to work are impaired. This increases the risk of accidents. People with a tendency to white fingers are at an increased risk of an attack if they are cold.

Kuldeindeks – Afkølingsindeks – Windchill factor

TiC / m/s	15	10	5	0	-5	-10	-15	-20	-25
0	15	10	5	0	-5	-10	-15	-20	-25
2	15	9	5	-1	-6	-11	-16	-21	-26
4	12	5	0	-6	-12	-18	-24	-30	-36
6	10	3	-3	-10	-16	-23	-29	-36	-42
8	8	1	-6	-13	-19	-26	-33	-40	-47
10	7	0	-7	-15	-22	-29	-36	-43	-50
12	6	-1	-9	-16	-23	-31	-38	-46	-53
14	6	-2	-10	-17	-25	-32	-40	-47	-55
16	5	-3	-10	-18	-26	-33	-41	-49	-57
18			-11	-19	-26	-34	-42	-50	-58
20					-27	-35	-43	-50	-59

Kilde: www.dmi.dk

Example: If the temperature is 10˚C and the wind speed is 14 m/s, the temperature will feel like -2˚C.

When working in building shells, on scaffolding and in open structures, it is necessary in winter (1 October to 31 March) to decide on the extent to which covers should be established in order to protect against the cold. This is a requirement if employees are exposed to problematic weather for longer periods. When working in building shells, the limit is approx. three days, and on scaffolding and similar approx. six days.

On building sites where a number of enterprises are working at the same time, the developer has to decide on who is to deal with the cover and how far this should extend. If more than ten people are working at the same time, this must also be stated in the Health and Safety Plan.

In the case of outdoor work operations taking place over a longer time, a screen must be set up to protect against the elements. Work huts, tents, canopies or similar can be set up.

If design, office or other work takes place for any length of time at the building site, this must take place on premises where the fittings are compliant with the rules on fixed work sites. The room temperature must be at least 18°C.

Limited working hours and protective workwear may protect against the cold. Workwear must fit well, offer appropriate insulation, allow moisture to pass through and have a windproof outer layer. The clothing must be able to allow excess heat to escape if the work is physically demanding.
When working in alternating hot and cold conditions, you should be able to alter and adjust your workwear easily.

Use a suitable surface if work is done lying down, sitting or kneeling while directly touching cold or damp surfaces.

Strong heat and direct heat radiation from the sun may be stressful in combination with high ambient humidity. Besides being subject to fluid loss, stress on the circulation and a rising body temperature, some people also react by becoming irritable and bad-tempered. However, heatstroke is rare in Denmark.

A combination of physically heavy work, strong sunlight and hot machinery (e.g. when laying asphalt) can create a fairly high heat load. Therefore, it is necessary to interrupt very hot and stressful work frequently with breaks in colder surroundings.

Do not wear too many clothes if you are going to work in damp, hot surroundings. When doing heavy work, it should be possible to take sufficient numbers of breaks and working hours must be restricted where necessary. Drink plenty of water.

Working in protective clothing can cause a particularly large amount of heat stress as excess body heat and sweat are unable to escape. During hard physical work, fluid loss and rising body temperature can quickly become dangerous. Make sure you take plenty of breaks in cold surroundings and limit your working hours where appropriate.

LASERS

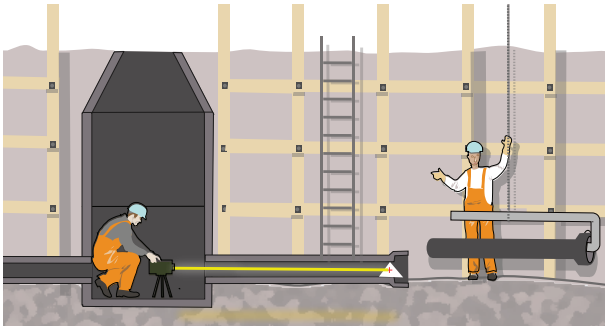
Laser radiation - both direct and reflected - may cause injuries to the eyes and skin. Lasers are divided into classes according to how dangerous they are, with associated safety arrangements. These are class 1 and class 2, where the ordinary blinking reflex of workers will normally prevent injury, and class 3 and above where special arrangements have to be implemented.

Classification of lasers and the associated safety arrangements must be compliant with European standard EN 60 825-1.

On delivery, lasers must have usage instructions in Danish and be fitted with warning signs.

Lasers may only be used by people who have the necessary knowledge and have received instruction on how to use them. To avoid hazardous radiation, everyone in the area in which the laser is used must be aware of the safety arrangements.

When work is being carried out using a laser, a warning sign must be placed somewhere appropriate and visible.



Other safety rules:

- Never look into the laser beam.
- Always use a beam stop.
- Avoid hazardous reflections from shiny surfaces and tools.
- Avoid using meters with sights.

- Position instruments so that the laser beam cannot be intercepted.
- The laser must be locked when it is not in use.
- Do not use a laser of a higher class than necessary.

CHEMICAL EFFECTS

There are chemicals and materials everywhere. We can encounter them as substances with a planned chemical effect, such as paint, foam sealant and flooring. Chemical effects may also derive from building materials where there is an accidental chemical effect, such as dust from insulation materials, wood and concrete, and fumes from welding and soldering. And in many instances we may encounter the remains of the sins of our forefathers during demolition and renovation work, such as asbestos, PCBs, lead and contaminated soil.

In other words, it is not enough just to be aware of the substances and materials you are using yourself: *hazardous substances and materials can also be found in existing buildings.*

The most important thing is to avoid contact with hazardous substances. This is not always possible. This is why it is important to implement a number of measures in terms of both planning and personal protection.

Prevention

It is possible to see, smell or taste many chemical effects. Among other things, you can see dust in the air and often see, smell or taste smoke, steam and gas. Other chemical effects are difficult or impossible to notice. Here, you have to check the substances and materi-

als by reading the label and the usage instructions.

Take particular care with contamination where chemical substances cannot be smelt or seen. There may still be chemical substances in the area. For example, carbon monoxide is deadly and gives no warning, and the fine, airborne dust from substances such as asbestos or quartz cannot always be seen or perceived.

Prevent possible health risks due to chemical substances by following this checklist:

- Remove the substance or material from the work site.
- Replace the substance or material with a less hazardous substance or material.
- Isolate the substance or material by enclosing the work process, for example.
- Establish process ventilation, e.g. in the form of local extraction.
- Use personal protective equipment.
- Ensure that you receive thorough instruction. Read the work site usage instructions.

Assessment of hazardous substances

Hazardous substances and materials must always be replaced with non-hazardous, less hazardous or less harmful or problematic substances and materials. The project planner also bears responsibility for this.

The Working Environment Authority may demand documentation indicating that it is not possible to replace a hazardous substance or

material for technical or financial reasons.

It is not enough for the employer to be able to document that the effects from the hazardous substances and materials are insignificant. If the use of a replacement substance or material at the same time involves significant differences in technical qualities or expenses, the employer must scrutinise overall the technical or financial consequences in relation to the health and safety considerations.

Usage instructions

Usage instructions from suppliers
The supplier is obliged to supply hazardous substances and materials with usage instructions in Danish which are easy to understand (safety data sheets). This obligation is also applicable to builders merchants.

Work site user guides
Work site user guides must be compiled which are specifically compiled for the specific use of the materials at the work site. This must be done on the basis of the supplier's usage instructions.

Work site usage instructions must be compiled in cooperation with the working environment organisation, and it is the responsibility of the employer to ensure that they are compiled.
Find out more about the contents of usage instructions at www.styrpaasubstancesne.dk.

All employees working with these substances have to be supplied with the latest usage instructions. The work site usage instructions must be on site where the work is being carried out.

Chemical workplace assessment - a special assessment

The use of hazardous chemical substances and materials must be assessed in a special supplement to the workplace assessment or APV, often referred to as the chemical APV.

If there is a risk of being subjected to effects from several different substances or materials, an overall assessment of the risk must take place.

The following must be included in the assessment:

1. Which materials are hazardous, and in what regard?

2. How are you exposed to them, and to what extent?

3. How do you use the materials, e.g. mixing and application methods?

4. How can we prevent ourselves/others being exposed to the substances/materials, e.g. by means of cordons, airing, ventilation and use of protective equipment, and will this prevention work as intended?

You can ideally use the enterprise's work site usage instructions as a basis as these include information on health hazards, protective equipment and rules for use.

If the assessment shows no problems, you can refer in the general APV to the work site usage instructions for the hazardous substance or material.

If you find conditions in the assessment which require action, you must describe this in the action plan for the general APV, e.g. stating that there is no personal protective equipment or that the ventilation is not good enough.

Remember to compile the work site usage instructions and create a list of all the products which you use within the enterprise or on the building site.

The BAR website at www.styrpaasubstancesne.dk includes further information on and examples of how to create a chemical APV.

Limits and measurements

The Working Environment Act includes limits for a number of substances, materials and work processes. Limits cannot be used in isolation, but are included in an overall assessment of health conditions.

People are often exposed to several substances at once, e.g. several types of vapour from solvents or welding smoke containing different substances, all of which are harmful. Here, it is not enough to observe the limits for each individual substance, as the overall effect (combined effect) may be more powerful. For example, hard physical work combined with air contamination such as dust, smoke, vapour or oil mist cause a powerful effect. We breathe more deeply when we work hard, and so we inhale more of the contaminated air. The concentration of all air contaminants must therefore be kept as far below the limit as possible. If you are in any doubt, use an authorised working environment advisor.

It is not enough to observe the limit if it is possible to use technical arrangements to further restrict the contamination. You must normally establish technical arrangements which correspond to good practice in the industry, or which correspond to processes in other industries. This is why it is rarely necessary to measure air concentrations of substances as the preventive arrangements are in place under all circumstances.

Use of measurements

Measurements are superfluous if you know that there is air contamination and where it is coming from. This can be found out by means of a thorough assessment of the following:

- Type and quantity of substances and materials used.
- Processes and work operations, including frequency and duration.
- Technical arrangements.
- Cleaning.
- Tidiness and order at the work site.

Experience from other similar enterprises and processes may assist with the assessment, even though measurements from one enterprise cannot be transferred directly to another enterprise.

If it is not possible to assess conditions according to the above principles, it is possible to undertake an exploratory survey. The purpose of this is to use simple means to assess whether the air quality is acceptable. Use direct display equipment for this type of survey. If you are in any doubt as to whether air contamination is harmful, contact an authorised working environment advisor.

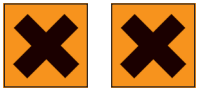
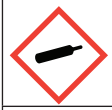
Classification and labelling

Hazardous substances must be classified in accordance with the rules of the Ministry for Energy and the Environment.

Explosive, flammable or environmentally hazardous substances and products, or substances and products which are hazardous to health are divided into hazard classes and are labelled as shown in the figure below:

Transitional period

Over a transitional period from January 2009 to June 2015, it is possible to choose between labelling according to the new rules or the old ones. This means that until 2015, you may encounter both the old and the new symbols.

New		Old
	Irritates on contact with the skin and eyes. May cause allergies on skin contact	 Xi - Irritant Xn - Harmful
	Highly dangerous or toxic on ingestion, skin contact or inhalation	 Tx - Very toxic T - Toxic
	Carcinogenic. Mutagenic. Damages reproductive health May cause allergies when inhaled Specific organ damage	 T - Toxic Xn - Harmful
	Corrodes the skin Causes severe eye damage Corrodes metals	 C - Corrosive Xi - Irritant
	Flammable	 Fx - Extremely flammable F - Highly flammable
	Pressurised, e.g. gas cylinders	
	Products which are harmful to the environment	 N - Dangerous to the environment

R and S phrases

There is information on risk (R phrases) and safety regulations (S phrases) for all hazardous substances.

R and S phrases and the name of the hazardous chemical substance must appear on the packaging.

Toxic substances and products

Enterprises using toxic substances and products must report this to the Working Environment Authority. This must be done on a special form which is available from police stations or at the regional Working Environment Authority Centres. The registration is valid for three years.

Toxic substances and products must be stored properly in a locked cabinet or room provided with a warning notice.

Code numbering

A range of products have to have a code number. This is applicable to paints, but also to other products such as wood preservatives, adhesives and sealants. The code number appears either on the packaging or in the supplier's usage instructions.

You must use the code number to select the correct product (as a starting point, choose products with the lowest possible code number) and to decide which safety arrangements - e.g. personal protective equipment - you must use.

The code number comprises two digits linked with a hyphen. The codes run from 00-1 to 5-6.

The digit before the hyphen is used to establish safety arrangements which may prevent inhalation of vapours, including vapours from organic solvents.

The higher the digit before the hyphen, the greater the need to use respiratory protection and process ventilation to provide protection against the risk of inhalation. Aqueous paints typically have a code number of 00-1 (1993). Alkyd paints with mineral turpentine typically have a code number of 2-1 (1993). Products based on xylene as a solvent typically have a code number of 4-3 (1993).

The digit after the hyphen is used to establish safety arrangements which may prevent contact with the skin and eyes, inhalation of droplets, dust from spray mist and any ingestion, e.g. by smoking or eating.

-1 means that there is a risk when inhaling spray mist or in the event of longer-term contamination.
-2 means that there is a risk when swallowing and inhaling spray dust.
-3 means that there is a risk of irritation or potential allergy.
-4 means that there is a risk of corrosive injury.
-5 means that there is a major risk of allergy.
-6 means that the product is toxic or that there is a risk of cancer.

Essentially the higher the digit, the greater the hazard. A substance coded 5-6 is the most harmful to health.

A paint product coded 00-1 is the least hazardous product that can be produced at the moment in purely technical terms.

Use of code numbers

Code labelling can help to determine what personal protective equipment is to be used. The Working Environment Authority has

diagrams in which you can see what protective equipment is to be used. This is dependent on code labelling, large or small surfaces and the application method.

An example:

Personal protective equipment and special workwear		Code number 1 2-1
	Application method	
Work site	Spatula 2 Brush Roller and similar	Spray
Outdoors	Gas filter mask a) p) r) Gloves h) i) k)	Full mask with air supply g) Overalls Gloves Hood
Small indoor surface*	Gloves h) i) k)	Full mask with air supply g) Overalls Gloves Hood
Large indoor surface* 3 →	Half mask with an air supply Gloves h) i) k)	Full mask with air supply g) Overalls Gloves Hood

1. Paint is to be applied inside an iron structure which is subject to major stresses and major functional requirements.

2. A paint coded 2-1 may be used.

3. The paint is applied with a brush or roller, and large surfaces are painted.

From this diagram, you can see that you have to use at least a half mask with an air supply, and gloves as well in case of splashes.

In case of doubt

If you are in doubt or are faced with a borderline case, you must always select the most effective protection.

The designation "small surfaces" covers door frames, skirting boards, pipes and similar which may be no more than 10% of the total surface area in the room, and together they must total no more than 4 m^2.

If the temperature in the room or on surfaces (e.g. radiators) is above normal room temperature, the digit before the hyphen in the code number is increased by 1.

PAINTS

Paint contains - among other things - binders and pigments, and it may also contain different types of solvents. Avoid inhaling vapours from paint, and avoid getting it on your skin if the paint contains organic solvents. When spray-painting, there is a risk of inhaling both aerosols (spray mist) and vapours from solvents. Aerosols may contain metalliferous pigments which are harmful to health (compounds of lead, chrome or nickel) and are therefore hazardous to inhale.

Paint may also contain irritant and allergenic substances.

Thinning of paint

If you thin a paint, the safety rules may change. Therefore, code numbers for mixtures which are ready for use (after thinning) must

always be stated; e.g. thinning of paint (coded 2-2) with a thinner (coded 3-1) will normally change the code to 3-2 and therefore requires more stringent safety rules.

Prohibitions

Maximum permitted code numbers are set for certain types of painting work. This is applicable to painting work taking place indoors, for example.

ORGANIC SOLVENTS

Organic solvents are used for degreasing and cleaning and may also be included in paints and adhesives, for example. Organic solvents will normally be classified as hazardous substances.

Health risks

Organic solvents may damage a number of organs and are absorbed into the body through the lungs or skin. These injuries may be acute or chronic. Acute damage manifests itself through headaches, dizziness, a feeling of intoxication and fatigue, and alcohol acts more quickly than normal. Organic solvents may also irritate the mucous membranes in the eyes, nose and throat and cause eczema.

If you are exposed to organic solvents over a long period, this may cause chronic damage to the brain and the nervous system. The symptoms may include memory loss, nervousness and irritability, followed by fairly severe mental changes, e.g. depression. Some organic solvents may cause cancer and reproductive problems (damage to the unborn child).

Risk of fire and explosion

Organic solvents are often flammable, and their vapours can form explosive mixtures together with the air. When heated, compounds with organic solvents containing chlorine may be split and give off phosgene (a toxic gas).

Flammable and explosive materials require special arrangements.

Use respiratory protection with an air support (provided by a compressor placed in an uncontaminated area, or from air cylinders) when working with organic solvents with a boiling point lower than 65°C, as these may be difficult to slow down with a carbon filter.

Precautions

Good advice on the use and storage of solvents:

- Always use the least harmful solvent.
- Follow the instructions in the work site usage instructions.
- Avoid smoking and the use of naked flames (welding, etc.).
- Make sure there is effective ventilation.
- Use suitable respiratory protection if it not possible to prevent inhalation of the vapours in any other way.
- Do not lean over an open container of solvent.
- Make sure that cleaned and impregnated objects are completely dry before undergoing further processing.
- Protect your skin from solvents with suitable personal protective equipment, e.g. gloves, overalls, aprons and sleeves, depending on

the nature of the work. Immediately remove soaked clothing and wash the skin if your skin is affected.

- Do not leave solvent-coated cloths lying around, in open containers or hidden in your pockets.
- Never clean your skin with solvents.
- Protect your eyes from splashes and spray. If eye irritation does not pass over when you flush your eyes with water, see a doctor.

IMPREGNATED TIMBER

Pressure-impregnated timber contains copper and boron compounds that are harmful to health and will be classified as hazardous materials.
Imported pressure-impregnated timber may also contain chromium or phosphorus compounds.

Boron compounds may affect the ability of men to have children, and such compounds may also affect unborn babies during pregnancy. Chromium compounds may cause allergies and are also suspected of causing cancer.

Vacuum-impregnated timber contains tributyltin compounds (imported wood), which are toxic when inhaled and highly irritating to the skin and eyes. Propiconazole/triazole and IPBC may cause irritation to the eyes and skin. Until fumes from vacuum-impregnated timber have evaporated, there is a risk of vapours of organic solvents, in particular turpentine, which may cause dizziness, nausea and headache.

When using and cutting pressure-impregnated timber:

- Use only pressure-impregnated timber when necessary to prevent fungal and insect attacks. In many instances, it is possible to use wood varieties with high levels of natural impregnation.
- Use wood which is impregnated by the least hazardous means.
- Use only wood, where the impregnating agent has evaporated sufficiently. The humidity of the wood must amount to no more than 25-30%.
- Avoid pressure-impregnated timber coming into contact with the skin.

Use suitable gloves and aprons, e.g. if the wood gets wet in the rain. There must be effective extraction if you are going to saw the impregnated timber, or if you are going to work the wood in any other way. Where possible, use suitable respiratory protection (at least a half mask with a P2 filter). Make sure that pressure-impregnated timber is stored and worked in areas with good ventilation.

FORM OILS

Form oils may be based on mineral, vegetable or synthetic oils and may contain solvents and certain additives. Mineral form oils will be classified in most instances as hazardous substances or materials.

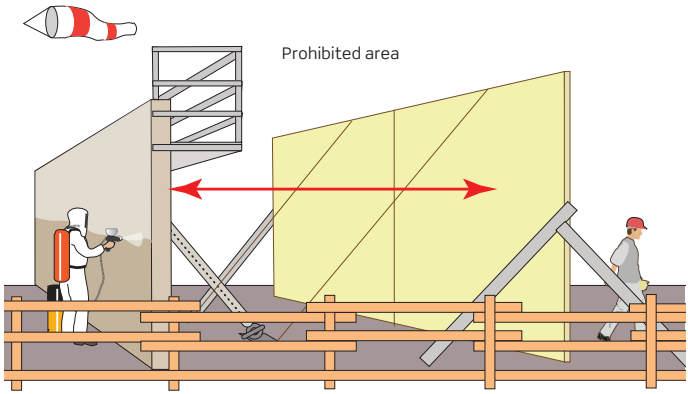
Contact with form oil can cause skin problems in the form of redness, irritation, swelling, blisters and eczema. Long-term contact with mineral oils may also cause skin cancer. Aerosols/spray mists may cause nausea and headaches when inhaled and result in lung diseases.

Avoid skin contact with form oil. Therefore, form oil must be applied with a brush or roller wherever possible. If the finish requires the form oil to be sprayed on, it is necessary to use at least filtered respiratory protection using a P2A2 filter.

In addition, there may be a risk of coming into contact with form oil when striking and removing formwork.

Safety arrangements

- Use the form oils which are least problematic or the least harmful to health.
- Check in advance how great the health risk is when using a product, and acquire clear and thorough information on the hazard.
- Get clear and thorough instructions on how you should carry out the work, and on what personal protective equipment you have to use.



Work site layout

Set up the work site so that neither the user nor anyone else is contaminated by spray, splashes and spray mist (aerosols). Be aware of wind strength and direction.

Protective equipment and hygiene

When spraying, it is normally necessary to use respiratory protection and oilproof overalls with a hood and gloves, etc.
Use oilproof aprons and gloves when applying the oil with a brush or roller. It is often necessary to wear special workwear when working with oiled formwork elements and similar.

Workwear contaminated with form oil must be kept separate from everyday clothes. When work is complete, it is important to wash and care for the skin and body. Therefore, it is necessary to make available suitable cleaning agents for the skin, soap, creams for skin care and clean and dry towels or disposable towels.

EPOXY AND ISOCYANATES

Epoxy compounds are highly allergenic and will be classified as hazardous substances or materials.

Allergies may occur after even a short period. Contact eczema (immediate hypersensitivity) is seen particularly on the hands and manifests itself as redness, itching, small bumps and fluid-filled blisters. In the case of severe eczema, the skin swells up and suppurates.

Epoxy is used in products such as paints, moisture barriers, floor coverings, sealants for concrete, joint sealants and adhesives. People who suffer from eczema, epoxy allergy or severe sweating of

the hands (hyperhidrosis manuum) must not work with these products.

Isocyanates (polyurethane or PU) may cause eczema and allergic asthma. Asthma is a hypersensitivity in the lungs which manifests itself in the form of attacks of shortness of breath when people are exposed to these substances. Several isocyanates are suspected of being able to cause cancer and are on the Working Environment Authority's cancer list.

Isocyanates are used in products such as paints, adhesives, roof pointing products, joint sealants, floor coverings and soft and hard foam, e.g. preinsulated district heating pipes. They are often the hardeners in two-component systems. Hardener and resin are sometimes supplied ready-mixed.

People who suffer from asthma, eczema, isocyanate allergy, chronic lung problems or severe sweating of the hands must not work with these products.

Spray prohibition

It is in principle forbidden to spray using products outside spray booths and spray cabins, where there must be effective ventilation. However, spraying is permitted in some situations, e.g. spraying of wooden flooring in some sports halls and on outdoor sports tracks. In some situations, there may be time restrictions on this type of work; it all depends on the work situation. Spraying work must be reported to the Working Environment Authority.

Training and instruction

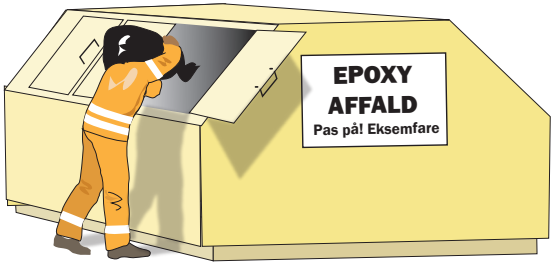
Everyone who is to work with epoxy or isocyanate products must undergo special training. There is a general training course and a short training course for work with sealants in closed containers. In

addition, the employer must ensure that sufficient instruction is given on how specific work is to be carried out.

Precautions for the use of epoxy and isocyanates

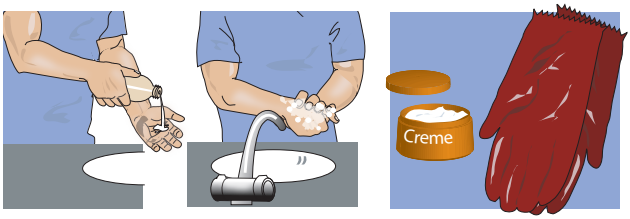
It is necessary to wear suitable disposable gloves and workwear or a protective overall, as it is important to avoid contact with the skin.

Also avoid inhaling any vapours or aerosols. Be aware that heating, e.g. when polishing hardened products, may cause isocyanates to be given off.



Only the people working with the products are permitted to remain within the work area, which must be provided with warning signs. Spillages, residues, empty packaging, discarded workwear and used disposable towels must be placed in special waste containers which clearly describe the contents.

There must be access to washbasins with hand-hot running water near to the work site. The water taps must not be operated manually. Where necessary, use a mobile washbasin. It must also be possible for staff to take a shower with hot and cold water, and there must be access to suitable cleaning agents, mild soap, soft disposable towels and suitable skin creams.



First-aid equipment with - among other things - an eye wash bottle must be situated close to the work site. There must also be a special changing room in which everyday clothes and workwear are stored separately.

Wash your hands before going to the toilet and before eating, and where necessary bathe directly after finishing work. You must change your clothes before you eat so that you do not eat while wearing your work clothes. You must not eat, drink or smoke on the work site.

ASPHALT (BITUMEN)

Work with asphalt includes laying different types of road asphalt, laying mastic asphalt, roofing work using bitumen products, bridge insulation and dampproofing, etc. using bitumen products.

Asphalt products (bitumen) will normally be classified as hazardous substances or materials.

When working with asphalt materials, air contamination which is harmful to health may occur, and some products may cause eczema if they come into contact with the skin.

If asphalt materials cause problems in respect of health and safety, they must be replaced with other, less hazardous materials.

Safety arrangements

Work site usage instructions must exist before work with asphalt and bitumen materials commences. When working with recycled materials, it is sufficient to prepare a written instruction.

Bitumen solutions which contain organic solvents for adhesion must not be used. However, if this is necessary - to permit traffic flows, for example - they may be used over the period 1 October to 1 April following consultation with the working environment organisation.

There are currently technically suitable products for adhesion and surface treatment which can be used to replace products containing organic solvents.

The temperature must be as low as possible when working with asphalt materials. In addition, it is necessary always to observe the set maximum usage temperature for bitumen types.

Natural and mechanical ventilation

Outdoors, it is necessary to plan asphalt work so that it does not take place directly within the smoke plume and so expose employees to asphalt smoke. The direction of the wind must be taken into account.

Arrangements must be put in place in the form of e.g. enclosure, use of a cover on asphalt kettles, process ventilation, driver's cabs with positive pressure and similar in order to prevent air contamination which is harmful to health from being inhaled.

In the case of machine laying using pavers over 2.5 m, it is possible to use driver's cabs with positive pressure or filters or to make use of other technical solutions such as a heat shield over the screed.

In the case of asphalt work in courtyards and other areas where there is poor natural ventilation, the smoke can be removed mechanically. This can be done either using mechanical ventilation or by fitting an extractor on the paver which sucks the smoke away from the area around the screed and feeds it through a catalytic converter.

Remove the smoke by means of process ventilation when carrying out asphalt work indoors, e.g. in industrial buildings and warehouses or when carrying out asphalt work in tunnels.

Personal protective equipment

Respiratory protection must always be available which must be used when it is not possible in any other way to prevent the development of air contamination which is harmful to health. Normally, as a minimum it is necessary to use a half mask with A2P2 filter (must be used over a maximum of three hours over the course of one working day) or turbo equipment with the same filter type. If there is a risk of contact with the skin, it is necessary to use personal protec-

tive equipment such as suitable gloves and footwear, which must be changed when contaminated with asphalt or emulsion.

Training

This work must only be carried out by people who have undergone special training or who are instructed by people who have undergone such training. All except those working for a short time only or in exceptional circumstances with asphalt products must undergo this training.

Welfare arrangements

Unless the work is taking place near to site huts or permanent personnel areas, water and hand cleaning agents must be brought along. In addition, you must not take your workwear home.

ASBESTOS

Asbestos was used for insulation and in different sheeting materials up to the late 1980s. Asbestos is carcinogenic and may cause cancer of the throat, lungs and pleura. People who smoke and are also exposed to asbestos are at greater risk of lung cancer.

Use of asbestos or materials containing asbestos is prohibited, but demolishing, repairing and maintaining buildings, etc. in which materials containing asbestos have been used is permitted. However, high-pressure spraying of materials containing asbestos (including Eternit roofing) is prohibited. It is possible to be granted an exemption for high-pressure spraying of individual systems, if cleaning will take place while giving off the least possible amount of dust.

Demolition is understood to mean complete removal of a material containing asbestos within a limited area. If a material containing asbestos is removed inside buildings, etc., it is necessary to report this to the Working Environment Authority. The same is true for work which is not deemed to involve short-term or low exposure to asbestos, e.g. removal of cement slate tiles containing asbestos on roofs, which cannot be removed in one piece.

Repair is understood to mean the enclosure and sealing of entire surfaces, e.g. of roof, ceiling and wall claddings containing asbestos.

Maintenance is understood to mean filling or sealing of small areas with small holes, e.g. from notices, decorations and fittings, sealing of individual intact, unperforated panels containing asbestos, and covering roof panels containing asbestos.

Materials containing asbestos which are removed, dismantled or otherwise taken away from their original location must not be put back up or be otherwise reused. This is applicable even if the materials are undamaged.

Minors under 18 must not work with materials containing asbestos or be otherwise exposed to asbestos dust. People who work with internal demolition have to have undergone special training. In the case of other work involving a risk of contact with asbestos dust, employees must have received training and specially extended instruction. The employer must be able to document the fact that employees have undergone this kind of extended instruction.

Training and specially extended instruction must be undertaken for the following work, for example:

- Work on the enclosure and packaging of a material containing asbestos which is not in good condition.

- Work on the removal of water pipes made of asbestos cement in soil where a significant proportion of the material is shattered.
- Removal of flat cement roof panels (slate tiles) containing asbestos.
- Clearing up after a fire or extensive storm damage, where there are large quantities of shattered material containing asbestos.
- Primary cleaning in connection with demolition work.
- External demolition of buildings under cover or total cover.

Safety arrangements

The general workplace assessment (APV) must be supplemented with a special assessment which describes how you can comply with the special asbestos rules.

During demolition work, the employer must prepare a work plan on the use of necessary low-dust working methods, ventilation, personal protective equipment and removal of waste. In this way, it is possible to ensure a good working procedure during demolition work, during cleanup operations in connection with fire, or when working with removal of materials containing asbestos from buildings, devices and installations.

The work plan must indicate how asbestos and material containing asbestos are to be handled. If a building is demolished, materials containing asbestos must be removed prior to demolition.

The work plan must also include cleaning work in connection with demolition work.

General safety arrangements:

- Use working methods and tools which give off the least dust possible. Materials containing asbestos which are to be removed should be damped so as to prevent the creation of dust.

- Remove dust wherever it develops. This can be achieved using mechanical tools with effective extraction.

- Use respiratory protection if there is a risk of asbestos dust. Respiratory protection must be at least a half mask with a P2 filter (must be used for a maximum of three hours over the course of a working day). If a lot of dust is generated, the respiratory protection must have an air supply. In the case of demolition work, you must work with respiratory protection with an air supply for a maximum of four hours a day, and you must take breaks after at most two hours of work. In the case of particularly stressful work, it may be necessary to reduce working hours.

- Use dust-repellent workwear with a suit and hood, but without pockets. The suit must fit snugly around the neck and wrists, and you must change your workwear frequently and avoid wearing it during meal breaks.

Signs

The work site must be cordoned off so as to keep unauthorised people away. In addition, there must be visible signs bearing the words: "Pas på. Asbestarbejde. Ingen adgang for uvedkommende" [Caution: asbestos work. No unauthorised access].

Waste

Waste containing asbestos, e.g. dust and filters must be damped, and it must then be stored and removed in closed, sealed packaging. The packaging must be labelled to indicate that it contains asbestos. Removal must take place as instructed by the municipality.

Cleaning

Effective cleaning of the work site is important. This is applicable to both external and internal demolition (removal) of building elements containing asbestos. Following indoor demolition, primary cleaning is required by means of vacuuming and then wet-cleaning. Dry sweeping is not permitted. Finally you have to vent the area, clean it again and then vent it again.

The vacuum cleaner must be suitable for the work and must therefore be able to prevent the escape of asbestos dust. The filters must be documented as suitable for the containment of asbestos dust, e.g. dust class H.

Changing rooms and showers

There must be two changing rooms when demolishing indoors – one for workwear and one for everyday clothing. You must pass through a bathroom with showers in order to get from one changing room to the other. The same is true for dusty work outdoors, e.g. during demolition of cement slate tiles containing asbestos which cannot be removed completely.

In the case of other forms of demolition and in the event of repairs (non-dusty work), the changing room must have separate storage of workwear and everyday clothing (two lockers), as well as showers with hot and cold water.

There must also be a separate canteen which must not be used for work purposes.

MINERAL WOOL AND OTHER INSULATION MATERIALS

Different former of insulation materials have very different effects which are harmful to health, and these effects must be taken into account in the considerations when products are selected, when work is arranged and when using personal protective equipment.

To prevent problems, it is necessary to secure the insulation materials so that they give off as few fibres as possible. This can be done by using products which are impregnated and sealed, and ensuring that products which must be cut or otherwise adjusted are altered as little as possible.

If insulation materials contain synthetic mineral fibres, it is necessary to compile usage instructions containing information on health risks and on what safety arrangements must be implemented.

Mineral wool (stone or glass wool) is used extensively for insulation. When working with mineral wool products, mineral fibres of varying sizes are released. The larger fibres can cause itching and rashes as they cut small scratches in the skin. The fibres can also irritate the eyes. The smaller fibres can block the nose and cause pain in the nose and throat. Working with mineral wool may cause bronchitis.

Safety arrangements when fitting new insulation

Plan the working process in a way to ensure that as little dust as possible is given off, while at the same time allowing work to proceed with good ergonomics. This can take place by e.g. insulating roofs and outer walls from above and outside respectively.

Prepare the structure so that you can use standard insulation materials.

Ideally, choose insulation products adapted for the structure to limit the amount of cutting necessary on the work site.

Use dust-repellent workwear if you are unable to avoid contact with mineral fibres in any other way. Clothing must not be separated at the waist, and it must fit snugly around the wrists, ankles and neck and have no pockets or holes. Any head covering must have a peak.

There must be gloves available on the work site. It may also be necessary to wear goggles or a face shield.
If necessary, wear suitable respiratory protection (at least a half mask with a P2 filter).

Be aware that there may be asbestos fibres in old insulation.

Especially dusty work

Especially dusty work occurs during e.g.:

- removal of old insulation,
- insulation above head height, depending on the insulation material,
- extra insulation in places which are difficult to access, including roof spaces, service corridors, basements and other enclosed spaces with poor ventilation, depending on the insulation material,
- injection or laying of granulate products.

There are more stringent requirements for the arrangements in the event of especially dusty work. Work must be planned so that it does not unnecessarily affect other works in the vicinity.

It is necessary to remove, as far as possible, contamination at the site where it occurs. This must normally take place by means of ventilation.

Employees must have access to changing facilities, with separate storage of everyday clothes and workwear. It must also be possible to take a hot shower.

Cleaning

Cleaning must take place in a manner which gives off as little dust as possible, e.g. by vacuuming or washing. Floors must not be dry-swept or cleaned with compressed air.

Where possible, floors should be kept damp during work in order to restrict the amount of dust given off.

QUARTZ DUST

A large number of construction materials are made from sand, clay, granite, flint, quartz powder (silica), etc. and contain quartz (crystalline silicon dioxide). The same is true for some types of paint, filler, adhesive and similar.

Quartz dust is created when e.g. flint, sandstone, granite and concrete are worked, or during sandblasting. Some of the dust comprises small particles which go right down into the smallest parts of the lungs when inhaled. This respirable dust, as it is known, irritates the mucous membranes and accumulates in the lungs of the person inhaling it.

This causes a risk of development of silicosis (chalicosis) and lung cancer. These illnesses manifest themselves through coughing and increasing shortness of breath. The illnesses can be diagnosed through impaired pulmonary function and pulmonary X-rays.

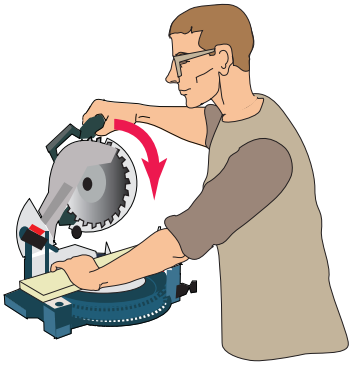
Safety arrangements

It is possible to restrict the development of quartz dust as follows:

- Use the least dusty work processes, e.g. blasting instead of demolition, crushing instead of cutting and drilling, and use low-speed tools.
- Use tools which are connected to a vacuum cleaner or a central dust extraction system when you work with tools which strike, bore or cut.
- Make sure that you wet the area when you are unable to extract the dust.
- Set aside time for regular cleaning.
- Clean the area by vacuuming or wet sweeping, not by dry sweeping. Vacuum cleaners must be fitted with suitable filters, i.e. filters which are able to prevent the escape of dust which may be inhaled. You may, for example, use type H vacuum cleaners in accordance with DS 2381.
- If necessary, use personal protective equipment. Respiratory protection must be at least a half mask with a P2 filter.

WOOD DUST

Wood dust is created when wood is worked. Wood dust can dry out the skin and mucous membranes and irritate the airways and mucous membranes. Wood dust can cause cancer of the nose and can cause allergies to varying degrees.



Safety arrangements

There must be extraction (process ventilation) at fixed work sites so that the air is not recirculated. The same is true when working hardwood on building sites and varying work sites.

Cleaning must take place during vacuuming. The vacuum cleaner must be fitted with a filter suitable for preventing the escape of wood dust.

WELDING AND CUTTING SMOKE

Smoke and dust from metalworking contain gases and particles from heavy metals, among other things, which together can cause chronic bronchitis, asthma and cancer of the airways. This may happen if the contamination is not removed effectively. Air contamination which is particularly hazardous to health may occur if electrodes, parent materials or coatings on parent materials contain substances such as zinc, copper, lead, cadmium or chromium.

Use suitable ventilation and extraction systems to remove welding smoke and grinding dust. Use a portable system if it is not possible to set up a central process ventilation system. The ventilation system must be fitted with a control device which indicates insufficient function.

In many instances, it may be necessary to use suitable respiratory protection, e.g. a turbo filter mask with a suitable filter, or respiratory protection with an air supply.

Welding and cutting of all forms of metal and associated grinding may be carried out only by people who have undergone special training.

FLY ASH

Fly ash is used as a filler in connection with roadbuilding, as well as in cement, concrete and gas concrete.

Fly ash consists of fine-grain particles which are separated from the flue gases from coal-fired power plants. Contact with the skin and mucous membranes may cause acute irritation. Allergies may also occur in the event of long-term contact.

Minors under 18 must not work with fly ash or come into contact with it. All work with fly ash must be arranged so that it gives off as little dust as possible and there is as little exposure to it as possible. This can be done by wetting the area as you work, for example.
Driver's cabs on contract machinery must be designed to prevent fly ash entering the cab; for example, the air supply must pass through an effective particle filter.

In the event of contact with fly ash, it is necessary to use personal protective equipment in the form of gloves, dust-repellent work-wear, eye protection and suitable respiratory protection, e.g. turbo equipment with a hood and particle filter.

CHROMATE IN CEMENT

The calcium compounds in cement and mortar products irritate the skin and mucous membranes. Water-soluble chromate in cement may cause eczema on contact with the skin.

The use of cement and hydrogenated products containing cement with a content of water-soluble chromate of more than 2 mg per kg of dry cement is prohibited.

If additives (iron sulphate) are used to reduce the chromate content in cement and products containing cement, the packaging must be labelled with clearly legible information on:

- Content of water-soluble chromate.
- Packaging date.
- Conditions for storage.

- Storage period.

Work site usage instructions must normally be prepared when cement is used.

LEAD

Lead compounds were formerly used in products such as paint and as flashing.

There may be a risk of effects from lead and lead compounds, e.g. when removing flashings or during demolition work. This is particularly true when scraping off, burning off and cutting materials covered in paint containing lead.

If you are exposed to lead for any length of time, you may suffer damage to e.g. the nervous system, brain, kidneys and gastrointestinal tract. Anaemia may occur, and lead may impair the ability of both men and women to have children and cause damage to the unborn child. In addition, lead is considered to be carcinogenic.

Minors under 18 must not work in areas where there is a risk of exposure to the effects of lead.

Lead measurements

In the case of demolition work, it is necessary to regularly measure levels of lead in the air (dust measurement) and in the blood of employees (blood lead measurement). This is particularly true if materials covered in paint containing lead are scraped or burnt off, and if systems are demolished (e.g. foundry furnaces).

If the results of two measurements in a row are below the set limit, no measurements have to be taken until any working conditions are altered.

If the measurement results are above the set limit, it is necessary to take dust measurements four times a year, and employees have to take blood tests twice a year. In addition, employees must have health checks and, where necessary, be moved to other work where there is no exposure to lead.

Safety arrangements

Effective arrangements must prevent lead dust or vapours containing lead from being given off. If there is lead dust, it is necessary to remove this by means of extraction from the location where it is given off. Employees must, where necessary, use suitable respiratory protection and dust-repellent workwear. If there is a risk of contact with the skin, employees must use personal protective equipment such as gloves and workwear. It is necessary to keep such workwear separate from everyday clothes.

Personal protective equipment, including workwear, must not be taken home. If it has to be washed, this must take place at the work site or at a laundry with special equipment for the purpose. The clothing must be transported in closed containers.

Welfare arrangements

There must be washing facilities with washbasins and showers with hot and cold water next to changing rooms. There must be two lockers per person so that workwear and private clothing can be kept separate.

The employer must ensure that the canteens are not contaminated with lead from personal protective equipment and must ensure that

work sites, changing rooms, shower rooms and canteens are effectively cleaned every day. Cleaning must take place by means of vacuum cleaning fitted with a suitable filter which is able to prevent the escape of dust contaminated with lead. Where appropriate, flushing, washing or some other effective method which does not cause dust to fly around may be used for cleaning. The developer's Health and Safety Plan must describe how to avoid the spread of dust to the surrounding area and how to prevent others on the building site being exposed unnecessarily to vapours or dust.

Hygiene

Employees are obliged to use the specially equipped washing facilities prior to meal breaks and at the end of the working day.

Employees must not smoke or consume food or drink in locations where work is being carried out with metallic lead or lead compounds.

Waste

The employer must ensure that waste containing lead is collected and disposed of in closed containers or similar.

SOIL CONTAMINATED WITH OIL AND CHEMICALS

Work with soil contaminated with chemicals may be hazardous to health. Without knowing the nature and extent of the contamination, it is impossible to determine the health hazard involved in the work.

Therefore, it is necessary to examine at an early stage in project planning whether the ground or any part thereof is contaminated

with chemicals which are hazardous to health. If it is, it is necessary to find out what chemicals are involved and the extent of the contamination. If you encounter an unknown contaminant, the work must be stopped and the contamination must be investigated.

During planning, it is necessary to attempt to predict accident and health risks and describe how arrangements can be implemented to avoid them.
If an unknown contaminant is encountered during excavation work, for example, it is necessary to stop work and summon a special expert. The Working Environment Authority and the local environmental authorities must also be notified.

Safety arrangements

The employer must do everything technically possible to avoid employees being affected by the contaminated earth. These may include, for example:

- Positive pressure ventilation with fresh air for driver's cabs.
- Setup of tents with positive pressure ventilation.
- Sprinkling dusty work.
- Establishment of diaphragms and pumps so that vapours, fluids, etc. do not penetrate out into the excavated area.
- Work must take place above the excavated area as far as possible.
- Restriction of access to the contaminated area.

Employees must use personal protective equipment if they are unable to carry out the work properly in any other way. This may, for example, include respiratory protection with a fresh air supply, pro-

tective clothing, protective gloves and oil-repellent and chemical-proof protective rubber boots. For machine operators and drivers, it may be necessary to use protective clothing, protective rubber boots, gloves and suitable respiratory protection.

Welfare arrangements, etc.

It may be necessary to set up a canteen, a changing room with one locker for workwear and one locker for everyday clothing, washbasins, a shower room and toilets immediately next to the work site.

Personal hygiene is important. It is particularly important to ensure that contaminated skin is cleaned thoroughly. Wash your face, hands and forearms before every break, and before going to the toilet as well.

PCBS

PCB is an abbreviation for a group of chemical substances known as PolyChlorinated Biphenyls, which can accumulate in the body. These substances may be carcinogenic and harm unborn babies. These substances can be absorbed by inhalation and through the skin.

PCBs were used in elastic joint fillers between 1950 and 1976 in all types of building and as a sealant adhesive in double glazing between 1967 and 1973. It may also be present in floor varnish, paint and similar. Elastic joint fillers of polysulphide type may contain up to 30% PCB.

PCB penetrates easily from adhesive or sealant into the surrounding woodwork or concrete.

Replacing windows and joints

Dust containing PCB may occur even with jobs that do not involve heating the sealant, such as replacing windows. Therefore, it is important for you to work with as little dust as possible. This means, for example, that you must use knives instead of electric cutting tools and that contaminated material residues must be collected and disposed of in accordance with municipal guidelines.

The following protective equipment is used when knives are used:

- Disposable overalls with a hood.
- Gloves made of e.g. nitrile.
- Respiratory protection with at least a P3 filter.

In the case of larger quantities of dust, e.g. when using electric tools to cut out joints, the respiratory protection must use an A2/P3 filter.

Double glazing
Cutproof nitrile gloves are used when removing and handling double glazing.

Clearance projects

If a clearance project is taking place in which all material contaminated with PCB is to be removed, there are a few special rules.

The work site must be screened off to the necessary extent, and negative pressure must be established in the work area. In addition, you must use special tools with extraction and dust filters.

When you use tools which give off dust and generate heat, you must use the following personal protective equipment:

- Respiratory protection with a fresh air supply or respiratory protection with a visor and turbo unit with combination filter A2P3.
- Gloves made of a material which provides protection from PCBs e.g. butyl rubber, neoprene, Viton or 4H (PE/EVAL).
- Full-cover overalls, class 4/5.

In general, it is a good idea to wash your hands before you eat so that you do not ingest dust which may contain PCB.

BIOLOGICAL EFFECTS

You may be exposed to biological effects in a number of work processes. These include:

- Work on or with drain connection.
- Pigeon and rat excrement during renovation works.
- Clearance in connection with mould attacks.

Drains and wastewater

You may vomit or suffer from diarrhoea if you inhale aerosols or have skin contact with waste water. You can avoid unnecessary contact with waste water by using disposable overalls, gloves or special workwear. This clothing must not be taken home and washed.

If your work mostly involves working with waste water or sewage sludge, you must be vaccinated against tetanus, hepatitis A and polio.

In the case of other work, e.g. removal of down pipes and similar, you should be vaccinated against tetanus.

Pigeon and rat excrement

Dust from animal excrement may contain endotoxins which are harmful to health. Therefore, preliminary surveys must take place in areas such as basements and attics during renovation work.

Such preliminary surveys must show whether there are large quantities of animal or human waste which are harmful to health. These may include pigeon droppings, rat excrement and drug addicts' syringes.

Work must be planned so that the harmful waste is removed before renovation work commences. You must use personal protective equipment in the form of respiratory protection, disposable overalls and gloves.

Dealing with mould

You may encounter mould in structures during renovation work. Mould can be found in private buildings, public institutions, schools, etc. Some varieties of mould give off toxic spores and may cause health problems. It is often the case that you cannot see with the naked eye whether or not a mould present is harmful to health, so it is necessary always to handle mould with care.

When removing mould, it is necessary to protect yourself and your surroundings against effects which are harmful to health. At the same time, it is necessary to ensure that infected dust and mould spores are not spread. Be aware that remaining in infected rooms may pose a risk. Therefore, any users should also be notified of this.

Avoid touching with your bare hands any materials which have been attacked by mould. Avoid getting mould spores or dust in your eyes, and avoid inhaling spores and dust. You must use a vacuum cleaner with a microfilter, e.g. a HEPA filter.

Use personal protective equipment in the form of:

- Close-fitting gloves and footwear.
- Goggles.
- Dustproof, full-cover overalls (disposable where applicable).
- A turbo mask with a P3/A2 filter, or possibly respiratory protection with an air supply.

PSYCHOLOGICAL EFFECTS

The rules on the psychological working environment require as a minimum that the enterprise sets regulations on:

- Time pressure and heavy workloads.
- Traumatic events, e.g. in the case of serious industrial accidents.
- Bullying and sexual harassment.

Building and construction enterprises often perform tasks which are associated with a major risk of accidents. This may increase mental stress, e.g. if employees work alone on roadworks, or if the nature of the work makes it difficult to comply with normal safety procedures, e.g. when working at heights.

Therefore, good safety arrangements also help to promote a good psychological working environment.

Mental stresses at work can lead to greater absence from work, lack of job satisfaction, additional conflicts or employees leaving the enterprise.

People who are subject to mental stress over any length of time find it may lead to concentration problems, nervousness, depression and fatigue.
Mental stress can also manifest itself as unpleasant palpitations, tense muscles and headaches. In a worst-case scenario, a poor psychological working environment may lead to depression and cardiovascular disease.

Time pressure, heavy workloads and influence on own work

Time pressure, heavy workloads and tasks which are not completed on time lead to overtime, a fast work pace and too little rest. This can lead to stress, fatigue and sleep problems. Too much overtime over longer periods, combined with too little sleep, may also increase the risk of industrial accidents and road traffic accidents.

Contracts with clients and developers should state when tasks are expected to be performed and under what conditions it is possible to alter schedules and tasks.

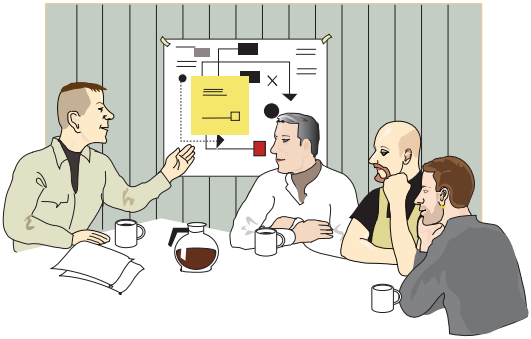
It is possible, with good planning, to avoid deadlines which are too short or unforeseen tasks. The plans must be monitored constantly. Gain greater clarity in respect of tasks and schedules by holding startup meetings at the building site and make sure there is good instruction before new tasks are set in motion or altered.

Manning levels must be suited to the nature and extent of the work. If complex tasks are involved, employees' knowledge and experi-

ence must also suit the level of difficulty of the tasks.

Piecework or any other form of performance-related pay may also lead to too fast a work pace.

Employees who work alone may find they suffer greater mental stress if time pressure arises or if they have a lot of work to do. Therefore, managers and colleagues must keep one another informed and maintain good contact throughout the working day. It is a good idea to ensure that employees can always get in touch with a manager or colleague at any time on a mobile phone. This enhances security and may prevent stress.



Employees' influence on how tasks are to be carried out also helps to increase satisfaction at work. It is important for employees to be able to speak up if they feel they have too much work to do or if the time pressure they face is too tight. Influence may also relate to the selection of tasks so that individual employees can avoid monotonous, repetitive stresses.

Education and training are also of significance to the perception of time pressure. It is important to ensure that all employees are familiar with the handling of materials, machinery and tools to be used for the work. Foreign and new employees may need more instruction than Danish employees.

Training managers, foremen and chargehands in cooperation, communication and conflict resolution can often help to prevent mental stress for both managers and employees.

Traumatic events

Traumatic events, e.g. after witnessing an industrial accident, may result in a fear of carrying out specific tasks or lead to apathy with regard to the working environment policy at the enterprise.

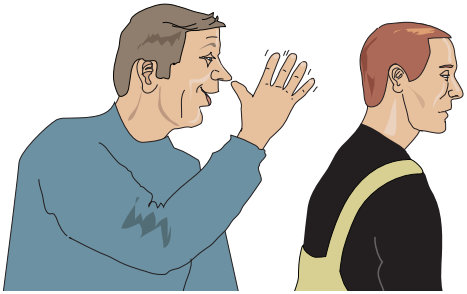
If an industrial accident or other serious incident takes place (e.g. threats of violence), it is important that managers and employees are familiar with the enterprise's emergency plans for such incidents.

An emergency plan may include a summary of who should accompany injured persons to the accident and emergency department, ensure that employees do not go home alone, call relatives and notify other people within the enterprise. The plan should also state who can provide trauma counselling to witnesses and other employees within the enterprise.

The management at the enterprise should make a decision on how the injured party can be supported while they are ill and how to get them back to the workplace quickly.

Bullying or sexual harassment

Bullying or sexual harassment are perceived differently by different persons.



Bullying is when employees subject others within the enterprise to unpleasant banter, hurtful comments, insulting telephone calls, physical assaults, threats or similar.

Sexual harassment is when employees are subjected to unwanted incidents of a sexual nature.

Bullying or sexual harassment generally create a negative atmosphere and poor relations within the enterprise. This can result in long-term sick leave for one or more employees.

A personnel policy with emphasis on openness and communication can help to prevent bullying and sexual harassment. For example, it may be a good idea to describe what incidents will not be accepted and what sanctions bullying and sexual harassment will lead to. It is also important to agree together with employees on how they can find help to complain and get psychological counselling in the event of bullying and sexual harassment.

Job satisfaction and cooperation

If employees do not enjoy working for the enterprise or at a building site, a number of conflicts will occur. If staff do not trust the management or one another, this may lead to insecurity with regard to safety at work. A lack of mutual respect may lead to low motivation or negative attitudes towards the enterprise. A lack of recognition leads to uncertainty on whether employees' work is good or bad.

Effective cooperation, with openness and communication, are very significant when it comes to creating a positive sense of community within the enterprise and to prevention of conflicts.

Trust between employees and colleagues are of significance for how people do their work and whether they enjoy working for the enterprise.

Respect and fairness are important elements both within the enterprise and on the building site. General good relations and inclusion of employees' points of view are important criteria for good cooperation.

Recognition for a job well done reinforces the sense of professional pride and may help to make individual employees more motivated and committed to new tasks.

Find out more about job satisfaction, cooperation and the mental working environment at www.trivsel.bar-ba.dk.

WORKING AT HEIGHTS

When planning a building job at height, decisions must always be made on which aids are necessary in order to do the job safely. This includes looking at which technical aids are best to use for the job from a health and safety standpoint, e.g. choosing between ladders, scaffolding, personnel lifts or lifts.

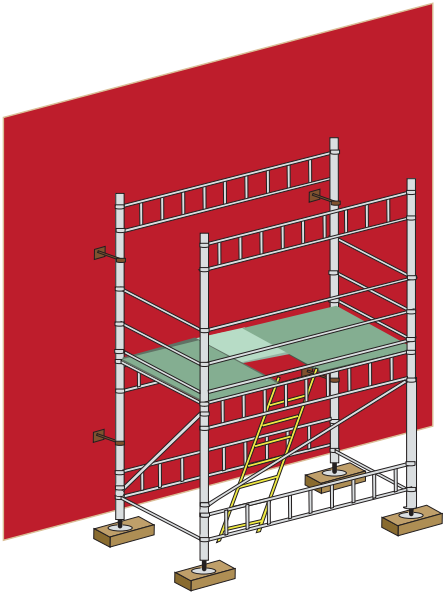
Among other things, check:

- whether there are usage instructions/setup guides, etc. at the work site,
- whether there is space for transporting the aids before and after carrying out work,
- whether work and transport routes are in order and can be used,
- whether there are any particular risks involved with the use of the aid,
- whether everyone has received proper instruction,
- who is allowed to work with the aid, etc.

FAÇADE SCAFFOLDING AND SCAFFOLDING FOR BRICKLAYERS

Façade scaffolding and scaffolding for bricklayers must be suitable for the tasks to be performed in terms of load-bearing capacity, width and height. On site, there must always be usage instructions in Danish which show what scaffolding may be used for.

Scaffolding must stand on a firm base. If there is any need to chock the scaffolding, the chocks must be stable and no more than 20 cm high. Scaffolding must be secured to prevent it falling over.



This can be done by securing the scaffolding safely to the façade/structure. Where necessary, follow the usage instructions for other safe ways of securing the scaffolding.

Scaffolding components must not be deformed or rusty, and the individual parts must fit together.

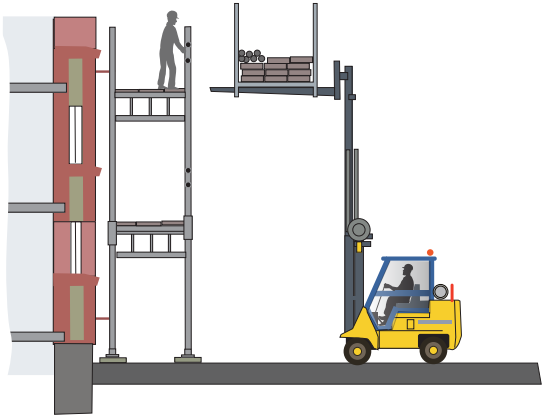
Anyone assembling, altering or dismantling scaffolding over 3 m must be trained for the job.

If the user of the scaffolding himself wishes to make minor changes to the scaffolding, e.g. moving brackets, etc., this may take place only on the agreement of the enterprise which put up the scaffolding.

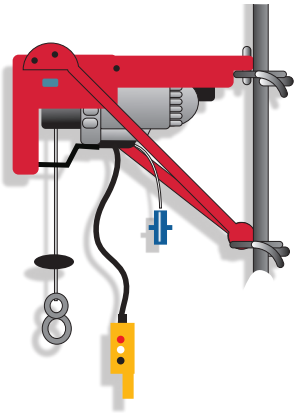
Transport

Initially use pallets, stillages and frame containers when you are going to move the elements of the scaffolding from a storage site to a vehicle and from the vehicle to the site where the scaffolding is to stand.

The materials are handled using a fork lift truck or similar. You can also use barrows at the site where the scaffolding is to be erected.



When the scaffolding elements are to be raised and lowered, you must also use suitable technical aids. You can use a base mounted electric hoist with a raised hoisting bracket or a scaffold hoist.



Manual hoists ("bicycle wheels") may only be used when installing and removing nets and waste chutes from scaffolding components.

Setup

Use only intact original parts or parts which you can combine safely. Follow the requirements in the setup guide when you build, reinforce and secure the scaffolding. See Branchevejledningen om Opstilling og nedtagning af stilladser [the Industry Guide for the erection and dismantling of scaffolding] for a more in-depth guide.

Particular risks

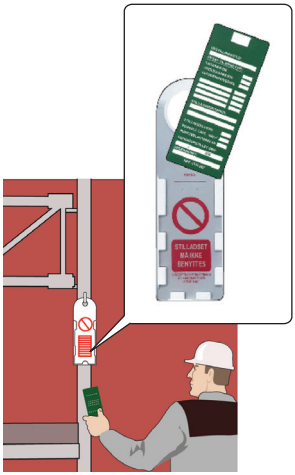
If brackets, screens, plastic or mesh are fitted to the scaffolding, the number of securing points must be increased, cf. the usage instructions.

It is necessary to perform a design calculation if the scaffolding is being erected in any way other than the standard way shown in the setup guide.

Signs

When the scaffolding is being erected, altered and dismantled, it must be cordoned off and provided with signs which indicate that it must not be used.

Once the scaffolding is fully erected, a commissioning permit must be displayed on all access routes. These signs must include information on what the scaffolding is designed for, what load it may carry, the date on which it was erected and the inspection date.



Loading of scaffold decks

Scaffolding is divided into classes, as shown in the load table. The load table states that only one scaffold level may be loaded to 100%, and one to 50%. The other levels must only be loaded if the scaffold erector has granted permission for this.

Scaffold class	Uniformly distributed load	Concentrated load A=500 x 500 mm	Concentrated load A=200 x 200 mm	Load on partial area Ac=cover width x frame distance	
	kg/m²	kg	kg	kg/m²	A m²
1	75	150	100		
2	150	150	100		
3	200	150	100		
4	300	300	100	500	0.4xAc
5	450	300	100	750	0.4xAc
6	300	300	100	1000	0.5xAc

Classes 1, 2 and 3 – lightweight façade scaffolding: 1 and 2 are used for inspection, 3 is used for lighter work without material stores

Classes 4, 5 and 6 – heavy steel scaffolding: 4 and 5 are used for bricklaying and concrete work, 6 is used where larger quantities of materials are also stored.

Scaffold widths

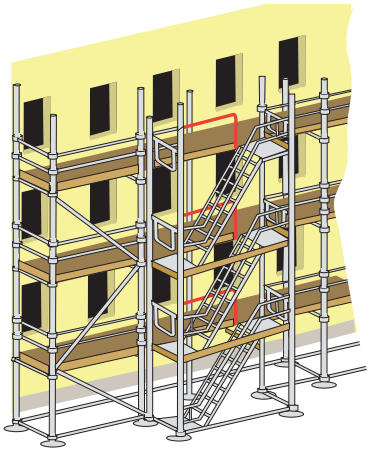
The scaffolding (work deck) must be of a width which allows work to take place properly and ergonomically correctly and which allows the necessary technical aids to be used.

If the width of a floor is only approx. 60 cm, only light repair and maintenance work must normally take place on the deck.

The width must be 120 cm when windows are being replaced or personnel are working with high pressure washers. Find out more about scaffold widths in Branchevejledning om standardblade for stilladser [Industry guide on standard sheets for scaffolding].

Ascents

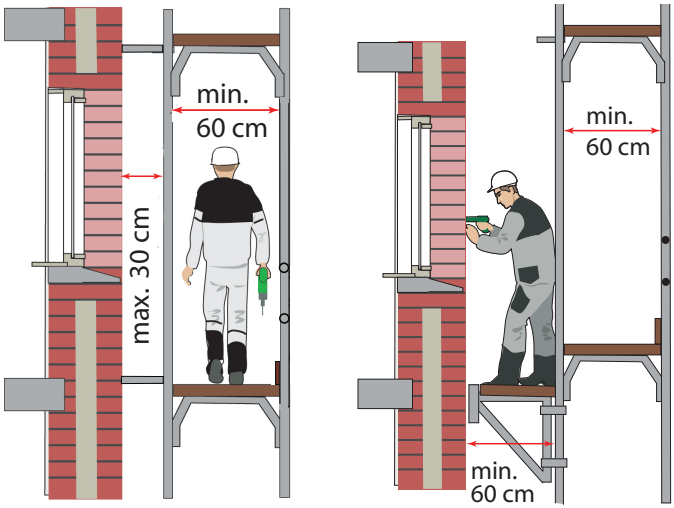
The scaffolding must be fitted with steps or ladders to be used when staff have to climb it. There must be a separate access area in the case of scaffolding where more than two people are working at the same time. This is applicable if the scaffolding is more than 5 m tall and and more than 10 m long.



The access area must reach the top continuous deck. Access holes in the floor of the scaffolding must be secured with a hatch which can be closed.

Distance to façade

Scaffolding must be placed as close as possible to the façade in respect of the tasks to be performed. If the distance to the façade is more than 0.30 m, there must be internal guard rails.



Guard rails

When a scaffold floor is 2.0 m or more above ground level a guard rail must always be set up. There must also be guard rails on lower scaffolding if there is a particular risk of falling or if a fall to the substrate would be particularly hazardous. Guard rails comprise a hand rail at a height of 1.0 metre, a knee rail at a height of 0.5 metres and a footboard at min. 0.15 m.

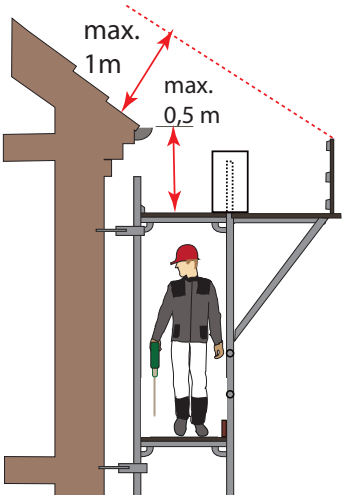
Screening

Low cordoning or screening which can safeguard the surrounding area if there is a risk of building materials or equipment falling from the scaffolding.

Scaffold decks

The scaffold deck must be load-bearing and rigid, and it must fill the entire scaffolding. It must be dimensioned and built in accordance with applicable norms and standards. The necessary strength, rigidity and stability must be assured. Avoid having overlaps in the scaffold floor as there is otherwise a risk of people tripping and falling over them. If overlaps cannot be avoided, these must be at least 25 cm. V-shaped units make it easier to use wheelbarrows and brick trolleys.

WORKING ON SCAFFOLDING

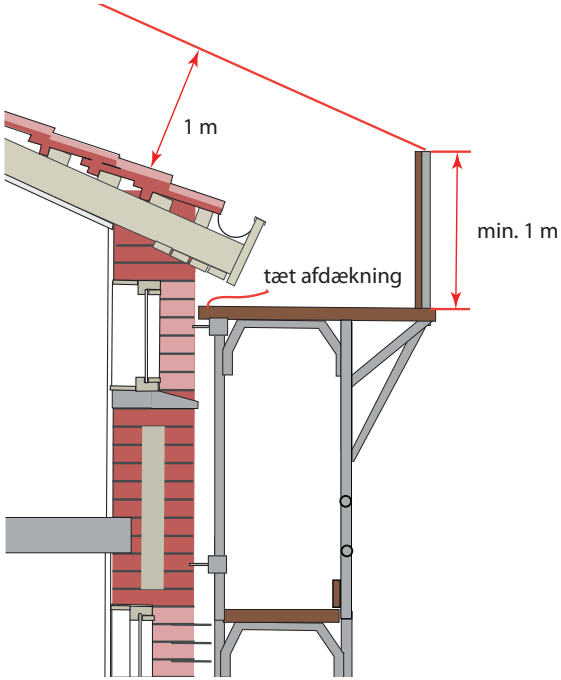


When work is being done on scaffolding, all hatches must be closed. Trestling, boxes, ladders, loose construction elements, etc. must not be used to increase the working height.

Scaffolding for roof work

When working on roofs, the distance from the roof eaves to the scaffold deck must not exceed 0.5 m. There must also be a closely spaced enclosure to the top scaffold deck If scaffolding is used for safety when

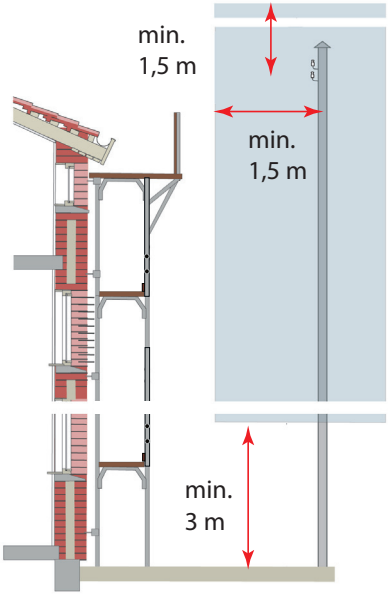
working on pitched roofs, this must be provided with a screen which can arrest the fall of anyone falling from the roof. This screen must be at least 1 m high and cover a parallel line 1 m above the surface of the roof. Use steel mesh, plywood panelling or similar, for example.



When working on roofs, the scaffolding must be made wider in order to ensure that the necessary space is available; this can be done using brackets. Parts which protrude on the top deck must be secured so that they cannot injure anyone.

Particular risks

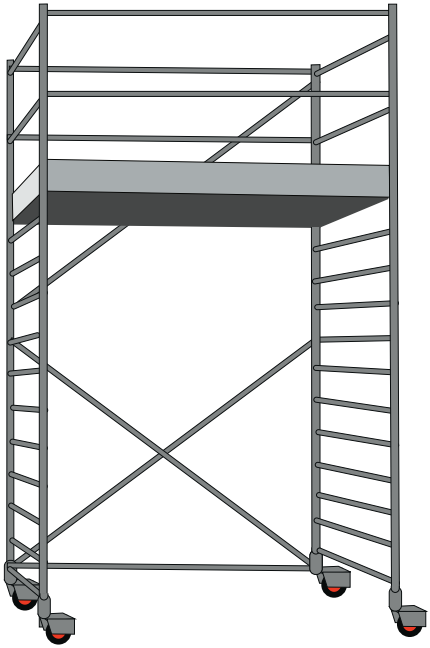
If there is a risk of the scaffolding being struck by cars or other vehicles, it is necessary to safeguard against this risk. The barrier must be approved by the road authority.



If there are overhead cables so close to the scaffolding that workers come within what is known as the safe distance (see drawing), the electric cables must be insulated to prevent contact or the power must be switched off. Only qualified personnel from e.g. the local utility company may make live cables safe. The measurements in the drawing are minimum figures.

ROLLING SCAFFOLDING

Only people trained for the task may erect and alter rolling scaffolding more than 3 m high. There must be usage instructions in Danish on site. This must specify the permitted uniform load and spot load.



The usage instructions must state when and how the scaffolding is to be fitted with supporting legs.

Erection, alteration and dismantling

Rolling scaffolding must be erected and dismantled according to the supplier's instructions.

The base must be even and sufficiently load-bearing.
Rolling scaffolding must be vertical and not be able to tip.

Rolling scaffolding must be fitted with internal steps or ladders to be used when staff have to climb it. The access opening must be at least 0.4 x 0.6 m in size, and it must be fitted with hinged or sliding hatches. The hatches must be closed when people are working on the floor.

There must always be guard rails from a height of 2 metres. There must also be guard rails on lower scaffolding if there is a particular risk of falling or if a fall to the substrate would be particularly hazardous. Guard rails comprise a hand rail at a height of 1 metre, a knee rail at a height of 0.5 metres and a footboard at min. 0.15 m.

The work platform must completely fill the scaffolding both lengthwise and widthwise. The floor must not be able to tip or move, and the wheels must be locked.

Working on rolling scaffolding

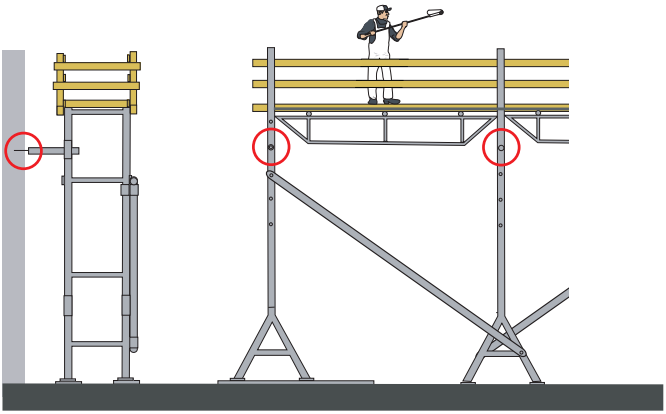
All wheels must be braked when the scaffolding is in use. The brakes must be easy to operate without using tools.

There must be no people on the scaffolding while it is being moved.

Never use boxes, ladders or other equipment to achieve extra working height.

TRESTLING

Only people trained for the task may erect and alter trestling more than 3 m high. There must be usage instructions in Danish on site. This must specify the permitted flat load and spot load.



Erection, alteration, dismantling and use

Trestling must be erected and dismantled according to the supplier's instructions.

The trestles must stand on a firm, even surface.

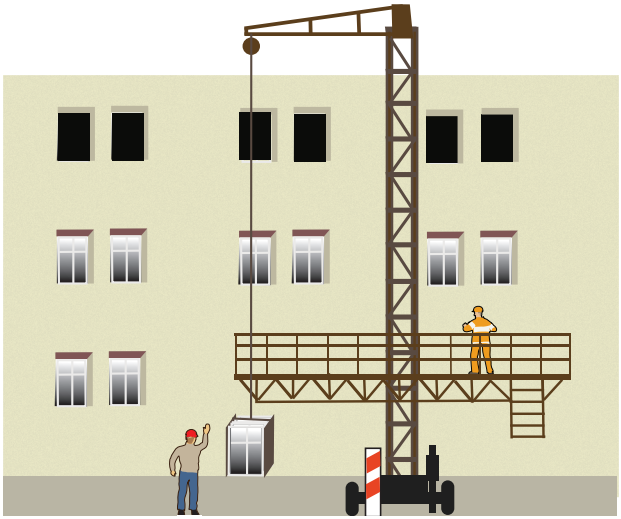
There must always be guard rails from a height of 2 metres. There must also be guard rails on lower scaffolding if there is a particular risk of falling or if a fall to the substrate would be particularly hazardous. Guard rails comprise a hand rail at a height of 1 metre, a knee rail at a height of 0.5 metres and a footboard at min. 0.15 m.

Never use boxes, ladders or other equipment to achieve extra working height.

WORK PLATFORMS, 1 AND 2-COLUMN

Work platforms must be suitable for the tasks to be performed in terms of load-bearing capacity, size, etc. There must be usage instructions in Danish on the work platform. These must include information on the use, operation and daily maintenance of the platform.

The working platform site must have a clear sign with brief usage instructions. This must state, among other things, the maximum permitted load and the distribution of the load over the platform.



It must be possible to disconnect the power supply - with a key switch, for example - to prevent unauthorised persons from operating the personnel lift.
The platform must not be used as a hoist.

All work platforms commissioned after 1 January 1997 must bear CE labels and be compliant with the requirements of the Machinery Directive.

Logs

It must be possible to read the history of the platform in logs kept at or near to the work platform. Among other things, these must include information on load tests, repairs and inspections. The owner of the equipment is responsible for keeping the logs.

Inspections

Logs

Documentation for:

- Approval and reporting.
- Load testing, stability, etc.

Information on:

- Main inspections, repairs, replacement of carrying means.
- Working Environment Authority enforcement notices relating to equipment.
- Make, year of manufacture and the name of the importer, plus any certificates for carrying means.

A main inspection must be carried out by the supplier or another expert at least once a year.

Erection

Only people who have received special instruction and have a knowledge of the supplier's usage instructions may erect, alter, move and dismantle work platforms. The same is applicable to work platforms designed for continuous moving.

The substrate must be load-bearing and capable of absorbing the compressive forces specified by the supplier.

Chocks must be max. 0.20 m high and stable, and they must be able to absorb the forces present in all directions.

If the mast is secured to a building element, both this and the material used for securing it must be able to absorb the necessary forces.

There must be cordons/traffic barriers according to the rules of the road authority if the work platform is erected in an area used by traffic.

Moving the work platforms

Work platforms may only be moved if the substrate is firm and load-bearing. In addition, it is necessary to ensure that the mast height does not exceed the supplier's specifications.

The supporting legs must be positioned directly above ground level.

Follow the supplier's instructions with regard to wind and weather conditions.

Signs

There must be a sign close to the gate which describes the maximum load in the following terms:

- Max. load in kg.
- Distribution of the load over the platform.
- The number of persons and other load (one person is equivalent to 85 kg).

The control panel must be provided with clear pictograms or text in Danish.

Covering

The work platform need only be covered if this has been agreed with the scaffold erector, and when the supplier's instructions are met. Even a small cover or signs on the guard rail will increase the wind load on the platform. This puts higher demands on erection/securing.

Access

There must be easy access to the platform. There must be permanent steps or a ladder if the distance to the ground exceeds 0.5 m. Steps and ladders must have hand rails or other support options.
The gate on the platform must be self-closing, and it must not be possible to open it outwards. The gate must also have an automatic lock or electrical contact which prevents the platform from being raised when the gate is open.

Guard rails/barriers

The platform must normally have guard rails on all sides which comprise a hand rail at a height of 1 metre, a knee rail at a height of 0.5 metres and a footboard at min. 0.15 m. Guard rails may also comprise solid panels or nets.

The internal guard rail can be omitted when working on a façade, but only if the floor of the platform follows the façade and the distance between the façade and the platform does not exceed 0.3 m at any point.

On a one-column personnel lift when working on a façade wall, the guard rail may only be removed if the work platform is provided at either end with a guide roller applied to the façade wall and if the

distance between the work position and the façade is less than or equal to 0.3 m.

There must be a durable marker around the work platform so that nobody can come dangerously close to the platform's work area.

Floor

The floor must be horizontal and made from a non-slip material. There must be a drain for rainwater, and openings in the floor must be max. 25 mm.

Working on work platforms

The load on the work platform must not exceed what the supplier has stated on the load plate, which must be located close to the access gate.

The maximum load must be described as the max. load i kg, the distribution of the load and the number of persons and other load. One person is equivalent to 85 kg.

It must always be possible to summon at least one person from the work site when work is being carried out on the platform. This may be necessary in the event of a stoppage or accident. It must be possible to summon people by shouting or using a mobile phone.

The work platform must not be operated until the driver has made sure that there is no risk of open windows, etc. touching the platform as it moves.

Minors under 18 may only operate work platforms if this takes place in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction. However, minors under 18 may work from a work platform.

Do not use ladders, boxes or similar to increase the working height.

The work platform must not normally be left in its raised position. However, this may be necessary, and in such instances this must be agreed with the regional supervisory centre. Balcony work may be one such example.

In such situations, work decks, work platforms and other access routes must be secured using guard rails or some other form for effective protection against falling. The control panel must also have a lockable switch.

Position the platform in its lowermost position at the end of the working day. Also remember; the power supply must be switched off and locked.

Particular risks

Avoid being crushed while the machine is in motion - ensure there is screening or similar. There may be a risk of being crushed between the mast and the platform, between the platform and building elements, or between the platform and the ground.

Avoid collisions with open windows and other structures/materials. This may overload the platform, resulting in a risk of collapse.

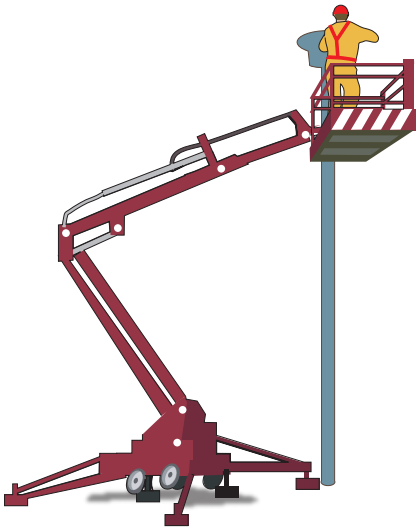
Uneven weight distribution on the work platform may have fatal consequences.

If the working height is over 30 m, a contingency plan has to be compiled which describes how people can be rescued or helped in an emergency.

PERSONNEL LIFTS/ TELESCOPIC LOADERS WITH BASKETS

Personnel lifts must be suitable for the tasks to be performed This applies to load-bearing capacity, reach, etc. There must be usage instructions in Danish on the equipment, describing - among other things - what the lift may be used for, its operation, emergency lowering and daily maintenance.

The work platform must bear a clear sign which describes the maximum permitted load. The control panel must bear clear pictograms or text in Danish.



Logs

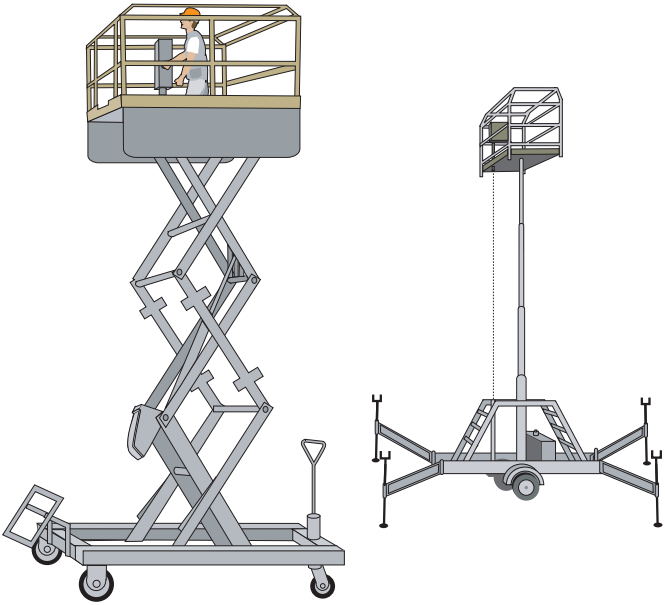
It must be possible to read the history of the platform in logs kept on the equipment. Among other things, these must include information on load tests, repairs and inspections. The owner of the equipment is responsible for keeping the logs.

Inspections

A main inspection must be carried out by the supplier or another expert at least once a year.

Design

The work position must have an enclosure 1.1 m high on all sides. This enclosure must either be made of a suitable panel material or be in the form of secure guard rails. Guard rails must as a minimum have a hand rail, a knee rail and a foot rail 0.15 m high with no gap from the floor.



The gate in the enclosure must be self-closing and must not open outwards.

To prevent hands from becoming trapped, there must be a 10 cm hand rail within and 10 cm above the top edge of the enclosure.

The actuating buttons in the basket must have a dead man's control function and be installed or labelled so that incorrect operation is avoided. Buttons, handles, etc. for operation of the personel lift must be marked with symbols which are easy to understand (pictograms) or text in Danish.

Use of personnel lift

People on the work platform must use safety harnesses and safety lines. However, this is not applicable if the personnel lift can only lift vertically, e.g. a scissor lift.

The erection location must be secure and load-bearing. The supplier's instructions with regard to the use of supporting legs and max. ground slope must always be followed.

There must be barriers or some other way of diverting traffic if you are going to use the personnel lift in an area subject to high traffic.

There must be at least one person on the work site who can be called in the event of a stoppage or accident when someone is working on the lift. It must be possible to summon this person by shouting or using a mobile phone.

Minors under 18 may only operate personnel lifts if this takes place in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction.

However, minors under 18 may work from a personnel lift.

PERSONNEL LIFT WITH CRANE BASKET

As a general rule, lifting people in a crane basket is prohibited unless the crane is specially kitted out to do so.

However, the Working Environment Authority may grant an exemption to this on the basis of an application. The following information must be forwarded beforehand:

- A risk assessment which states that other, safer solutions cannot be used due to technical or economic reasons and that there is sufficient safety when lifting people using a crane.
- The period over which people will be lifted using the crane, and a description of the task.
- Drawings and calculations of the crane basket planned for use.
- Documentation stating that the safety factors used when dimensioning the crane and lifting gear are compliant with applicable requirements.
- A description of the inspection and checking procedures intended for use before work commences, both after erection and in daily use.
- Identification of the crane to be used for lifting people along with documentation on the safety-related state of the crane, including complete 12-month and 10-year inspections.

Use

The person in the basket and the crane driver must be able to talk to one another, possibly by means of a radio or telephone.

The work basket must not normally be left in its raised position. If this is necessary to allow a task to be done, an exemption must be applied for first.

An application for exemption is conditional upon:

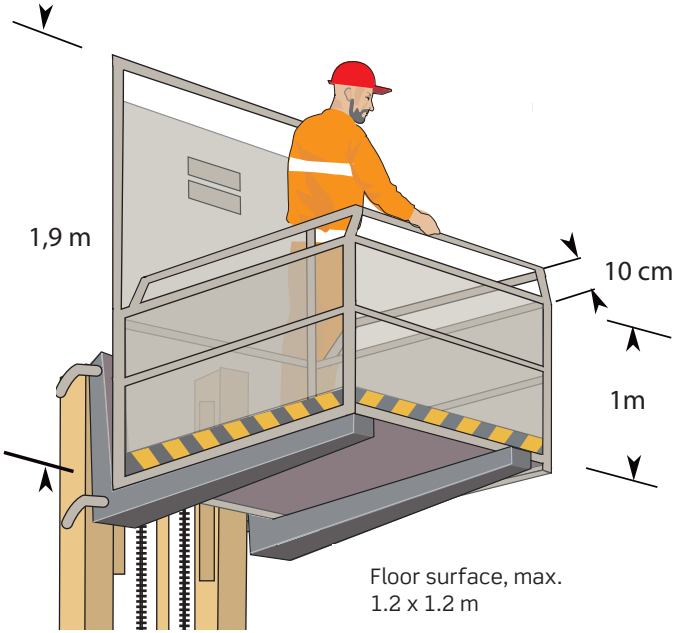
- A description of the work.
- Personnel wearing approved fall protection equipment when leaving the basket, and ensuring that the safety line is always secured to the crane hook or a permanent structural element.
- Ensuring that inspection and maintenance procedures are in place for fall protection equipment and securing of the line.
- Constant supervision of the task taking place.

Design

There is a long series of requirements with regard to the design of the crane and the basket. For more information on this, see the the Working Environment Authority's guides.

PERSONNEL LIFT WITH FORK LIFT TRUCK

Using a fork lift truck to lift people is permitted. This may take place during minor repair and replacement work or for work of short duration.



Design

The lifting capacity of the truck at its maximum lifting height must be at least four times the maximum permissible load of the work basket.

The floor surface in the work basket must not exceed 1.2 x 1.2 m and be no less than 0.6 m^2 per person. The floor must be without gaps and non- slip.

The work basket must be kitted out as a personnel lift as shown in the drawing. However, there must be an enclosure at least 1.9 m high facing the truck mast to prevent anyone being trapped against the mast.

The personnel basket must be secured properly to the truck, and it is necessary to ensure that it cannot be uncoupled by mistake.

Use

Driving is not permitted when there are people in the personnel basket.

Fork lift trucks with work platforms require an even, load-bearing surface to drive on (floors, permanent roads or iron plates).

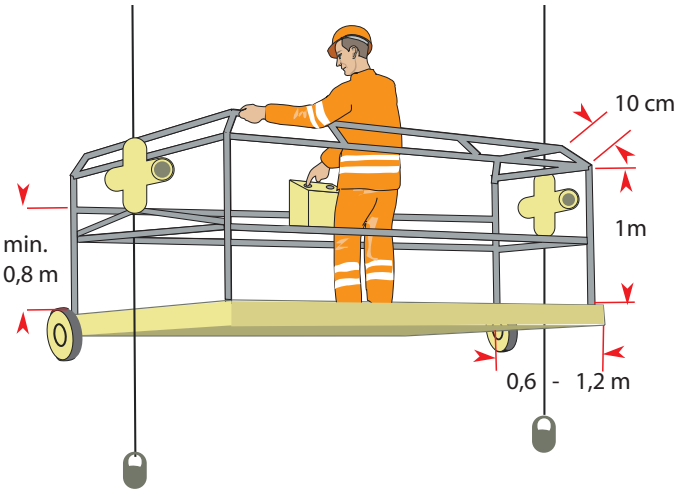
Minors under 18 may only use fork lift trucks to lift people if this is done in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction.

Logs and reporting

If you are to use a fork lift truck for lifting people, this must be reported to the Working Environment Authority. Logs must also be kept which are left in the truck. These logs must provide information on the history of the truck, including information on repairs, load tests, inspections, etc.

FACADE HOISTS

Any facade hoist dating from before 1 January 1997 must be approved by the Working Environment Authority. After this date, it must be type-approved or constructed in accordance with a harmonised EU standard.



Logs

Logs must be placed on or near to the facade hoist. These must describe the history of the equipment, including information on repairs, load tests and inspections. The owner of the equipment keeps these logs.

Inspections

A main inspection must be carried out by the supplier or another expert at least once every 12 months.

Design

A facade hoist is a work platform or bosun's chair with a winch, hook and captivation device. Facade hoists are machines and therefore must be CE-labelled. The supplier's usage instructions must be formulated in compliance with the Working Environment Authority's provisions in the executive order on the design of technical aids. The usage instructions form the basis for the suspension, use and repair and maintenance of the facade hoist, where it must be ensured that:

- All mechanical and electrical elements are protected against harmful effects resulting from the weather and the work.
- Articulated facade hoists do not incline by more than 10% during work.
- The suspension system (boom, carrier rail, roof trolley) is made of steel or aluminium.
- Facade hoists and bosun's chairs with platforms are no more than 1 m^2 in area if they are suspended from one carrier cable.
- Bosun's chairs must be fitted with rollers, wheels or skids.
- Parts must be secured with a chain or strap, and hooks must be provided with devices to prevent them becoming unhooked.
- Winch operation must be such that free lowering during normal operation is not possible.
- All moving parts must be secured to prevent trapping.
- All inlets on rope reels and guide discs must be screened to prevent trapping.

The facade hoist must be fitted with guard rails. These must comprise a hand rail at a height of 1 metre, a knee rail at a height of 0.5 metres and a foot rail (0.15 m) immediately above the floor. It must also be fitted with free-running rollers or similar against the façade.

Each winch on the facade hoist must be fitted with a captivation device, each of which acts on its own safety line. Winch ropes and safety lines must be secured independently of one another.

There must be usage instructions and guides in Danish which describe securing, suspension, operation, loading and maintenance. A guide must be provided with the facade hoist.

Working from facade hoists

Minors under 18 may only operate facade hoists in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction.

However, minors under 18 may work from a facade hoist.

LADDERS

Ladders must be suitable for the tasks to be performed in respect of design, size, etc. All ladders must be supplied with usage instructions in Danish. These must specify what the ladder may be used for, correct setup, daily maintenance, etc.

Ladders for normal use must be compliant with the provisions of DS/INSTA 650 or EN 131. However, ladders can also be designed in other ways which are just as effective. It is also a good idea to use

ladders with wide rungs as these ensure a better working position and better blood circulation.

All ladders must be inspected at appropriate intervals for looseness, cracks and broken sections, and defective ladders must be repaired or discarded immediately.

A personnel lift or scaffold, for example, must be used wherever the use of a ladder is inappropriate or not permitted.

Use

Ladders may only be used for work for short periods. The time limit for specific tasks is 30 minutes.

If work is taking place on a shift basis and from a firm base, ladder work must not exceed 1/3 of the daily working hours.

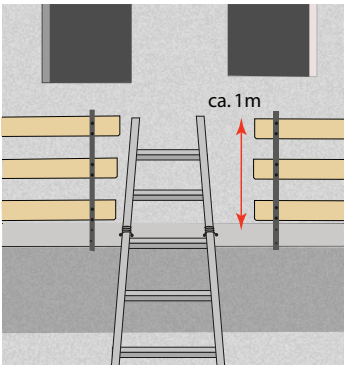
Other rules when working on ladders:

- Wear appropriate footwear.
- Carry only smaller objects in your hands.
- Tools must be light and easy to handle.
- It must be possible to operate tools with one hand.
- The working height must normally be no higher than 5 m (from ground level to the rung on which you are standing).

You may work higher up in exceptional cases, e.g. when replacing bulbs, installing elements and carrying out other service tasks. There must be a person to hold the ladder if you work more than 5 m up. During element installation, you can use ladders at working heights of up to 8 m in connection with:

- Installation of top fittings and guard rail posts.
- Attaching and detaching elements.
- Guiding elements.
- Pointing.
- Minor repairs.

Ladders as access routes



If you have to use a ladder as an access route, it has to be secured properly. It must also be at an appropriate gradient, and there must be a handhold approx. 1 m above the top level.

RAPPELLING

When working in places which are difficult to access, e.g. inspection under bridges, it may be necessary to use ropes (rappelling) as a technical aid when carrying out this work. Rappelling may take place only if you are unable to use other, more appropriate and safer equipment. An assessment of the work and selection of a solution in relation to health and safety must always be undertaken.

If, through this assessment, you come to the conclusion that rappelling is the best, safest solution, the following criteria must be met:

- You must use at least two ropes, each with its own independent anchor point. One is a load-bearing rope, the other is to ensure your safety.
- The employee must be equipped with a climbing harness which must be connected to the safety rope.
- The working rope must be fitted with a safe ascending and lowering mechanism and have an automatic blocking system.
- The safety rope must be fitted with a moving fall protection device which follows the movements of the user.
- Tools and other accessories must be secured firmly to the climbing harness or chair.
- Employees carrying out rappelling must have received particularly comprehensive training on the execution of the work in question, especially the relevant rescue procedures.

ROPE ACCESS (INDUSTRIAL CLIMBING)

Rope access is work where ropes are used to provide access to the work site – industrial climbing.

The following conditions must be met in the case of work supported by ropes:

- You must use at least two ropes, each with its own independent anchor point. One is a load-bearing rope, the other is to ensure your safety.
- The employee must be equipped with a climbing harness which must be connected to the safety rope.
- The working rope must be fitted with a safe ascending and lowering mechanism and have an automatic blocking system.
- The safety rope must be fitted with a moving fall protection device which follows the movements of the user.
- Tools and other accessories must be secured firmly to the climbing harness or chair.
- Winch operation must be such that free lowering during normal operation is not possible.
- All moving parts must be secured to prevent trapping.
- All inlets on rope reels and guide discs must be screened to prevent trapping.

Employees carrying out rope access must have received particularly comprehensive training on the execution of the work in question, especially the relevant rescue procedures.

LIFTING AND HOISTING EQUIPMENT

This equipment must be designed for the tasks to be performed in respect of load-bearing capacity, layout, etc. This equipment must be supplied with usage instructions in Danish. Among other things, these must indicate what the equipment may be used for, e.g. operation, maximum permissible load, usage restrictions and daily maintenance.

Minors under 18 may only operate hoisting equipment in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction and hold the necessary certificates.

Training and certificate requirements

Certificates are required if you have to use the equipment to lift loads, either free-hanging or supported. See the table below:

Certificate types	Fork lift trucks and telescopic loaders	Other valid certificates
Fork lift truck - A	Fork lift stackers	The B certificate is also valid for fork lift stackers
Fork lift truck - B	Fork lift truck	
Telescopic loader - A	Telescopic loader with forks	Fork lift truck B
Telescopic loader - B	Telescopic loader as crane	D certificate E certificate B certificate

Certificate types	Crane types	Other valid certificates	
A	Rotating tower crane (construction crane) Slewing crane (harbour crane) Overhead crane (shipyard crane)		
B	Mobile crane	The B certificate is also valid for telescopic loaders with forks	
C	Overhead travelling crane Gantry crane	A	
		B - acquired before 01.01.2000	
		B - acquired after 01.01.2000	
D	Truck mounted crane 8 tm - 25 tm	B - acquired before 01.01.2000	
		E	
		The D certificate is also valid for telescopic loaders with forks	
E	Truck mounted crane over 25 tm Tractor mounted crane over 25 tm Telescopic loaders designed as cranes over 25 tm	B - acquired before 01.01.2000	
		The E certificate is also valid for telescopic loaders with forks	
G	Contract machinery used as cranes	B - acquired before 01.01.2000	
		B - acquired after 01.01.2000	
		D	E

The driver does not need to have a crane driver's certificate if he is operating contract machinery which is only occasionally used as a crane in connection with the normal tasks of the machinery. He may thus carry out this work as long as the following conditions are met:

- There must be nobody in the immediate vicinity of the load when it is lifted, transported and set down.
- The load must not be lifted more than approx. 1 m above ground level.
- The machinery must be inspected and maintained in compliance with the supplier's instructions.
- The supplier's usage and maintenance instructions are on the machine.
- The machine is designed for crane work, cf. the supplier's usage instructions.

Inspections

The driver must report any fault or irregularity in the equipment to the employer. This is important so that the equipment can be fixed before work recommences.

A main inspection in accordance with the manufacturer's instructions must be carried out by the supplier or another expert at least once a year.
Hoisting gear which is used outdoors must also undergo a 10-year inspection from a special expert. The results of the 10-year inspection must be documented in a report, and the Working Environment Authority must receive a copy of this.

Logs

Equipment which requires notification must carry logs which describe the history of the equipment and include information on load tests, repairs and inspection. The owner of the equipment keeps these logs.

Reporting

There are a number of hoisting implements which must be reported to the Working Environment Authority in connection with new purchases, change of owner or following significant renovation or repair.

This is applicable to:

- All hoisting gear and winches designed for lifting persons.
- All hoisting gear and winches used for changing installation positions.
- Permanently mounted lifting equipment with a maximum load of more than 300 kg. The limit is 1000 kg for electric hoists.

For every new installation, it is also necessary to report permanently mounted hoisting gear and hoisting gear requiring significant installation work when it is set up. This is applicable e.g. in connection with moving tower and construction cranes, irrespective of whether the installation is taking place for the same owner.

Mobile hoisting gear, e.g. winches, mobile cranes and truck-mounted cranes, do not have to be reported when setting them up for the same owner.

Load testing

Load testing of all new hoisting gear must take place before it is commissioned. Also carry out load testing in the event of:

- Major reconstruction or repair
- Every main inspection and 10 year inspection.
- Replacement of carrying means
- New setup where a report also has to be submitted to the Working Environment Authority.

CRANES

Minors under 18 may only operate cranes in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction and hold the necessary certificates.

Wind

The maximum wind strength under which the crane may work must be described in the crane's usage instructions.

Even a light wind may cause the load to swing and can therefore make lifting unsafe.

In each individual situation, the crane driver must assess whether he can undertake the lift safely so that neither the gear nor the ground assistant are endangered.

Hooking

When a load is secured or released to a crane hook, this is known as hooking. The ground assistant must have received instruction on how to carry out the work, including the specific hooking work. The ground assistant ought to have completed a relevant course. These courses are offered by the technical colleges and by some suppliers of hooking gear.

The ground assistant must be familiar with the labelling on the hooking gear, which provides information on the permitted load for chains, webbing, etc. and maximum webbing angles.

A startup meeting should be held prior to installation work. Here, the ground assistant and crane driver review the installation sequence and guidelines for the lifting job in question.

Always follow the specification on the load/delivery note as regards hooking.

Before final lifting, the load must be lifted slowly clear of the substrate, and you must then check that:

- the load is in equilibrium (hangs straight),
- the webbing and hooking gear are seated correctly,
- the webbing is not trapped,
- the load is not caught on the substrate.

When positioning the load, the ground assistant must ensure that:

- the load can be positioned securely, supported safely and such that the hooking equipment can be removed without risk,

- the hooking equipment is kept taut while any bracing of the load takes place.

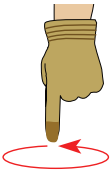
The gear can be sent back once the hooking equipment has been suspended safely from the crane hook and secured to prevent trapping.

If there is any doubt about the safety of the hooking, the weight of the load or any other aspect, work must stop. This is the responsibility of the ground assistant, and he must subsequently consult the contractor/crane driver.

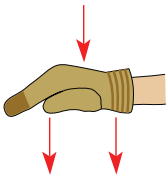
If lifting is already in progress, the driver must immediately lower the load to the nearest safe resting position.

The ground assistant and crane driver are entitled and obliged to refuse to do a lift if they feel that the lifting in question may be dangerous.

Hoists



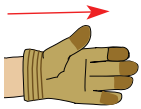
Lower



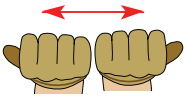
Lower (used at short distances between hookers and crane drivers)

Rising barriers

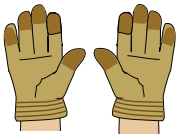
Swing left



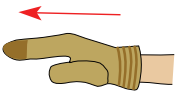
Swing right



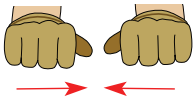
Telescope out



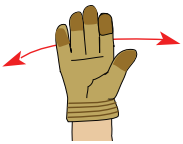
Quick stop



This direction



Telescope in



Signal not understood

"Lollipops" are used at long distances

Hooking gear

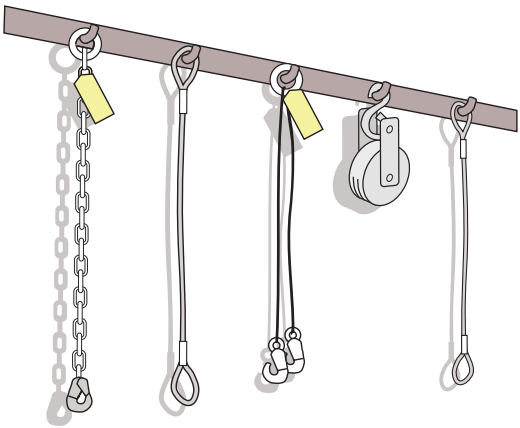
Hooking gear must be fitted with a legible sign or other display. The SWL/WLL must be specified here, along with the date of the last inspection.

The hooking equipment may also be supplied with a colour code which indicates when the last inspection took place; cf. below.

Farvekoden Hvid angiver at materiellet er kasseret

Hooking gear must be checked every time it is used, and it must undergo a main inspection at least once a year.

Follow the supplier's instructions on when the gear should be discarded. There must be Danish usage instructions on the hooking gear to the necessary extent.

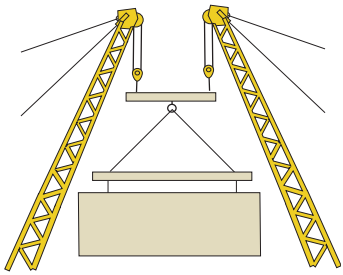


Hooking gear should always be stored properly in a dry, airy place. Fibre ropes in particular must be protected against direct sunlight as ultraviolet rays will break down the rope. Discarded gear must be kept separate from other gear.

- Crane and hoisting hooks must be provided with devices to prevent them becoming unhooked.
- Galvanised hooking gear must not be used for lifting jobs in saltwater.
- Wire webbing must not kink when tensioned.
- Chains under load must not be twisted. Shortening must take place using an approved shortening hook, and joints must be made using approved joint links.
- Webbing/fibre ropes must be protected from sharp edges.

Double lifting

Double lifting with cranes must be planned carefully. This task must be managed by an expert, who must maintain safe communication with both crane drivers.



Both cranes should be of the same type, and ideally use the same speed regulation system. At no time may the load exceed 75% of the capacity of each individual crane. If nec-

essary, special gear must be used which ensures correct weight distribution and vertical lifting.

TOWER CRANES

Erection

Specially trained staff must erect tower cranes. When a crane is erected, it is necessary to follow the supplier's instructions; in particular as regards the substrate, tolerances, securing of crane rails, etc. Following erection, the crane must be reported and test-loaded.

The crane must be placed on a load-bearing substrate at a safe distance from steep slopes and excavations. Moving parts on the crane must not cause a risk of trapping; the distance between crane parts and buildings, structures and materials must be at least 0.50 m.

During erection, it is important to:

- Set up a sign showing the permissible load.
- Check the height stop, operation end stop and emergency stop.
- Check signalling devices (bell/horn).
- Make sure there is an instruction manual and logs in the driver's cab.
- Test drive the crane together with the crane driver so that any faults are rectified before the installer leaves the site.

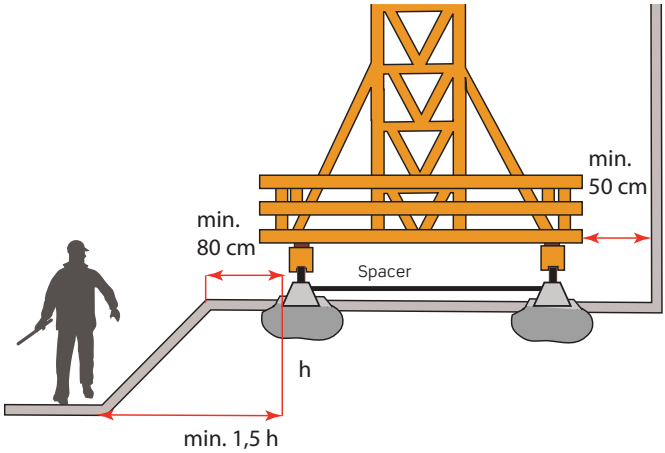
There must be a personnel hoist on the crane when the access route to the driver's cab is more than 25 m. However, this is necessary only if the crane is in position for more than 2 months and this is possible in practical and technical terms.

There must be warning signs bearing the words: "Gå ikke under hængende last." [Do not walk beneath suspended loads.] when the crane is used in areas where people are moving around. These signs must be visible and readily legible.

Crane rails

Requirements for crane rails:

- The crane rail must be placed on a load-bearing surface. Materials which may become wet and thereby impair the stability of the crane must be dug out and replaced with some other load-bearing material (such as broken stone ballast, laid out in thin layers and rolled after each application).
- Where necessary, the craneway can be cast in concrete in accordance with the instruction manual.
- The crane rail must be drained and the rails aligned so that the tolerances for distance and height difference can be observed.
- Rail joints must be implemented so that rigid joining of the rail ends is assured. These are supported by double or particularly wide transverse sleepers.
- The track must be laid so as to ensure a safe distance between the rails and steep slopes, excavations, fixed parts and material stores.



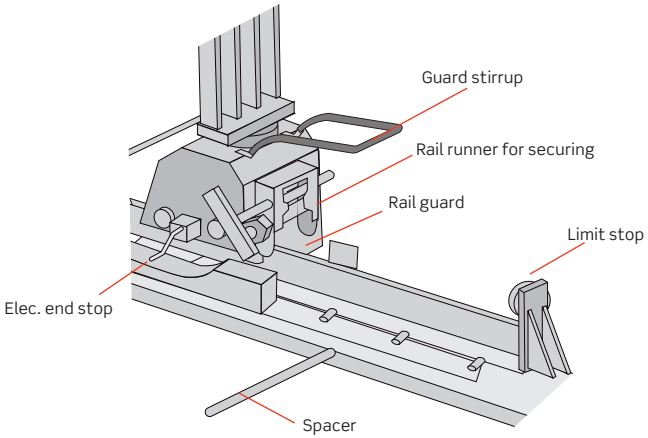
When the rails are laid, it is necessary to check that:

- the track gauge has been checked and found to be correct, and that the dimensions and tolerances prescribed by the supplier have been observed – and that there is a smooth transition to curved sections,

- the rails have fixed end stops applied to each rail and sufficiently far away, but at least 30 cm, from the outermost rail support. These end stops must be applied so that the stops at the same end of the track are touched by the crane at the same time,

- operation end stops for the machinery are applied such that the crane is braked fully before the fixed end stops are reached,

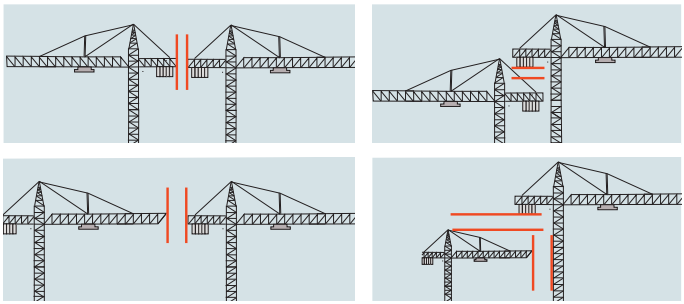
- bogies (drive wheels) stand straight on the rails and are fitted with rail guards, guard stirrup and rail claws,
- the crane is fitted with devices which prevent it from tipping over if an axle breaks or the crane is derailed.

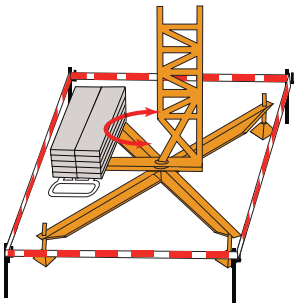


A crane moving on rails must not be able to collide with people, e.g. in situations in which a full overview of the driving area is not possible. This can be rectified by cordoning off the driving area or by providing the crane with flexible contact stops. Crane rails should be checked by driving through the curves before the fitters leave the site.

Collision

If there are a number of tower cranes on the same site, they must not be able to collide with one another. When parking, the jib must be able to yaw freely in the wind without risking colliding with other cranes or building elements.





The yaw area must be marked off using clear, durable markers.

MOBILE CRANES AND OTHER MOVING CRANES

The risk of tipping over is dependent on the load-bearing capacity of the substrate on which the crane is standing. Before lifting anything, therefore, the load-bearing capacity of the substrate must be documented. Supporting legs must be used as described in the crane's usage instructions, and the maximum supporting leg pressure will also be specified here.

Supporting legs must be folded out (extended) so that they correspond to the load and jib radius in question.

All supporting legs must be placed on a load-bearing substrate – where necessary, use plates beneath supporting legs to distribute the load over the substrate.

If the crane is to move with the load elevated, the substrate must be flat and firm, corresponding to a road prepared for finishing (asphalt). Otherwise, transport plates must be laid out.

LIFTING WITH FORK LIFTS

Pallet forks must only be used to lift loads which are suitable for lifting with a fork lift. It is necessary to make the load safe by securing it or by tilting the forks backwards when moving with the load. The forks must not be used directly as crane hooks.

The forks must be inspected regularly for wear, cracks and deformations. Forks may only be repaired by specialists, and only according to the supplier's instructions.

Minors under 18 may only operate machinery with forks for lifting in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction and hold the necessary certificates.

Driver certificates

- A driver certificate is required in order to use a telescopic loader with forks.
- A driver certificate is required to use a fork lift truck.
- Forks used on e.g. diggers and mini loaders do not require driver certificates.

LOADING AND TRANSPORT MACHINERY

Diggers, caterpillar tractors with buckets or blades, loaders with rubber wheels, dumpers, scrapers, graders and similar are regarded as loading and transport machinery.

The following must be ensured for these machines:

- Inspection according to the supplier's instructions, but at least once every 12 months.
- Danish usage instructions must always be supplied with the machine.
- They must be provided with safety cabs.

Only people aged over 18 and who hold valid driving licences – or tractor licences, as a minimum – may drive loading and transport machinery. Minors under 18 may only operate loading and transport machinery in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction.

HOISTS

Only specially trained personnel may carry out erection, dismantling and alteration of material hoists and building hoists for transporting people.

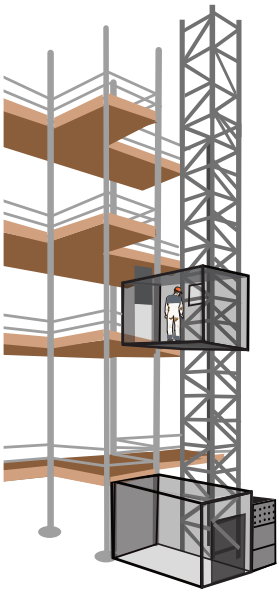
Minors under 18 may only operate hoists which are not controlled by pushbutton in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction.

The owner of the hoist or the person hiring the hoist must ensure that the hoist and its accessories are looked after and maintained properly in accordance with applicable requirements.

Building hoists intended for lifting persons

Erection inspection

When erecting, reconstructing or carrying out significant repairs to a hoist, an erection inspection of the unit must take place.
If the hoist has been erected correctly, this will be noted in the service book and an inspection sign will be put up in the hoist, showing the date of the next inspection.



If the erection inspection shows that the requirements have not been met, the owner or user responsible for the hoist must have information on this, with de-

tailed reasons for the deviation. The hoist must not be used until faults and defects have been rectified.

An inspection body accredited by a recognised accreditation body must undertake the erection inspection.

Inspections

An expert enterprise holding certification for this purpose must undertake the inspection, maintenance and repair of building hoists.

Building hoists intended for lifting persons must be inspected at least once a month.

The number of inspections a year must be specified in the service book for the hoist. Copies of inspection reports must be provided the service book.

Inspections also include access routes to the hoist and loading areas.

Inspection and testing

If the hoist has been set up in the same location for more than 12 months, it must be inspected and tested every calendar year, at intervals not exceeding 14 months. The same requirements as for erection inspection apply during inspection and testing.

Design

Hoists must be fitted with signs which indicate what they are to be used for – including inspection signs and a sign indicating the maximum load/number of persons.

Hoists intended for lifting persons must be secured so that only the door at the loading area can be opened. The loading area must also be secured with guard rails.

The design must be compliant with the guidelines in DS/EN 12159 (hoists intended for lifting persons) by 1 January 2012 at the latest.

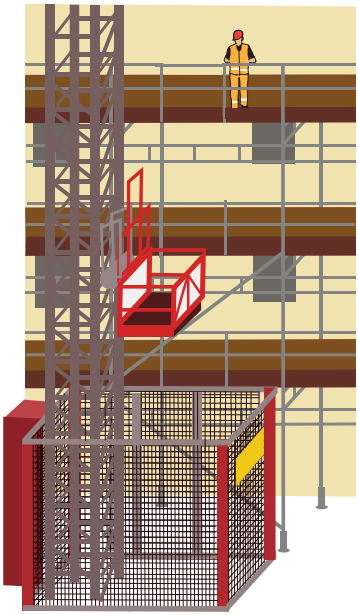
Building hoists intended for lifting goods

Inspections

An expert must ensure during appropriate inspection and maintenance that the goods hoist is still in a safe state.

The expert must undertake the inspection prior to commissioning and after every setup. If the hoist has been set up for any length of time in the same location, it must be inspected regularly – cf. the supplier's instructions – but at least once every 12 months.

It must be possible to document the results of the inspection and to make them available to the Working Environment Authority.



Design

Hoists must be fitted with signs which indicate what they are to be used for – including inspection signs and a sign indicating the maximum amount of goods.

Building hoists must be safeguarded against the risk of someone falling from the seat or loading area. This means that all loading areas above ground level must be fitted with full guard rails.

The seat on goods hoists must be secured with guard rails at a height of 1 metre.

The seat must also be designed so that there can be no risk of trapping when the hoist is being driven.

The design must be compliant with the guidelines in DS/EN 12158-1 (goods hoists) by 1 January 2012 at the latest.

Inclined hoists

Inclined hoists must be set up according to the supplier's instructions. Inclined hoists must be labelled with the maximum permitted load.

The following rules also apply:

- It is necessary to secure running rails firmly to both the ground and roof edges.
- Any supporting legs must stand on a firm, stable base and be secured to prevent slipping.
- The area around the hoist must be cordoned off to unauthorised traffic.
- There must be an emergency stop available from the operation

point, and an overview of the movements of the platform must be possible.

- The load must be secured to prevent it falling off, and it must not project by more than 20% over the side edge of the platform.
- It must be possible to use guard rails to secure standing positions at roof edges or wall openings to prevent falling.
- It must be possible to stop the hoist via a lockable main switch.

Minors under 18 may only operate inclined hoists in connection with industrial skills training (e.g. as apprentices), and if they have received the proper instruction.

MACHINERY AND TOOLS, GENERAL

General information on machine protection

The EU's Machinery Directive passed into Danish law in 1993. The Machinery Directive's requirements for safety and marketing are applicable to all machines produced after that date. The Directive is also applicable to all used machines imported from countries outside the EU.

Machinery produced before 1 January 1993 must still be compliant with Danish regulations.

Purchasing machinery

Before buying a new machine, it is necessary to assess:

- Where and how it will be used.

- Who will use it.
- What health and safety risks may occur.
- What the machine is like in relation to equivalent machines.
- How daily cleaning and maintenance take place.
- Are the noise and vibration levels acceptable.

When you buy a new machine, check whether it comes with usage instructions in Danish, and whether a copy of the EU declaration of conformity is supplied. The usage instructions must include information on how you should set up, use and maintain the machine.

Obligations of the supplier

On delivery, machines must be fitted with the necessary protective equipment. They must also be designed to be as user-friendly and as quiet as possible.

They must also include warnings and information on other types of hazard which may occur despite the safety arrangements.

CE 01

All new machines must be provided with a rating plate which provides the name and address of the manufacturer, the series and type designation, any serial number and the year of manufacture. The machines must also be provided with a CE label which indicates that the machine is compliant with the requirements of the Machinery Directive and hence Danish legislation. This label must be clear and durable.

When the machine is CE-labelled, the manufacturer must also supply an EU declaration of conformity with each individual machine.

The name and address of the importer must be stated on the machine.

Usage instructions

Usage instructions in Danish must be provided with all machines. The usage instructions must include the necessary information on how you can use the machine safely.

The usage instructions must also include information on how to:

- Start the machine.
- Use the machine.
- Operate the machine.
- Set up the machine.
- Install the machine.
- Set the machine.
- Maintain and repair the machine.

Any safety inspection requirements must also be specified in the usage instructions. They must also include information on the necessary training and any use of personal protective equipment, as well as information on vibration and noise levels.

The usage instructions include the plans and diagrams required to allow you to use the machine, maintain it, inspect it, check it and

repair it, as well as other useful information on the subject of safety. The usage instructions must be readily accessible.

The usage instructions must be specified directly on the machine insofar as this is possible.

Obligations of the user

Machines and similar must always comply with the requirements for technical aids. It is up to employers, business managers, supervisors, repairers and other employees to ensure that this is the case. This is independent of the obligations of the manufacturer and the supplier. Users must also ensure that machines and technical aids are used appropriately in a proper manner with regard to health and safety.

Protective equipment or safety elements must not be removed when you use the machine.

Employees must immediately reports faults with the machine or its protective equipment to the person responsible.

Be aware that there are special regulations for children and minors. Minors under 18 normally must not operate machines with fast-moving cutting tools, such as circular saws, metal cutting saws, shearing and cutting machines, hewing machines, milling and planing machines, etc.

However, these machines may be operated by minors under 18 if the machines are shielded in such a way as to render the moving and machining parts inaccessible during operation and there are no other hazards associated with the machine. However, this is possible only if minors receive thorough instruction on how to use the machine.

In connection with the work there must be usage instructions in Danish which indicate how to set up, operate and maintain the machine.

Special rules for machinery

There are special rules and guidelines for a number of machines and technical aids:

- Executive orders with technical regulations, the provisions of which must be complied with.
- At guides, how to use the machine properly. However, this may well be done in other ways as long as at least an equivalent safety level is achieved.

A number of standards have been compiled in connection with the Machinery Directive. When a machine is produced in compliance with a harmonised standard, it is possible to assume that the machine is compliant with the requirements of the Machinery Directive and hence Danish legislation.

Approval

There are no general requirements for approval of machines – although type testing and type approval are required for a number of hazardous machines.

If you are in any doubt as to whether a machine is compliant with applicable rules, you can request information from the Working Environment Authority.

Validity

The rules on machine protection are applicable to all machines, irrespective of how they are used and who uses them. These rules are also applicable to machines which are used entirely for private purposes (e.g. hobby machines).

Inspection of machinery

It is the obligation of the employer (user) to inspect machines and machine systems regularly in order to ensure that they are entirely safe.

The usage instructions must specify when and how regular maintenance is to take place. Here, it is necessary to comply with the supplier's instructions.

Inspection should take place at intervals set for each individual machine, e.g. in relation to how often it is used.

The supplier or another expert must carry out the inspection.

Setting up machinery

Machines must be set up such that it is possible to work with them comfortably and without risk. There must also be somewhere to repair and maintain the machines.

Design of machines

Machines must be designed such that they do not pose a risk to safety or health when they are installed and maintained and when they are used for the purpose for which they have been designed.

That is to say, they must be designed so that the following elements cannot cause injury:

- Moving machine elements.
- Machine elements or materials which are flung out.
- Development of e.g. smoke, gas, dust, hazardous substances and materials.
- Noise.
- Vibration.
- Electricity.
- Heat.
- Cold.
- Radiation.
- Fire.
- Explosion.

It must not be possible to reach or fall into the hazardous area.

It must be possible to carry out work at or with the machine in appropriate working positions.

Protection devices

Protection devices must be able to withstand both physical and chemical influences such as heavyhanded handling and loads from foreseeable misuse.

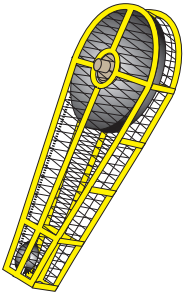
Mobile safety screens and similar must be connected to the ma-

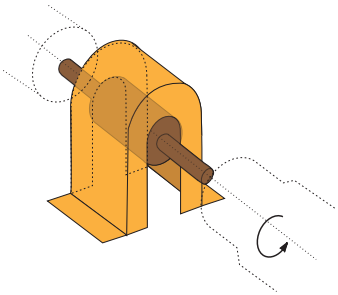
chine in such a way that hazardous machine movement can take place only when the screens are in their safety position.

Protection devices must be inspected regularly, and their function and condition must be checked as indicated by the supplier.

Shields

Shields must prevent people from touching hazardous machine elements or tools, or such things from being flung out and causing accidents.





Shields are also used against the risk of radiation, e.g. in the case of heat, light, radioactivity and lasers, and against cold and draughts.

Operating buttons and handles

Buttons, handles and pedals for operation of machines must be designed and positioned so as to prevent incorrect operation. They must be designed correctly from an ergonomic standpoint.

Start buttons must be recessed, covered or subject to requirements so that the machine cannot be started accidentally. Start buttons

should ideally be white or green, but they may also be grey or black.

Positioning of operating points

From the operating point, there must normally be a complete overview of the machine's risk zones. If this is not possible (e.g. in the case of larger, combination machinery), the starting device must automatically give a clear warning signal in plenty of time before the machine starts.

Stop device

Every machine much be fitted with a stop device which can be operated quickly, easily and without risk from a normal operating point. The stop button must normally be red. If there are a number of operating points on one and the same machine, the stop buttons at the other operating points must be designed as emergency stop buttons.

Emergency stop

There must be emergency stops on machines if such emergency stops are able to limit accidents or prevent near-accidents. There must be emergency stops in the hazardous locations in addition to the normal stop device. If necessary, the emergency stop must be combined with an automatic brake.

The emergency stop must be red and positioned so that it can be seen and operated easily. The emergency stop may be a mushroom-shaped button, a bar or a pull-cord. The word NØDSTOP [EMERGENCY STOP] must appear on or beside an emergency stop. However, the text may be omitted if the emergency stop is a red mushroom shape with a yellow base plate. In some situations, emergency stops may also be integrated into operating pedals, pedals for operation of thread cutting machines and plate rolls. A gentle pressure on the pedal operates the machine, but if the pedal is fully depressed, it

stops. That is to say, an emergency stop is built in.

The machine may only be restarted using the normal starting device once the emergency stop has been returned manually to the "ready" position.
If failure of the general operating controls may be hazardous, there must also be an emergency stop together with the operating controls.

Remote control

Radio and other wireless controls are typically used in connection with the operation of cranes, lifting platforms, winches, stationary and mobile machines and gates.

It must be possible to carry the operating unit in such a way that it cannot be dropped. All hazardous machine movements must normally be controlled by holding them down (dead man's control function).

The unit must normally be fitted with an emergency stop, a locking option, indicator lamp and durable operating symbols or text which can be understood easily. The driver must normally be able to give a warning signal, e.g. a horn signal. The receiver must be protected against signals from external transmitters.

If a signal is interrupted, suffers interference or is not received, this must normally result in all movements stopping and braking.

When remotely controlled aids are used, there must be signs put up in appropriate places which warn of the fact that remotely controlled aids are in use.

It must be possible to switch off the power supply to a machine quickly and safely.

Hold-down button (dead man's control)

A hold-down switch is a starter device which ensures that a machine can run only as long as the switch is held down. Anyone operating a hold-down switch must have a complete overview of hazardous machine movements. If the operating device is released, the operator must not be able to reach into the hazard zone until the hazard has been prevented, e.g. when the movement has stopped.

In special cases it is a requirement that the movement of the machine is stopped both when releasing the operating device and when using force to operate it, i.e. depressing it fully. A three-position switch (panic switch) can be used in these instances.

Two-handed operation

Two-handed operation prevents the operator inserting a hand into the hazardous area of a machine.

Two-handed operation must be positioned and designed such that:

- Machine movement can commence only if both hands are used simultaneously (it is recommended that the simultaneity required should be set to between 0.2 sec. and 1 sec.).
- Machine movement stops in less time than it takes to move a hand from two-handed operation to the hazardous area if just one of the operating devices is released.
- The machine can only be set in motion once again when both operating devices are returned to their starting position.
- Accidental and incorrect operation are prevented.

Brakes

A machine must be fitted with brakes if it continues running once the motor has been switched off (run-on) and hence there may be a risk of accidents.

The brakes must normally operate automatically when the power has been switched off. If they do not do so, it must be possible to operate the brakes from the operating point. There must be a sign on the machine with clear, durable text.

MACHINERY FOR CONCRETE AND MORTAR

Mixing machines

Use a conveyor, screw conveyor, hoisting gear rather than shovelling if the mixing machine is used a lot. This helps to reduce burdens on the people who are to fill the machine.

Mixing machines, screw conveyors, etc. may be operated by minors under 18 if the machines are shielded in such a way as to render the moving and machining parts inaccessible during operation and there are no other hazards associated with the machine. However, this is possible only if minors receive thorough instruction on how to use the machine.

In connection with the work there must be usage instructions in Danish which indicate how to set up, operate and maintain the machine.

Concrete surface finishers

Machines with petrol engines may only be used indoors when the rooms are well ventilated.

Concrete surface finishers with rotating discs or propellers must be secured as follows:

- Rotating discs or propellers must be shielded so that no part of a foot can enter the hazard zone.
- The machine must have a hold-down handle (dead man's control)
- On petrol-driven machines, it must be possible to activate the starter while operating th hold-down handle on the steering gear.

Vibrators

Vibrators which are used to distribute wet concrete in moulds and to level off floors and floor decks are driven by low-voltage motors via transformers.

It may be necessary to restrict work periods if the vibration level is high (find out more in the section on vibrations).

Good maintenance is a must if vibration damping is to work effectively. There should be a switch on the operating handle if the vibrator motor is built into the unit.

Do not leave an immersion vibrator with the motor on.

If the vibrator does not have a switch in the handle, you have to take it to the switch, place it in a stand or secure it in some other way until it has stopped.

Minors under 18 may only operate concrete surface finishers and vibrators in connection with industrial skills training which (e.g. as apprentices), and if they have received the proper instruction.

MACHINERY FOR WOOD

Stationary machines

Table saws, bandsaws and planing machines must be set at a good working height. This will prevent people having to bend forwards unnecessarily. There must be a rolling trestle to support long or wide pieces.

Materials and finished goods must also be placed at a good working height and as close as possible to the machine.

If handheld machines are used on benches as stationary machines, the requirements for stationary machines must be met.

At permanent work sites, there must be equipment which can catch or suck up dust and shavings during cutting. Extracted air must not be recirculated.
Woodworking machines require the user to have received special instruction on how to use these machines properly.

In general, gloves must not be worn when working with woodworking machines unless the tools are entirely shielded to prevent contact.

Machines with fast-moving cutting tools such as circular saws, table saws, crosscut saws and planing machines may be operated by minors under 18 if the machines are shielded in such a way as to render the moving and machining parts inaccessible during operation and there are no other hazards associated with the machine. However, this is possible only if minors receive thorough instruction on how to use the machine.

There must be usage instructions in Danish which indicate how to set up, operate and maintain the machine in connection with work.

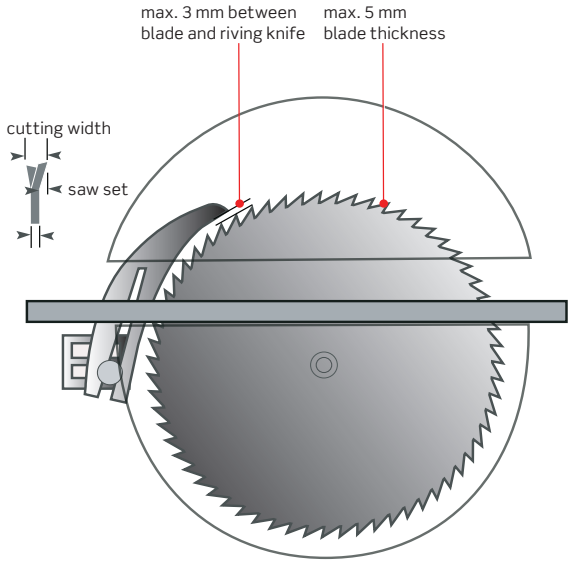
Circular saws (stationary)

The blade must be flat and without wobble, "blue spots" and cracks.

- The blade must always be sharp and correctly fitted, and it must be not be missing any tips.
- The part of the blade which is not in the wood must be shielded.
- It must not be possible to press the blade cover onto the blade.

Blades with carbide tips must be:

- Intact, i.e. not missing any tips.
- Equipped with a riving knife.
- Equipped with a voltage drop relay.



The riving knife prevents the wood pinching the blade and therefore being lifted and thrown back at the user. It also shields the rear teeth of the blade so that loose pieces of wood are not thrown out. The riving knife must be rigid, thicker than the blade and thinner than the saw set. (In the case of carbide blades, it must be 0.3 mm thinner

than the cutting width). The riving knife must be easy to adjust.

Table saws

When rip-cutting, the fence (width-controlled) must be used and set so that the wood can be moved along in a straight line.

Upper guard, lower guard and splitter must be in position and adjusted. In the case of concealed cuts, e.g. groove and rabbet work, it is possible to remove the top guard as the wood covers the teeth of the blade. If the top guard is removed, a feed block must be used. When work is finished, the top guard must be immediately put back on. Use a pushing rod or handle if there is a risk of touching the blade during rip-cutting.

When cutting grooves, you should use a template and attach a diverter strip so that the small pieces of wood cut off do not come into contact with the teeth at the back of the blade.

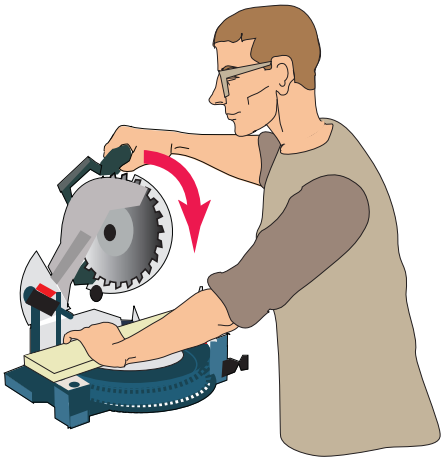
During shortening (crosscutting), it must be possible to control the wood by running it against an adjustable fence.

Crosscut saws (pendulum crosscut saws)

Crosscut saws with the blade beneath the bench must:

- Be shielded beneath the bench.
- Be fully shielded when at rest.
- Return to their rest position automatically (balance saws).
- Be impossible to pull over the edge of the bench.
- Have a top guard or some other form of protection from the blade over the bench during sawing.

Crosscut saws with the blade above the bench must:

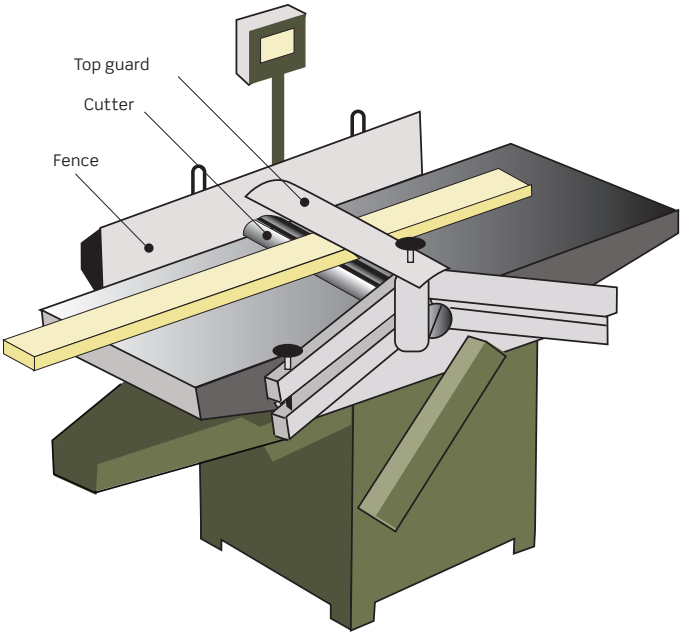


- Have a shield around the blade as far down as possible below the centre.
- Have visor protection for the rest of the blade which is working. This part of the shielding must automatically be locked when the saw is at rest.
- Return automatically to their rest position.
- Be impossible to pull over the edge of the bench.

Planing machines

There must also be a guard over the cutter on the side of the fence where no work is being carried out.

- The guard over the working section must be easy to adjust.
- Small workpieces must be held securely using a feeder board.
- The planing machine must be fitted with a voltage drop trigger.



Feeder devices

Feeder devices on circular saws, handsaws, planing machines, bench milling machines and similar must be fitted with emergency stops. The feeder device must be connected to the woodworking machine by means of a special plug so that both machines stop when the emergency stop is actuated.

MACHINERY FOR METAL

Metal saws

In addition to what is specified for wood cutting saws, pendulum crosscut saws for metal must also:

- Be operated using a hold-down handle (dead man's control).
- Have an emergency stop.
- Stop as quickly as possible when the hold-down handle is released.
- Have a friction clutch or other device which prevents hazards resulting from the blade digging into the metal or getting stuck.

Pendulum crosscut saws in which the blade is fed mechanically must have additional protection, e.g. shielding so that it is not possible to touch the tool, two-handed operation, a light barrier or equivalent.

Metal saws may be operated by minors under 18 if the machines are shielded in such a way as to render the moving and machining parts inaccessible during operation and there are no other hazards associated with the machine. However, this is possible only if minors receive thorough instruction on how to use the machine.

In connection with the work there must be usage instructions in Danish which indicate how to set up, operate and maintain the machine.

Thread cutting machines

Thread cutting machines must be operated by means of a pedal or hold-down handle which stops the machine when it is released. The pedal must be shielded so that it is not possible to start the machine accidentally, and it must otherwise be designed with three positions:

- Top position, no actuation: the machine is stopped.
- Middle position: the machine is running.
- Bottom position: emergency stop function.

Long, rotating pipe sections which protrude must be shielded and supported in pipe trestles.

Trimming of pipes which are rotating in cutting machines may take place only on machines with a pipe cutter fitted. Thread cutting and trimming must not be undertaken on pipes which have fittings installed.

Fittings must not be screwed onto pipes which are rotating in thread cutting machines.

Thread cutting machines may be operated by minors under 18 if they are shielded in such a way as to render the moving and machining parts inaccessible during operation and there are no other hazards associated with the machine. However, this is possible only if minors receive thorough instruction on how to use the machine.

In connection with the work there must be usage instructions in Danish which indicate how to set up, operate and maintain the machine.

MOTORISED HAND TOOLS

When buying hand tools:

- Go for vibration-damped tools.
- Go for vibration-damped handles which provide insulation from the cold.
- Go for low-noise tools.
- Go for tools which are lightweight and easy to use.
- Choose tools offering the option of connection to dust extraction.

A high level of vibration (see the section on vibration) may restrict the amount of time in which the machine can be used every day.

The motor must be switched off and any plug or air connection disconnected when cleaning, adjusting or changing tools.

Minors under 18 must in principle not operate vibrating hand tools and similar with a level in excess of 130 dB(HA) except in connection with industrial skills training (e.g. as apprentices), and unless they have received the proper instruction.

However, minors are allowed to carry out short-term work with vibrating tools (of less than 30 minutes' duration over the course of a full working day).

There must be usage instructions in Danish which indicate how to set up, operate and maintain the machine in connection with work.

Chainsaws

Only power chainsaws which are type-approved or CE-labelled may be used. Minors under 18 must not work with power chainsaws. Power saws must be maintained carefully, with frequent chain lubrication, chain tension checking, etc. When the chain is sharpened, it must be checked using a measuring tool.

The chain brake must be kept clean, and it is necessary to check that it works. The idle speed of the motor must be set so that it is considerably lower than the speed of the chain clutch.

- The user must have a good knowledge of how the power chainsaw is designed, how it works and must be maintained, and the user must be familiar with the safety-related requirements.
- People who have no experience of chainsaws must be trained by a person with a good technical knowledge before they are permitted to work independently with power chainsaws.
- You must not work with power chainsaws from ladders, unless the ladder has a specially designed work platform.
- You must only use specially designed power chainsaws (pole chainsaws) above shoulder height.
- You must only use saws with combustion engines indoors when effective ventilation is provided due to the exhaust gas given off.
- You must only use electric power chainsaws at voltages above 50 volts in dry weather outdoors.

You must use the following personal protection equipment when working with power chainsaws:

- Safety helmet.
- Eye protection, protective goggles or a visor.
- Leg protection, trousers with cut-resistant inserts on the fronts of the legs.
- Foot protection, safety boots with cut-resistant inserts.
- Ear defenders, when the noise load exceeds 85dB(A).

Minors under 18 must not operate power chainsaws unless in connection with industrial skills training (e.g. as apprentices), and unless they are to receive the proper instruction.

There must be usage instructions in Danish which indicate how to set up, operate and maintain the machine in connection with work.

ELECTRIC HAND TOOLS

Inspections

Enterprises must ensure that electric hand tools are inspected regularly according to the instructions of the manufacturer.

- In general, electric hand tools (class I) must be inspected at least every two months.

- Double-insulated tools (class II) normally have to be inspected every six months. Most professional hand tools are double-insulated.

Use

Minors under 18 must in principle not operate vibrating hand tools and similar with a level in excess of 130 dB(HA) unless in connection with industrial skills training (e.g. as apprentices), and unless they receive the proper instruction.

However, minors are allowed to carry out short-term work with vibrating tools (of less than 30 minutes' duration over the course of a full working day). There must be usage instructions in Danish which indicate how to set up, operate and maintain the hand tool in connection with work.

Drilling machines

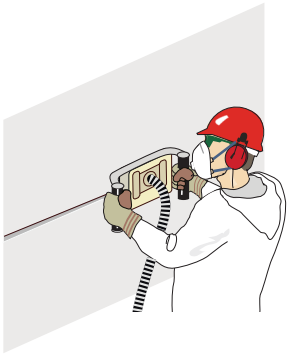
Be prepared for the drill to get stuck.

- Avoid using the locking button.
- Do not drill loose workpieces (workpieces should be secured with a holding jaw or on a bench).
- Use extraction if possible. Always use a dust filter unless contamination can be removed effectively.

Wall chasers

Dust which is harmful to health is given off when cutting chases in masonry. Therefore, an extraction unit must be fitted to the wall chaser.

You must wear a dust mask as you work, unless the dust can be removed effectively from your respiration zone.
You must also wear ear defenders.



Polishers

The following points are applicable to belt grinders, vibrating sanding machines and eccentric grinders:

- Use extraction if possible.
- Always wear a dust mask filter unless contamination can be removed effectively.

Polishers often have very high levels of vibrations.

Angle grinders

The most serious risk involved with grinding and cutting machines is disc shatter as splinters can pass through the body of a human.

Disc shatter is caused by:

- the disc being tensioned incorrectly. Use correct tensioning flanges, shims and tensioning.

- the rotation speed being higher than the speed for which the disc is approved.
- the disc being used incorrectly, the disc being fitted crooked and/or at too great a pressure, for example.
- poor adjustment.
- careless working, with knocks and blows.

Safety rules when using an angle grinder:

- Pull the plug out of the socket when replacing the disc.
- Use a disc which fits the machine and which has the relevant speed rating.
- Tension the disc using the correct tensioning flanges.
- Check whether the disc rotates without wobbling – before you use it.
- The prescribed screen must be fitted.
- Do not press hard on the disc.
- Do not subject the disc to pressure from an angle or any other pressure which may break it.
- Do not use cutting discs for grinding, or grinding discs for cutting.

- Compressed air-driven angle grinders must be prevented from running at too high a speed due to being connected to too high a pressure.
- Always wear ear defenders.
- Always wear eye protection, goggles with side guards or close-fitting goggles.
- When handheld grinding machines give off dust in sufficient quantities to harm health, they must have extraction.
- Remove loosely hanging scarves and similar.
- Position the machine carefully so that the disc is not knocked.
- Position the machine so that the disc does not get wet.
- In wet rooms, and in areas where the earth connection is particularly good, you should only use low-voltage machines (via a transformer).

Bayonet saws

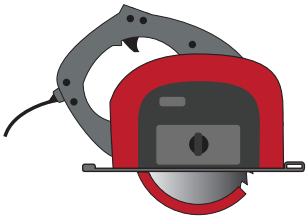
When using bayonet saws, there is always a risk of cuts so pay particular attention when starting and ending tasks.

- Always wear ear defenders.
- Always wear eye protection, goggles with side guards or close-fitting goggles.
- When replacing blades, pull the plug out of the socket.

Handheld circular saws

Handheld circular saws must generally be fitted with riving knives. However, some types of circular saw/plunge saw are exempt from this requirement – but the supplier's usage instructions must state clearly if the riving knife can be omitted.

- A riving knife must be made of steel (rigid) of a thickness equivalent to the cutting width (in the case of carbide blades, it must be 0.3 mm smaller than the cutting width).
- The riving knife must be adjusted in the same way as for stationary circular saws.
- There must be a fixed upper guard which covers the blade entirely on the fence.
- The lower guard must comprise a moving screen which completely covers the blade under the fence.



- The lower guard must automatically move back to a safe position when you remove the saw from the material being cut. (You must test this before starting work with the saw and at regular intervals throughout the working day.)
- When sawing, you must stand to one side of the kerf in case the saw kicks back.
- During sawing, the workpiece must be secured using clamps or similar if necessary.

- Wear ear defenders.
- In the case of dusty tasks, you must use handheld circular saws connected to extractor units or cutting benches with extraction. You must use suitable respiratory protection if the dust concentration has not been reduced sufficiently using an extractor unit.

Minors under 18 must not operate handheld circular saws as the moving and working parts are not shielded during operation.

However, minors under 18 may operate handheld circular saws in connection with industrial skills training (e.g. as apprentices), but only if they receive the proper instruction.

Routers

There is a risk of serious cutting injuries if routers are not used and maintained properly.

- Remove the plug from the socket when swapping bits.
- Only use bits which fit the machine.
- Make sure that bits are fitted correctly prior to use.
- Keep the machine clean so that all its functions are available.
- Wear ear defenders.
- Always wear eye protection, goggles with side guards or close-fitting goggles.

POWDER-ACTUATED TOOLS

A powder-actuated tool is a nail gun in which an explosive charge drives a bolt or nail into a solid material.

Powder-actuated tools must be either CE-labelled in accordance with the new Machinery Directive (2006/42/EC) or hold type approval from the Working Environment Authority. The type approval number is written as DK + a number followed by A or B, which indicates the gun group.

Powder-actuated tools approved by the Working Environment Authority, are divided into groups A and B:

A. Piston guns, where the muzzle velocity for the bolt exceeds 100 m/sec., and projectile guns.

B. Piston guns, where the muzzle velocity for the bolt is 100 m/sec. or lower.

Normally only type B bolt guns may be used. Type A guns may only be used if it is not possible to use type B guns for technical reasons.

Powder-actuated tools must be designed in such a manner as to incorporate at least two independent safety devices to prevent accidental firing. These safety devices must operate even if a loaded gun is dropped or knocked.

The manufacturer or his representative here in Denmark must undertake all essential repairs and the prescribed annual inspection. They must issue proof of inspections carried out.

- The person using the gun must be 18 or over.
- The person using the gun must have received thorough instruction and practice on the correct operation and function of the gun

(including all the details in the usage instructions and safety provisions, as well as inspection and maintenance, daily cleaning and greasing).

- Minors under 18 may operate powder-actuated tools in connection with industrial skills training (e.g. as apprentices).

Before using a powder-actuated tool, it is necessary to ensure that it is not possible to shoot through an object. If there is a risk of this, it is necessary to ensure that there is nobody standing behind walls and similar in the shooting direction.

Keep unauthorised persons away from the work site. Before firing, it is necessary to put up warning signs in appropriate locations, e.g. in doorways to the risk zone. These signs must bear the words:

WATCH OUT
Powder-actuated tools are in use

Cartridge loading is selected on the basis of usage instructions in respect of the work in question. The correct spall shield must be used, and it may be necessary to acquire a special spall shield.

Firing is not permitted:

- Into brittle or hard materials (e.g. tempered steel, granite and glazed tiles).
- Near to edges so that there is a risk of the bolt being flung back or splinters being broken off.
- Anywhere you have previously attempted to fire in a bolt or nail.

- Against bolts or nails which have not been driven in completely on a previous attempt (double shot).
- Anywhere where sparking may cause fire or explosion.
- If there is a risk of hitting electric cables, gas pipelines and similar.

The work area must be designed such that the operator stands on a firm, secure base.

Cartridges must not be carried loose in a pocket.

The gun must be placed in the storage box when not in use, and this box must then be locked.

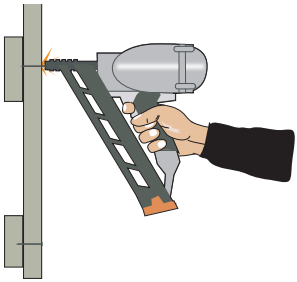
When using a powder-actuated tool, the person using it and any assistant he may have must wear:

- Helmet.
- Close-fitting safety goggles.
- Ear defenders which attenuate the sound of shots.

Powder-actuated tools must be subject to inspection at least once a year, and at any other time when necessary. The inspection must be undertaken by the manufacturer or his representative. Proof of the inspection must be issued when the inspection has been completed.

Check the tool regularly in order to see whether it is damaged in any way.

NAIL GUNS



Nail guns are fired using compressed air, electricity or spring force. These guns are every bit as dangerous as powder-actuated tools, except for the smallest types.

Nail guns must have at least two independent safety devices to prevent accidental firing: the trigger and a safety catch.

The safety catch is located at the muzzle of the gun. It must have a travel of at least 7 mm before it can be fired. Either the trigger or the safety catch must have been returned to the safe position before the gun can be fired again. (Repeat firing may be permitted with a special safety catch design so that accidentally depressing the safety catch is difficult.)

Compressed air-driven nail guns must be connected to the compressed air hose at the gun itself. The highest permissible air pressure must be stated on the gun.

The person using the gun must be 18 or over. He must have received thorough instruction on the use of the gun (including all the details in the usage instructions and safety provisions, as well as inspection and maintenance). l Minors under 18 may operate nail guns in connection with industrial skills training (e.g. as apprentices).

Ear defenders are often required, and eye protection must be worn.

The choice must be made according to the gun supplier's regulations.

For nail guns for small staples, tacks (max. 0.3 grams), etc., more lenient rules apply. There is no age limit of 18 here.

WALLPAPER REMOVAL

It is important to ensure there is plenty of ventilation while work is in progress. Open windows, and ideally a throughflow of air, are required for safe working. If it is not possible to create sufficient ventilation, respiratory protection must be used.

Wallpaper wetting agent must not be used together with steam.

COMPRESSED AIR SYSTEMS AND TOOLS

Compressed air cylinders

Compressed air cylinders must be fitted with:

- Rating plate.
- Safety valve with pressure-relief device.
- Pressure gauge (manometer) marked with a red line to show the maximum permitted working pressure.
- Drainage nozzle for condensate in reservoir.

Cylinders must be positioned so as not to be subject to collision, knocks or blows.

An expert must inspect compressed air cylinders internally and externally every four years, ensuring that the pressure in bar (atm) times the volume in litres is greater than 200.

Compressed air tools

Machines and tools operated using compressed air are subject to the general provisions for machine protection.

Compressed air-driven tools/devices should be used in place of low-voltage devices in tanks, wet rooms, on wet concrete and elsewhere where there is strong leakage to earth.

Compressed air tools often cause a lot of noise and dust. Therefore, acquire the tool that makes the least possible noise, and use it at the lowest possible pressure. Apply special nozzles to the tool in order to reduce the spread of noise and dust, e.g. a cover or bellows and possibly a filter. If it is not possible to reduce the noise or dust load sufficiently, personal protective equipment must be used.

Minors under 18 must in principle not work with rotary compressed air tools, compressed air hammers and chisels and sandblasting, unless in connection with industrial skills training (e.g. as apprentices). However, they may work with these if they receive proper instruction.

In connection with the work there must be usage instructions in Danish which indicate how to set up, operate and maintain the tool.

Rotary compressed air tools

Grinding wheel tools must be secured to prevent the disc rotating at too high a speed, including in the case of air being connected at a pressure higher than prescribed.

Compressed air hammers

When using compressed air hammers, it is necessary to ensure that vibration in the building will not cause a hazard.

Air chisel hammers

Hazardous concentrations of dust, e.g. quartz dust, may be given off when chiselling in concrete and masonry. Here, it is necessary to limit the spread of dust to the surrounding area by means of dust extraction or by spraying water, if it is not possible to extract the dust. It is necessary to remove dust in a way which does not spread dust – e.g. by means of dust extraction.

Air chisel hammers have a high vibration level. As far as possible, plan the work so that you use remotely controlled tools or so that handheld tools can be supported mechanically. Vibration-damped tools should be selected when acquiring tools.
It is possible to damp vibration in existing tools by using handles made of shock-absorbent materials.

You must always wear eye protection, and normally ear defenders and respiratory protection as well, when working with compressed air hammers, and it may also be necessary to wear safety footwear.

Sandblasting

Sandblasting includes blasting with natural sand, steel sand, cast iron sand, baking powder, steel balls, corundum, glass and similar.

Sandblasting with natural sand should be avoided as this contains quartz. Quartz is particularly hazardous to health and poses a risk of silicosis and cancer.

As far as possible, limit the spread of dust during sandblasting outdoors by means of a tarpaulin or similar. Put up warning signs and make sure that sandblasting only takes place in areas where it will not cause inconvenience to others.
The operating device must have a hold-down handle (dead man's control). In the case of long hoses (above 40 m), it is advised that the opening function be controlled electrically. Unified air control is not permitted.

When working at low temperatures, the hold-down handle of the ejector must be secured to prevent incorrect function due to frost in condensate. This can be done using anti-freeze and dosing equipment.

Personal protective equipment

- Sandblasters must use respiratory protection with an air supply either as a hood which covers the head, neck and shoulders, or as a full mask plus a hood. The air supply to respiratory protection must be provided from a system with an oil separator and possibly also a heating or cooling unit.

- Sandblasters and all other people in the sandblasting area, even for a short time, must wear special dust-repellent workwear such as a close-fitting overalls, tall boots and working gloves with long cuffs.

- Ear defenders are normally necessary.

- Workwear and personal protective equipment must be kept separate from everyday clothes and must not be taken into eating areas.

Remove used sand as quickly as possible. Cleaning using compressed air is not permitted. Brushing and shovelling may be carried out once the sand has been wetted. The sand may only be reused following special cleaning. Respiratory protection must be used when cleaning.

Before starting work on renovating façades, the municipal authorities must give permission for the work.

Waste must be removed in accordance with the rules laid down by the Ministry for Energy and the Environment.

Wet sandblasting
It is possible to increase the cleaning effect by adding water. Wet sandblasting is not as hazardous to health as dry sandblasting as the quantity of dust in the air here is just 1/10. The sand must be removed while it is wet.

High-pressure cleaning

High-pressure systems with a maximum pressure in excess of 800 bar pose particular hazards, and these must never be used handheld due to the cutting ability of the jet and its powerful kickback.

When working with high-pressure cleaners with pressures in excess of 25 bar, or where the product rating (the maximum pressure in bar times the number of litres per minute) is in excess of 10 000, it is necessary to make sure that:

- There is no-one else in the work area.
- You do not spray onto electrical installations.
- You have a non-slip foothold.
- You have a free, unhindered working area around you. (Working on ladders is not permitted.)

If you are working for more than half an hour, you must have a shoulder strap or similar which can relieve the pressure of the hands on the spray nozzle.

Hazards during use:

- The jet acts as a cutting tool on both materials and people (injuries are deep and serious, even though the lesions do not appear to be much).
- The jet may be thrown back from hollows and curved surfaces.
- Substances which are toxic or hazardous to health may be spread in the form of a mist.
- Hoses and nozzles may vibrate like compressed air tools (causing white fingers).

Use the wind direction on the site to remove impurities. It is generally necessary to use personal protective equipment.

Minors under 18 must in principle not carry out high-pressure cleaning at a working pressure in excess of 70 bar (7 MPa) unless connection with industrial skills training (e.g. as apprentices), and unless they receive the proper instruction.

There must be usage instructions in Danish which indicate how to set up, operate and maintain the machine in connection with work.

High-pressure cutting

Never use high-pressure cutters handheld if the pressure is in excess of 800 bar. This is hazardous due to the cutting ability and powerful kickback of the jet.

Nozzles must be secured in special tools.

The cutting area must be inaccessible due to the power of penetration. The working field of the jet must be shielded according to the rules for machine protection.

Mist and noise may occur as with high-pressure cleaning, so respiratory protection and ear defenders may be necessary.

Minors under 18 must not carry out high-pressure cutting unless in connection with industrial skills training (e.g. as apprentices), and only if they have received the proper instruction.

There must be usage instructions in Danish which indicate how to set up, operate and maintain the machine in connection with work.

PRESSURISED CYLINDERS

Pressurised cylinders can be either neutral grey or be of the colours shown.

The contents of pressurised cylinders are generally indicated by the colour. The contents of the cylinders are also stamped on the cylinder.

- Cylinder valves must never be lubricated.
- Cylinders must never be thrown or otherwise exposed to knocks, blows or heavy loads. Therefore, they must be secured properly to prevent tipping, rolling or falling.
- Pressurised cylinders must be protected against strong heat. They must be positioned in such a way as to be easily removable in the event of a fire.
- Only the cylinders to be used for the work being carried out may be present at the work site. The valves must be closed on cylinders not being used.
- The valve's protective cap or collar must be fitted securely during transportation.

Oxygen cylinders must be kept scrupulously clear of any contamination with oil or grease. The valve must be opened slowly.
When using e.g. acetylene gas, a check valve must be fitted before the manometer.

The Danish Emergency Management Agency has issued technical regulations on how to design indoor and outdoor stores of larger quantities of gas and inflammable liquids.

Aerosol cans

Aerosol cans must not normally be exposed to temperatures in excess of 40 °C or for any other overload during use and transportation. Cans must not be punctured or discarded until they are completely empty.

SITE LAYOUT

Lay out the building site so that work can be carried out properly. This means that safety on and around the construction work must be taken into account right from the planning phase.

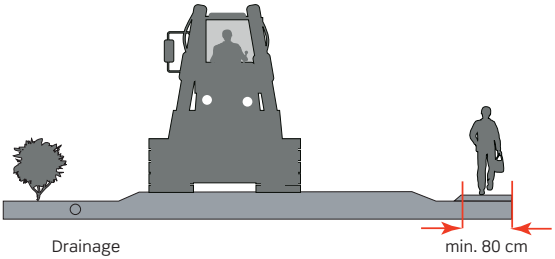
You should, for example, plan how to:

- ensure that technical aids can be used,
- set up temporary guard rails (both on floor decks and roofs),
- make holes in floors and roofs safe to prevent falls,
- suspend safety nets in the structure, avoiding hazards,
- secure scaffolding,
- make sure the building facility is clean and tidy,
- install safe electrical installations and good lighting – particularly in shared areas for a number of contractors,
- ensure risk-free fitting of building elements, such as concrete elements, roof coffers and trapezoidal plates,
- establish good access and storage,
- set up cranes, etc. as expediently as possible.

Access to the site

Hang a site plan up at the entry to the building site to help people to find their way about. It should be possible to see from the plan where enforcement notices are applicable concerning the wearing of helmets, speed limits, one-way access and similar issues of significance to safety.

Access to and exits from the site should be separated and clearly signposted. Keep pedestrian traffic as far away as possible from motor traffic.



Roads and walkways must be planned and structured to handle the traffic using them at all times.

Among other things, the following must be taken into account:

- the weather - with necessary drainage and stable structuring of roads, with a surface which permits snow clearance,
- the ability to use necessary technical aids for transporting materials.

Fencing

Fence off and lock the building site and site huts out of working hours. All buildings should be locked.

Keeping things clean and tidy

A messy building site creates a greater risk of accidents. At the same time, this may cause problems and give rise to conflicts between the work gangs and companies on site.

Therefore, the Health and Safety Plan (PSS) must state how to keep the building site in order, when it is to be tidied, and by whom.

Good advice on keeping the building site tidy:

- Do not stack materials in such a way that they may topple or otherwise cause a hazard. Only place materials in the locations designated for them.
- Keep holes for gullies and similar properly covered.
- Remove discarded scaffolding materials at once.
- Storage sites must have good foundations and be raised above the rest of the terrain.
- Always comply with the waste regulations of the municipality when disposing of waste.
- Do not position waste and materials in such as way as to prevent you from clearing the site of snow, mud and water.
- Electrical cables and conduits must be suspended. If they cross access routes and roads, they must be suspended, buried or protected in some other way.

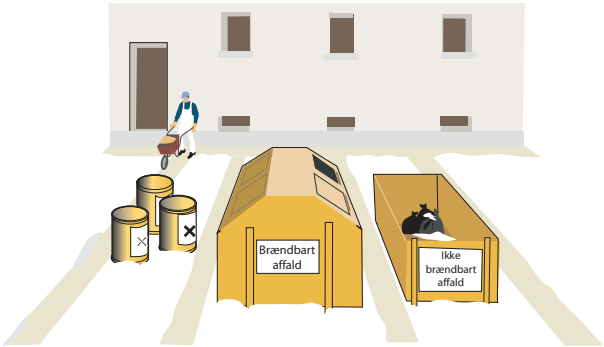
- Conduits for electricity and pipes for compressed air, gas and water to temporary site installations may be suspended on walls or from ceilings. If you have to place them on the ground or floor, they must be positioned so that nobody can fall over them or damage them.

- Dry sweeping is not permitted. Vacuum the area instead, and clean everything in a way which does not spread dust and other contamination hazardous to health.

- Do not remove covers, guard rails and other safety devices when tidying up.

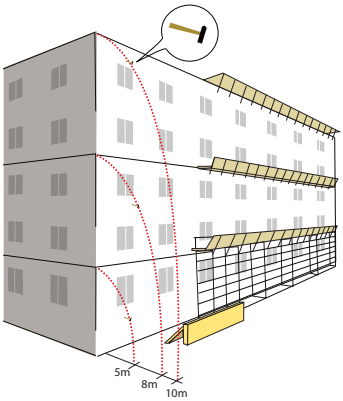
- Arrange the site so that materials and similar are not in the way of motor and pedestrian traffic.

- Place waste and empty packaging in specially designated areas or in containers, and ensure that these are emptied regularly.



Screening falling objects

Protect both motor traffic and pedestrians against falling objects both on site and along buildings.



Erect screens, safety nets or other covers on scaffolding and buildings where people are moving through entries and alongside buildings.

If you are unable to screen or cordon off the area properly, it will be necessary to divert the traffic.

Screens must project by at least two metres and may consist of boards 25 mm thick. Instead of screens, you can use safety nets as long as they are of fine mesh type with a mesh size of no more than 2 cm (not to be confused with dust nets). A denser mesh size may be necessary if, for example, threaded rods, bolts, nuts, etc. may be dropped.

When you place materials and tools on roofs or in other high places, you must ensure that they cannot slip or be blown off by the wind.

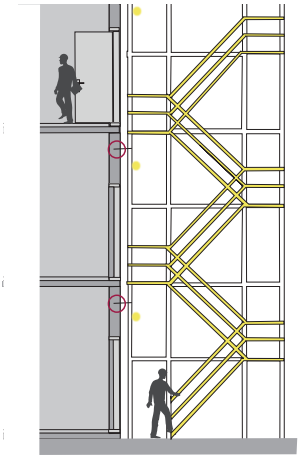
Be aware that materials which are not heavy in relation to their size may land a long way from the building when they fall.

ACCESS ROUTES

Safe, correct access routes must always be established to buildings, construction pits, scaffolding, etc. These access routes should be established without holes and changes of level, and kept free of waste and materials.

Stairs

You should install the stairs to be fitted in buildings as early on as possible so that they can be used as access routes on site. Remember that they must have guard rails on both stairs and half-landings before people start to use them.



Full guard rails with hand, knee and foot rails must be fitted on landings. It will normally be possible to dispense with the foot rail on stairways.

Set up stair towers if people are unable to use the stairs to be installed.

Ladders

Ladders must only be used for access at low heights, and only if there is not much traffic on them. You must only transport light materials and tools which can be carried with one hand.

Ladders must be secured at the top and have an appropriate pitch so that they remain stable. There must be a handle or handrail approximately 1 m above the top level.

Roads

Roads on the building site must be large enough and in such good condition as to allow all pedestrian and motor traffic to use them safely.

- Keep motor traffic and pedestrian traffic separate.
- Make the roads one way.
- As far as possible, avoid heavy and long vehicles having to reverse. If this is unavoidable, prepare procedures on how reversing can take place safely. For example, this may involve reversing being controlled by a banksman, or alarms being deployed when a vehicle is reversing.
- Set up the roads so that you can use suitable technical aids.
- Regularly remove mud from roads and ditches.

It must be easy to clear snow and lay grit. You must grit if there is any chance of overnight frost. Frost-free grit bins and low-lying, drained snow dumps should be ready for use before winter.

In dry periods, it may be necessary to water roads so as to prevent the spread of dust.

Structures and surfaces

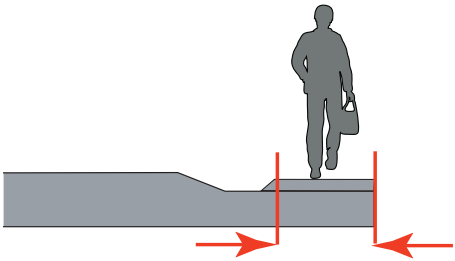
It is a good idea to use the residential roads and parking areas to be constructed as site roads.

The temporary roads on the building site must also be built up so that heavy traffic can use them regardless of the weather. Therefore, they have to be drained so that they do not end up waterlogged.

The roads may, for example, be raised above ground level and provided with ditches which effectively lead the water to a permanent drain.

Walkways

Walkways must be raised above ground level or be otherwise built up so that they can be used at all times and are free of water and mud.



Walkways are set up so that it is possible to use flat trucks, sack trucks, wheelbarrows and other suitable technical aids for transporting materials, etc.

During this work, there must be no mixing of pedestrian traffic with heavy motor vehicles such as trucks, excavators, telescopic loaders or similar.

When transporting materials, the minimum walkway width must be 80 cm, but it may be necessary to make them wider.

The width can be restricted to 60 cm in the case of access routes to be used by people only.

You must be able to walk between the car park and site huts wearing normal footwear. You must be able to walk between the site huts and your place of work wearing work footwear. You must be able to walk on the roads wearing rubber boots in the case of earthworks.

Escape routes

Escape routes must be described in the Health and Safety Plan (PSS), which also has to describe who is to establish, maintain and remove these.

Consider escape routes in the following instances:

- When working in excavations or construction pits.
- When working on roofs.
- When working with roofing felt (there must always be two access/escape routes here).
- When working on pipes or drains or with water, district heating, gas, etc.
- When demolishing building elements.
- When setting up and working on scaffolding.
- When working in closed rooms, gullies, etc.
- When working in lifts, trucks, cranes, masts, chimneys and similar. It must be possible to call for help from the location, e.g. for emergency lowering.
- When working in ducts, pipes and similar.

- When working in crawl spaces, roof spaces and similar.
- When present in huts, crew trucks, containers, etc.
- If work areas are at risk of flooding.
- Anywhere where staff may be subjected to substances and materials which are hazardous to health.

There must normally be escape routes in at least two directions. If this is not possible, there must be visual monitoring, contact with one or more people or other special arrangements which make the site secure.

It is the responsibility of each individual employer to assess the need for escape and evacuation routes in connection with their own work before their employees start working on site. If this assessment requires changes to the developer's plans, this must be clarified with the developer.

Site huts

Set up site huts so that parking and storage of materials between the huts is prevented as far as possible.

Conduits for electricity and telephones and pipes for water and drains must be positioned appropriately so that individual huts can easily be connected to one another.

Site huts must have good lighting so that people can find their way about safely. Water and drainage pipes must be frostproofed.

You should take into account the following when positioning site huts:

- There must be an access route to a public road or car park.
- The distance to the work sites must not be too great.
- It must be possible to access site huts from a public road or car park without passing through an area in which helmets have to be worn.
- You must be able to access the huts from the public road wearing light shoes no matter what the weather.
- Position the huts so that there is at least 2.5 m between window sides. This ensures there is sufficient daylight.
- There must be escape routes in at least two directions from all huts. These routes must be at least 2 m wide and must not be blocked by materials or other items.
- Position the site huts in places where they are protected from falling materials and subject to a minimum of inconvenience due to dust and other air pollution, noise, vibration, splashes, etc.

There must be a telephone on site which employees can use.

SITE HUT FACILITIES

Welfare facilities must always be assigned when work starts on the building site. The employer is responsible for ensuring that the necessary facilities are present.

This will normally be in the form of a site hut which contains:

- Toilet.
- Washbasins with running hot water.
- Showering facilities with a changing room.
- Separate changing and eating areas.
- Two lockers for each employee.

The requirements for a site hut can also be met if employees use welfare facilities in an existing building, i.e. toilets, a canteen, shower, changing room, etc. However, the utility value must at a minimum be of the same standard as a general site hut.

Lightweight mobile huts

Site huts may be lightweight mobile huts if employees are working for a maximum of two weeks on site and the employer has a maximum of four people employed on site.

Construction work

In the case of roadworks and other construction work where the building site moves as work progresses, the provisions could be altered in special cases.

Connection to drains

If on-site work continues for more than two months, toilets must always be connected to the drains.

If work continues for less than two months, toilets must be connected to drains if this can be done without digging with a back-hoe or similar.

Drainage-free toilets must be of the same hygienic standards as toilets with water flushing and drains.

Quantities and distances

Welfare facilities must be situated conveniently in relation to one another and the individual work sites.

- 1 washbasin for every 5 people,
- 1 shower for every 10 people,
- 1 toilet for every 15 people.

There must be a distance of no more than 200 m or a transport time of five minutes to a toilet.

Short-term work

Special rules are applicable to welfare facilities if tasks:

- will last for no more than 3 days,
- will not exceed 6 man-days in scope,
- or employees start and end their daily working hours somewhere other than the building site.

In the case of short-term work, the employer must ensure that during work, employees have access to:

- toilets,
- suitable eating areas, if meal breaks are taken while they work,
- washbasins with running hot water,
- changing facilities and the opportunity to store clothing and personal effects
- the opportunity to dry workwear if it has got wet while they work.

In addition to this, there must be showers and changing facilities where everyday clothing and workwear are kept separate if work:

- is very dusty or dirty,
- involves a risk of contagion from materials,
- involves a risk of coming into contact with substances and materials which are harmful to the skin or which it is impossible to prevent the spread of,

- exposes employees to high temperatures or is physically very demanding.

Special requirements – drain work, asbestos, asphalt, lead, epoxy and polyurethane

If work is carried out where employees may come into contact with substances and materials, bacteria and similar, which may be harmful to health, there are special rules for layout and use of showering and changing facilities, among other things. See, for example, the section on asbestos, epoxy and waste water.

Layout of huts

The internal walls and floors of huts must be easy to clean. The height of the room must be at least 2.1 m. In very large units, however, the height must be at least 2.3 m.

The rooms must be well ventilated, lit and insulated, and the temperature must be at least 18°C when they are used.
Tools, materials and similar must not be stored in these rooms.

Eating areas

Eating areas must be at least 1 m^2 per person plus 1 m^2. There must be a refrigerator and facilities for heating food, water for coffee and similar. The room must have two ventilation openings.

The windows must constitute at least 10% of the floor area. They must have sun screens, and it must be possible to open at least one window.

Changing

The changing room must provide at least 1 m^2 per person excluding washing and showering facilities.

The room must be fitted with a ventilation opening.

Employees must be able to store their everyday clothes and work-wear separately.

This may be done in two lockers or one divided locker. A single locker must measure 25 cm x 25 cm x 170 cm. A divided locker must be twice as wide; 50 cm.

There must be locks on the lockers, and they must have a shelf and a vent to the outside. There must be a bench by the lockers.

It must be possible to dry workwear in the lockers or on a common hanger.

Showers

It must be possible for staff to go directly from the changing room to the shower. Showers must be supplied with hot and cold running water.

The floor area in each shower must be at least 1 m^2, or 0.64 m^2 for shower cubicles.

The rest of the area up to 1 m^2 will be added to the changing room.

Ventilation facilities must be provided, mechanical where possible.

Toilets and washbasins

Toilets on the building site must normally be connected to the drains and have water flushing.

If it is not possible to connect the toilet to the drains, the toilet bowl

and waste tank must always be separate, and overall the toilet must be of the same hygiene standard as a toilet with water flushing.

The toilet cubicle must be at least 1 square metre in size.

If there is access to the toilet from outside, the room must be fitted with a washbasin. The floor area here must be at least 1.2 m².

Overnight accommodation, major projects

In the case of major building, construction and infrastructure projects where it may be anticipated that there will be a need to attract a workforce from outside the local area, part of the tender documentation or an offer by the employer may include the setting up of overnight accommodation options, camps.

This area is not part of the Working Environment Act, and so there are no clear rules on setting up and running accommodation facilities. Therefore, recommendations from BAR Bygge & Anlæg are provided below.

It is by no means always possible to position accommodation facilities immediately next to building and construction projects. When localising accommodation facilities, you should always focus on maintaining optimum conditions in respect of transport, and it is particularly important to ensure easy access to public transport and shopping for everyday necessities, with opening hours which fit in with working hours at the site. Close proximity to leisure and sports facilities is also a must.

When running the camp, it is important to consider the following:

- A permanent caretaker/camp manager who is also able to support the social lives of camp residents.

- High standards of cleanliness.
- Good washing facilities/options.
- Simple and "homely" leisure activities.
- Policies on smoking and alcohol.
- Food on offer: Breakfast and dinner; flexible arrangements so that people can get something to eat at "odd times".

The layout should support the following:

- Good sleep hygiene, mainly by preventing noise.
- Hygienic storage and preparation of food, a certain amount of privacy being offered when it comes to preparing food and eating.
- Sufficient quantities of healthy food in the camp mornings and evenings.
- Communication with relatives and friends, e.g. telephones and Internet connections.
- Social fellowship.

Caravans and containers are not ideal accommodation facilities for construction workers.

STATIONARY WORK SITES

Work with stationary circular saws, trestles, thread cutting machines and other work carried out in the same location for any length of time must take place in a building, hut or tent and as a minimum in a roofed shelter or similar.

In particular, make sure you have the following:

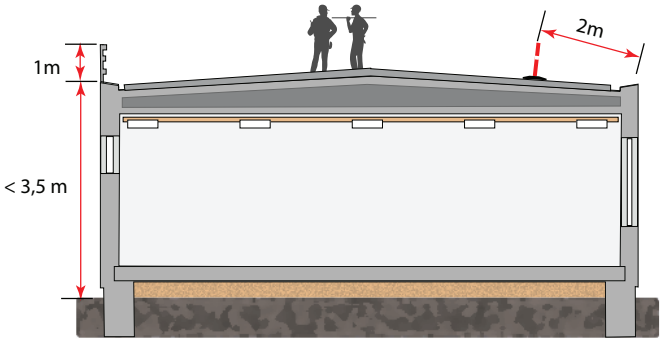
- Good work lighting.
- Heating and ventilation, where necessary.
- Workbenches must be at the right height.
- There must be space for technical aids for moving heavy objects.
- In the case of work processes which give off dust, smoke or vapour which are harmful to health, process ventilation is normally established which is exhausted to the outside.
- In the case of noisy work processes, it is necessary to ensure that other people on the building site are not subjected to unnecessary noise. Noise must be damped in accordance with what is technically possible.

WORKING ON ROOFS

- Irrespective of the height and roof pitch, it is necessary to secure workers if there is a particular risk of them falling or if falling from the roof would be particularly hazardous.
- It is necessary to secure materials and tools to prevent them sliding off or being blown down by the wind.
- Working beside or on overhangs and similar can be made safer using scaffolding.
- When selecting safety arrangements, it is necessary to attach importance to the nature of the work, the weather conditions, the nature of the roof surface, what workers could fall down into/onto, a combination of the above factors, etc.
- Holes in the roof surface must always be made secure by means of guard rails or a cover able to support a person's weight.

Flat roofs below 15 degrees

It is necessary to set up guard rails along the edge of the roof if work is being carried out or workers are on roofs with a pitch of less than



15°, and if at the same time the edge of the roof is more than 3.5 m above ground level.

If work is being carried out on a non-slip surface and in good wind and weather conditions, it is possible under special conditions to decide not to establish guard rails at up to 5 m above ground level.

It is possible to replace the guard rails with a clear, durable marker 2 m from the edge of the roof if the work does not require workers to come closer than 2 m to the edge of the roof. In this instance, workers must not enter the area outside this marker or place materials outside the marker.

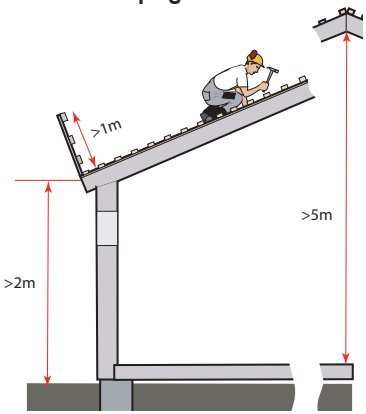
The marker must as a minimum consist of cones with marker strips, chains or similar between them. Barrier tape must not be used.

If the top of a wall is to act as a guard rail, it must be at least 1 m high.

Sloping roofs above 15 degrees

When working on sloping roofs, workers must be secured against falling if the base of the roof is more than 2 m above ground level and staff are working or present at a height above 5 metres.

If scaffolding is used for safety when working on pitched roofs, this must be provided with a screen



which can arrest the fall of anyone falling from the roof. This screen must be at least 1 m high and cover a parallel line 1 m above the surface of the roof. Use steel mesh, plywood panelling or similar, for example.
The work deck of the scaffolding must at the most be 0.5 m below the base of the roof.

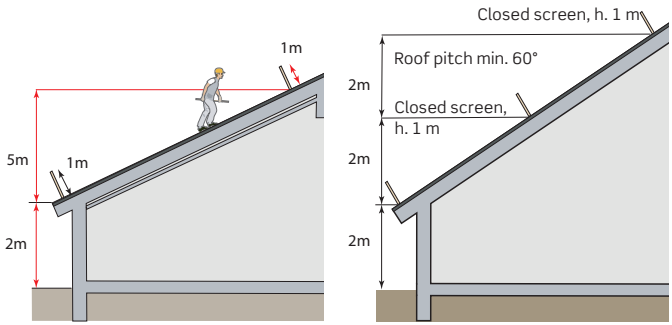
Additional requirements
Be aware that basement entrances, light wells, sharp objects and similar which constitute a hazard in connection with falling will require safety arrangements in all instances, irrespective of the fall height.

Roofs with a pitch of 15° or more:
Use roof ladders if the roof is smooth, unless walking on the battens is acceptable.

Roofs with a pitch of 34° or more:
Set up a screen so that no employee is working at any time more than 5 m vertically from the nearest screen.

Always use roof ladders, unless walking on the battens is acceptable.

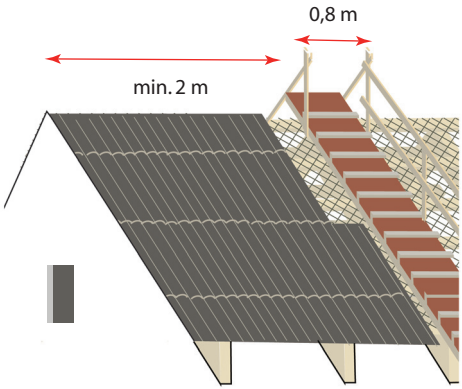
Roofs with a pitch of more than 60°:
Set up a screen so that no employee is working at any time more than 2 m vertically from the nearest screen.



Always use roof ladders, unless walking on the battens is acceptable.

Working at gable ends

If personnel are working less than 2 m from the gable end and the fall height is more than 2 m, guard rails must always be set up.



In exceptional circumstances, it is possible to use suitable fall protection equipment to prevent falls during short-term work.

Working on existing roofs

Thoroughly examine the structure and load bearing capacity of the roof before starting repair or renovation work.

Some roofs have roof cladding or batten substrates which cannot bear the weight of someone standing on them. This is true of - for example - clear corrugated panels, glass panels, PVC panels and most fibre cement panels if the c-c distance between battens is greater than 0.46 m.

If the battens are unable to bear a load, they must be replaced with battens of strength class T1 and labelled with the name of the manufacturer.

Walkways with guard rails towards the open roof can protect staff from falling through. Hang a safety net between the walkways.

Never use a safety net as your only protection. This will not prevent anyone falling through the roof.

Thatching catwalks

Use secure thatching catwalks to enhance safety and to prevent thatchers straining their leg muscles more than is necessary.

Thatching catwalks and platforms should generally be horizontal so that it is easy to move about on the roof.

FALL PREVENTION

Safety nets

When using safety nets, it is necessary to use nets suitable for the intended purpose.

Depending on their type and installation, safety nets can be used to safeguard against injury, the risk of people falling and the risk of materials, tools, etc. falling.

A net with a close mesh must be used to provide safety from falling materials, tools, etc.

Safety nets must be installed and used in compliance with the supplier's usage instructions. Take care not to confuse dust nets with safety nets.

If safety nets are used to protect people from injury in connection with falling, a plan has to be compiled which indicates how to bring someone who has fallen back up or down to ground level.

The net must hang completely freely if it is to act as a safety net for workers as well. You must not place materials or other objects under the net, and the net must be designed and type-approved in accordance with applicable norms and standards and fitted with a manufacturer's notice showing information on its use.

The supplier's instructions for the use and maintenance of the net must be kept on site.

Suspension of nets

Attachment points for the net will be planned and established when the building structure is erected.

Using a personnel lift is ideal when suspending the net. Hang the net up as close as possible to the area beneath the work area. The

net must be secured to building elements which can bear the weight of a person who has been saved by the safety net.

Hang up the net so that it has the clearance specified on the manufacturer's plate. You must not store goods under the net if this reduces clearance to an unacceptable level. The same is true in connection with the passage of persons or vehicles, the suspension of cables and similar.

If you tie several nets together, you must ensure that people cannot fall on the joins.

Protect the net from weld spatter and similar.

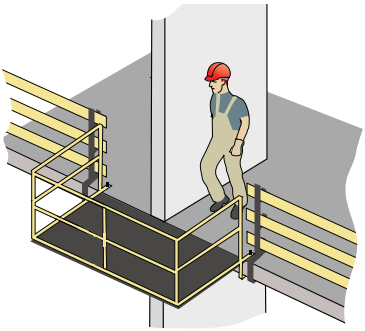
Follow the supplier's instructions with regard to inspection and maintenance.

Open façades

It is practical to use guard rails which can easily be removed if cranes are to position materials, or if you are going to set up façade elements.

If there is a risk of someone falling when working with removed guard rails and similar, fall protection equipment must be used as a minimum.

If a cross wall blocks an access route, you have to set up what is known as a "pulpit". Also remember to set up guard rails at the edges of the "pulpit".



Element construction

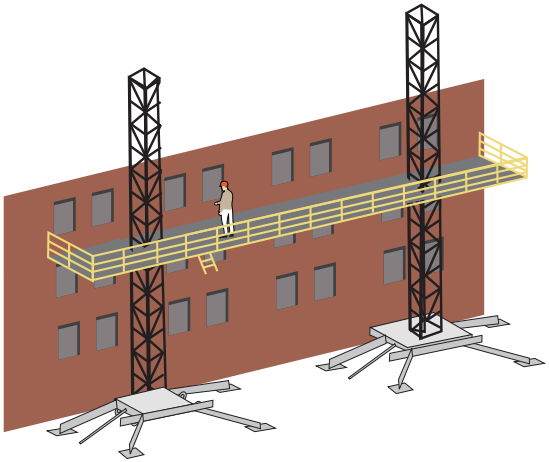
You are permitted not to set up guard rails for short-term tasks if the risk of setting up, using and removing them is greater than the risk you are aiming to avert. This may be the case, for example, when fitting concrete elements at a height of up to 3.5 m.

However, you must always set up guard rails in the following instances:

- When working with narrow elements such as gas concrete and Siporex.
- If there are indentations and openings in the deck.
- If you are going to hoist materials up.
- If there is a particular risk of falling, e.g. due to the weather conditions or nature of the work.
- If the ground makes falling particularly dangerous.

Replacement of windows

Use a work platform such as scaffolding, a lift or other form of standing area when the lower edge of the window is more than 2 m above ground level.



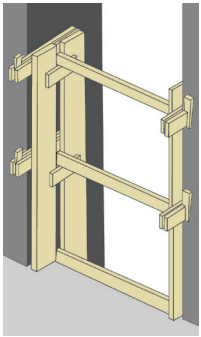
If you are fitting the windows from inside, you must safeguard against falling out.
Proper transportation of the windows to the places where they are to be installed must always be ensured. Suitable technical aids must normally be used for both vertical and horizontal transportation.

Replacement of balconies

There must be scaffolding or another base at the most 10 cm below the balcony when demolishing cast balconies. The scaffolding must absorb the shock in the case of collapse (normally twice the weight of the balcony).

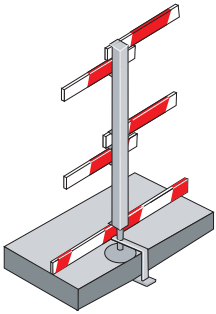
Screen off the working area so that fragments of concrete from the work do not constitute a risk.

Door openings



Always fit guard rails in door openings in stairwells and lift shafts, for example.

Patent scaffold posts



Patent scaffold posts may consist of a pipe placed on a fixing device. Some may also be used for screening façades.

Risk of falling to a lower level

Openings in floors, roofs, walls, horizontal divisions and similar which constitute a fall hazard must be provided with guard rails, covers or other suitable safety arrangements.

Always set up guard rails or another effective barrier when the work deck, working platform, access route and similar are more than 2 m above ground level.

Even if the height is less than 2 m, guard rails must always be set up in the following instances, for example:

- If the nature of the work constitutes a particular hazard, e.g. during sandblasting and high pressure cleaning.
- If landing on the surrounding ground is particularly hazardous, e.g. because of reinforcement bars sticking out, or materials stacked up.

If you cover openings with a tarpaulin, there must also be hand, knee and foot rails.

Plan construction work so that the fact that inserts are to be cast in concrete elements is taken into account right at the planning phase, so it is possible to install guard rail posts without having to drill holes for them.

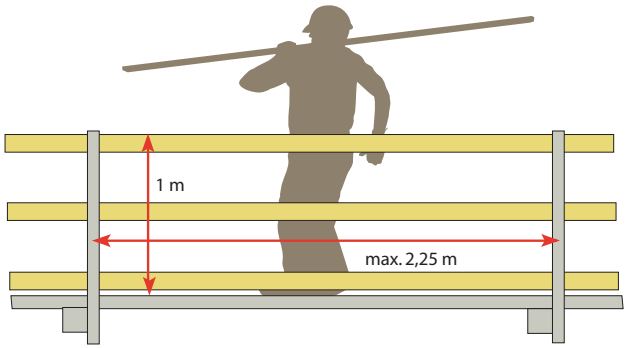
Requirements for guard rails and roof barriers

Guard rails must comprise a handrail at a height of 1 metre, a knee rail at a height of 50 cm, and a foot rail 15 cm high.

If there is a particular risk of materials or tools falling, you must fit a more closely spaced cladding of sufficient height. This may involve a net or panels, for example.

Requirements for guard rails

Guard rails must be of the strength necessary to prevent a person falling.



Guard rails made of wood can be used with a post distance of max. 2.25 m if the following criteria are met:

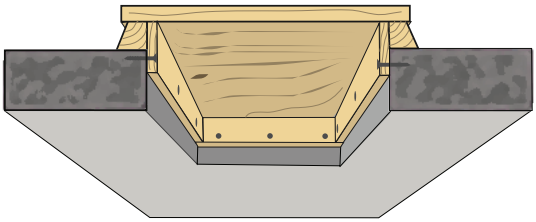
- These posts must be able to withstand a spot load of 1.25 kN (125 kg) applied at the point where the hand rail is secured without them being displaced by more than 25 mm from their original position.
- The hand and knee rails must be made using 31 x 125 mm boards, and foot rails must use 31 x 150 mm boards.

Guard rails for safeguarding against falling on sloping roofs can normally be implemented as above, if the railings are supplemented with a closely spaced cover consisting of plywood sheets, box screens or steel mesh.

The strength of the roof barrier can be tested by letting a load roll down the roof twice at a distance of 5.0 m from the barrier. This load must weigh at least 75 kg, be 1.0 m long and be of a diameter of 0.3 m. The roof barrier must be able to withstand this load.

Holes in floor decks and changes of level in access routes, etc.

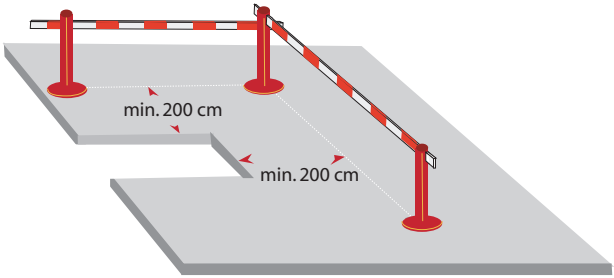
Cover all holes or screen them off if there is a risk of anyone tripping over them or stepping through them, or if materials could fall through them. This is applicable irrespective of how large the holes are and where they are located. Make sure that you secure the cover so that it is unable to be dislodged, and ensure it is able to withstand the anticipated loads.



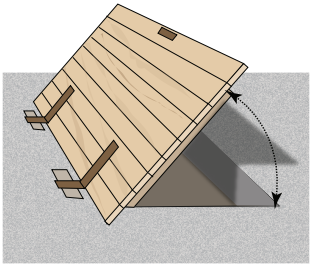
Likewise, all changes of level where people move around should be screened off or marked so that people do not fall or trip.

Large holes

Set up guard rails or supply a clear, durable marker at least 2 m from large holes.



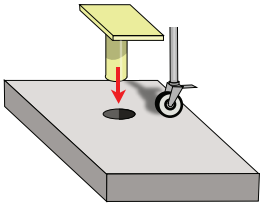
Smaller holes



It is possible to cover smaller holes with a trapdoor provided with battens so that it cannot be pushed aside. Place hinges on the hatch so that it cannot be removed, but you can still use the hole e.g. to transport materials through.

Small holes

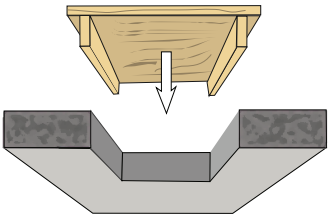
You have to cover small holes yourself if there is a risk of tripping or if you use motorised technical aids.



Skylight openings

Holes that are to be turned into skylights have to be covered with a load-bearing, non-slip material which remains in place.

Alternatively, they can be secured using guard rails or clear, durable markers at least 2 m from the edge.



Non load-bearing surface

Personnel must not work on surfaces which are not load-bearing without precautions being implemented to prevent falling. This may, for example, include points where joists, roof panels and similar cannot withstand people walking on them.

LIGHTING

Orientation lighting must be described in the Health and Safety Plan. Both this document and the tender documentation must state which part of the lighting individual contractors are responsible for.

General

Place light switches as close to the entrance as possible. If orientation lighting is necessary but has not been installed in working areas or rooms, it must be possible to switch on work lighting at the entrance to the area or room.

In the locations where the lights must always stay on, you must position the light switches so that you do not turn out all the lights by mistake. Where necessary, use a key switch.

Distribute the lighting over as many electrical groups as possible so that a single fuse cannot turn out the lights over large areas.

Consider whether emergency lighting is required anywhere.

Areas and rooms with insufficient lighting must be cordoned off or marked.

Premises without light must be cordoned off if there is a risk of anyone falling or otherwise being injured. Other rooms or areas which have insufficient lighting can be either cordoned off or marked.

Provide a cabinet containing fuses and lamps in a readily accessible location.

Non-dazzle lighting

Lighting must never dazzle, cause reflections or cause uncomfortable heat. Always apply light from at least 2 sides. This helps to prevent deep shadows.

Risk of fire and risk of electrical accidents

Keep fittings clean and in good condition. Remember to put back protective grilles when you have replaced bulbs and lamps.

Fittings which are to be used in the open must be designed for the purpose. Defective fittings may cause fire or electrical accidents.

Bear in mind the positioning of lamps. If they have a high surface temperature, they may start a fire. Therefore, never place them on the floor; there is a major risk there of them coming into contact with highly inflammable materials.

Lamps which do not have double protection must have earth connections at their connection points. Remember to use transformer plugs or to replace e.g. German and Swedish plugs.

Orientation lighting

Orientation lighting is the lighting necessary to allow people and vehicles to move safely around the building site. This must be at a strength of at least 25 lux.

Work lighting

Work lighting is the lighting necessary to allow employees to do their jobs safely. The light must be suited to the tasks being performed.

Measurement and assessment of lighting

It is possible to measure the strength of lighting using a luxmeter. The lux unit is a measure of how much light falls on a given surface.

Orientation light	25 lux
Rough work	50 lux
More demanding work	100 lux
Covered work area	200 lux
Installation work	300 lux
Precision work	500 lux

Be aware that the older a light source is, the less light it gives off. Therefore, it is a good idea to choose higher lux values than those stated here.

ELECTRICITY

General information on building site installations

Building site installations must meet the requirements laid down in the Heavy Current xecutive Order.

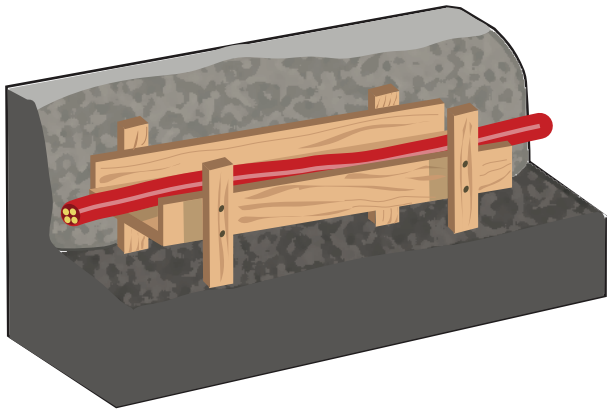
The tender documentation must describe the ways in which and extent to which individual contractors are responsible for electrical installations or parts thereof on the building site, e.g. the period of time over which this is to take place.

Newly installed electrical installations must be reported to the local electrical utility by an authorised electrical installer. This is applicable to both temporary and permanent installations.

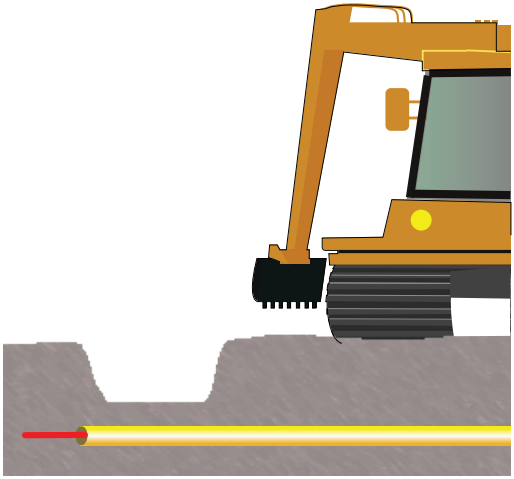
If a temporary installation on the building site is retained for more than three months, the installation must be inspected every three months by an authorised electrician. The owner (user) of the temporary installation is responsible for the state and maintenance of the installation.

Building site power supply

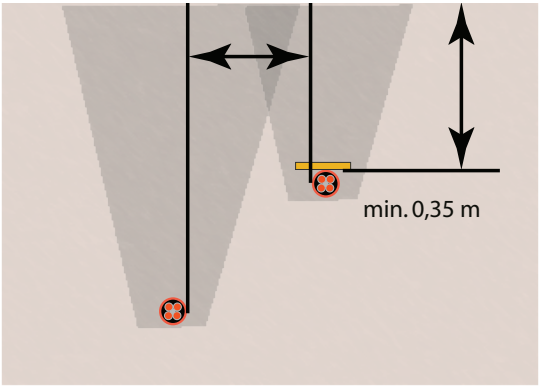
Electrical cables which power main or subsidiary switchboards must be protected from damage. They can, for example, be suspended, buried or protected in some other way.

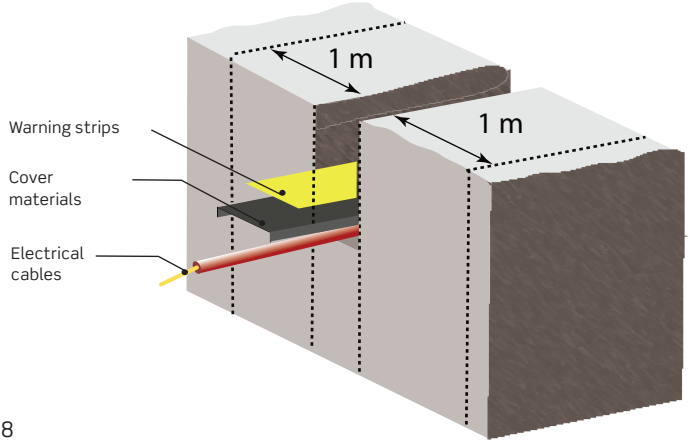


To prevent injury, building site power supply cables should not be laid on roads or walkways. If this is unavoidable, the cables must be protected against mechanical overload. For example, cables can be buried under the carriageway.

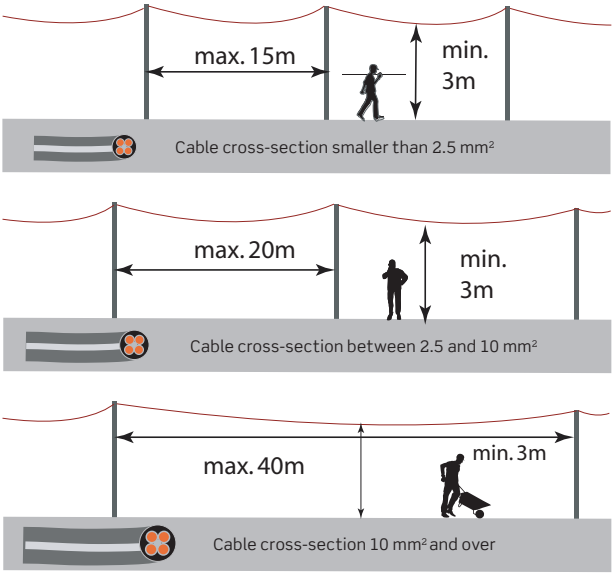


If the cables are buried, they must be located at a depth of at least 35 cm and be protected with conduits, U-profiles or plastic cover plates.





Cables and wires can also be suspended on masts, building elements, scaffolding, trestles or similar. In such instances, they must be secured using insulated material. If you use such suspended cables, you must ensure that they are clearly labelled and hang away from roads and walkways or are sufficiently high to prevent cranes, excavators, trucks and other work machinery from striking them.



Temporary installations must be positioned in such a way as to require as little as possible relocation.

Flexible cables, apart from supply cables (cables on electrical de-

vices and extension cables) must as a minimum be sheathed and heavy-duty – type H07RN-F or equivalent.

Construction site switchboards

Construction site switchboards must be CE-labelled and compliant with the provisions of EN 60439-4. Switchboards which do not meet this standard and are not so labelled must not be used.

Construction site switchboards must be secured so as not to tip over and must be positioned in such a way that they are accessible and can easily be operated. The area in front of the switchboard must be tidy.

Plugs in construction site switchboards must be protected from indirect contact by means of ground fault circuit-breakers (Danish HFI or HPFI). Plugs designed for powering other switchboards must not be connected to any other equipment. These plugs will be labelled with a warning, e.g.:

For supplying other switchboards only.
No HFI protection.

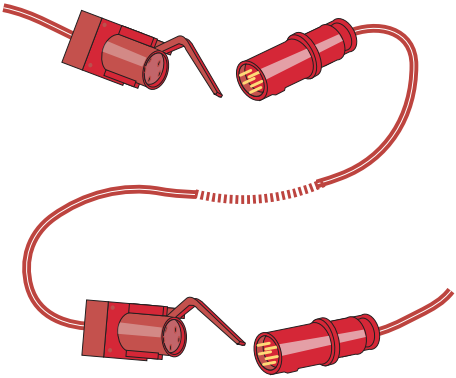
If a fuse blows, you must only replace it once. If this fuse also blows you must call in an electrician. This is also applicable in the case of reclosing of automatic fuses.

It has to be possible to interrupt the power supply to the building site. Therefore, there must be lockable switches in all construction site switchboards.

Appliances and tools

Appliances which are connected to installations on the building site must be protected against indirect contact.

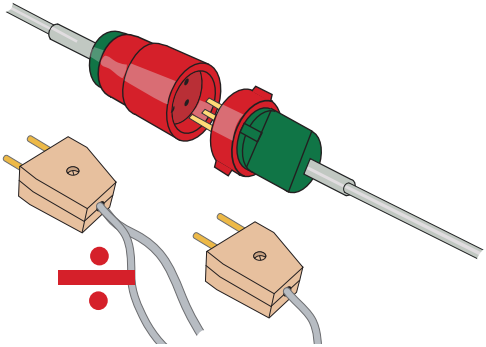
Plugs must normally be fitted with earthing contacts which are connected to a protective wire. These plugs can be rdinary Danish earthed plugs, earth pin plugs or industrial plugs. Foreign Schuko plugs must not be used.



This is also applicable to cable reels and similar. Here, both the plug and the socket component must have earthing contacts.

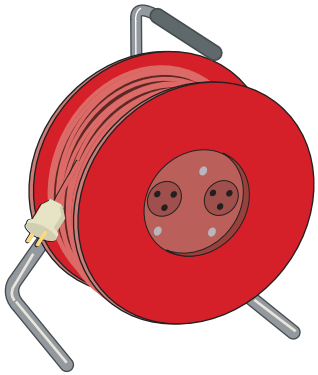
You must only connect appliances to the voltage and current for which they are designed. They may be connected by inserting a plug in a socket or by means of a wired-in connection, as is the case with e.g. cranes and similar. Only authorised electricians may install wired-in connections.

There must be a lockable switch (repair switch) on wired-in appliances.



Plugs, sockets and extension sockets must have high mechanical strength, e.g. two-coloured (red/green). Only one cable must run from a plug or extension socket.

Cable reels must be sufficiently strong, using cables which are sheathed and heavy-duty, type H07RN-F, or equivalent wear and water resistant cables, and be fitted with protective conductor and an earthing pin/contact.



Remember to unwind the entire cable from the reel, otherwise there will be a risk of the cable on the reel melting (fusing).

Enterprises must ensure that electric hand tools are inspected regularly according to the instructions of the manufacturer.

- Ordinary electric hand tools (class I) must be inspected at least every two months.
- Double-insulated tools (class II) normally have to be inspected every six months. Most professional hand tools are double-insulated.

Ground fault circuit breakers (HFI/HPFI) are very sensitive and can also interrupt the power supply on account of moisture. Therefore, it is a good idea to ensure that connection points for plugs, sockets and extension sockets can be kept dry. Hang up connections, cover them or wrap them.

WATER PIPES

To prevent damage to water pipes, you have to hang them up or bury them. Prevent people from tripping over water pipes which have to be laid on the ground or floor. Also protect them from damage.

It is particularly important in winter to ensure that water supply pipes are insulated and frostproofed so that water can continue to run through them.

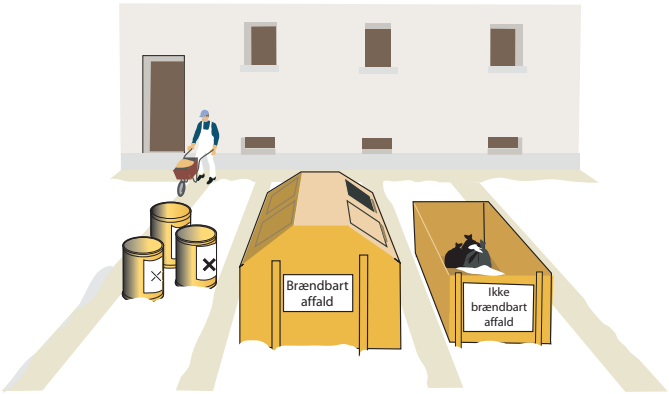
Prevent frost problems with water installations and drains:

- Fit water installations with drain cocks so that you can empty the water out of water pipes when they are not in use. Empty the water out of water pipes and hoses when everyone goes home or if work comes to a temporary halt.

- Water hoses should be rolled up and stored in a frost-free room.

WASTE

Waste and empty packaging must be placed in specially designated areas or in containers which are emptied regularly.



Materials and waste have to be disposed of in accordance with the waste regulation for the municipality in question.

Materials and waste must not be positioned such that water, snow and mud cannot be removed.

Be aware that there are special rules and arrangements in connection with disposal of asbestos, epoxy and isocyanate products and PCBs. This includes spills, empty packaging, used workwear, etc.

WINTER ARRANGEMENTS

To protect against the weather, stationary work sites (e.g. rebar work, sawing using a stationary circular saw, pipe cutting, etc.) must take place within a container, under a canopy or indoors, irrespective of the time of year.

Over the winter, it is necessary to safeguard against problems caused by water, rain, hail and snow, as well as the cold and dark.

The Working Environment Authority's rules in Executive Order on conditions at construction sites requires winter arrangements over the period 1 October to 31 March.

Carcasses, scaffolding and open structures must be covered if:

- the work extends over a long periods (approx. three days for carcasses and approx. six days for scaffolding and similar).
- the weather is so bad that employees risk being exposed to conditions harmful to their health.
- covering such structures is possible and reasonable.

The National Agency for Enterprise and Construction's rules on winter work are applicable for the period 1 November to 31 March. These rules divide arrangements into seasonal arrangements (rain, etc.), which contractors must fund, and weather-related arrangements (snow, frost, etc.) which the developer must fund. The guidelines to these rules include a number of descriptions which are also of significance to the working environment over the winter.

The collective agreements have guidelines on payment for implementation of winter arrangements and guidelines for the supply, setup and moving of shelters.

The building regulations require that it must be possible to carry out building work in the dry. This may mean that covers have to be used.

Make sure that drain laying and drainage work are carried out in plenty of time before the winter.

Roads and storage sites must be drained effectively.

Supply conduits (electricity) and pipes (water) must be laid in plenty of time. Temporary water pipes and drainage pipes must be insulated.

Acquire shovels, snow ploughs, sweepers and other snow clearing equipment in plenty of time. Also remember grit, urea salt and winter mats. These may also be placed in a store.

Review your winter arrangements at a meeting in plenty of time before the onset of winter.

Examples of possible arrangements:

- Closing of façade openings with plastic coated frames or similar.
- Full or partial covering with a plastic tarpaulin or similar.
- Enclosure in the form of an effectively arranged climate screen or wind screen.
- Cover or complete cover.

- If a plastic tarpaulin is to be fitted to the scaffolding, it must have a sufficient number of attachment points.

- If the scaffolding is covered with a net, it is not necessary to have the same number of attachments points as is the case when covering it with a tarpaulin. A net which limits the effects of the wind by up to 50% will ensure that people can see in and out, and hence in some cases this will be a sufficient and acceptable solution.

EXCAVATION WORK

An experienced person should manage and monitor the excavation work, including the nature of the soil, and make decisions on slopes and the use of shoring devices.

Before you start excavating, it may be necessary to investigate the following with local authorities or utility companies:

- Contamination of the soil from earlier production or landfill sites.
- Any earlier excavations in connection with supply pipes or other facilities.
- You must pay particular attention to whether there are any installations in the ground. There may be gas pipes, electricity cables or communication cables.
- Permission to excavate from the municipal authorities.

It may be necessary to undertake surveys of the soil before starting excavation work, e.g. if there is contamination of the soil, and if so to what extent.

Written assessment - work plan

In the case of excavation work at depths in excess of 5 m (particularly hazardous work), the employer must draw up a written assessment for execution of the work. If necessary, this assessment must include specific arrangements so as to avoid any hazards.

If there is more than one employer, the developer in such instances must also create a Health and Safety Plan. It must be possible for all work processes to take place safely and appropriately, including with regard to ergonomics and good working positions.

Emergency preparedness

When planning excavation work, specific conditions may require preparation of an emergency preparedness plan. Here, the necessary equipment must be available. This may include pumps, ladders, additional shoring materials, respiratory protection and special workwear if there is any risk of encountering contamination.

Safety during excavation work

Make sure that the soil is exposed, and use lights at dark times of year. Rain, snow, frost and darkness may be of great importance with regard to safety during excavation work.

There may be sand veins, water-bearing strata (flow) and previous excavations with loose backfill. There is also a risk of collapse with all excavation faces. Pay particular attention to e.g. sand, flow, marsh, water veins or a high water table.

Also, pay attention to buildings, structures or trees near to where you will be excavating.

You must also pay attention to factors such as heavy traffic which includes buses and trucks, or piledriving and blasting which may affect the stability of the soil.

Excavation work near roadworks

You must draw up a boundary demarcation plan if excavation work is to take place near to or on roads carrying traffic. The local road authorities have to approve the plan, which must be compliant with the rules for boundary demarcation.

The distance between work site and road is important as vibration from the passing traffic may cause the excavation to collapse.

Excavation without shoring

It is important to ensure that the sides will not slip in the case of excavation without shoring. You can ensure this by means of the following:

- by establishing slopes,
- by keeping the sides even and free of large rocks, and
- by removing excavated soil so that it does not place stress on the edges and allow the excavated soil to slip down.

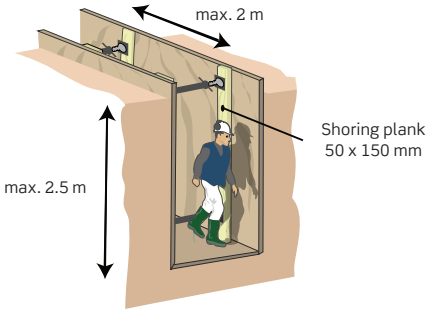
To safeguard against a hazardous collapse, you can create a sloped face in which the sides take the shape of steps with an incline of 1:2 (1 across and 2 up). In the case of excavation depths in excess of 5 m, the slope must have an incline of 1:1.

In exceptional circumstances, it may be justifiable to work in excavations without slopes at a depth of 1.7 m, if the earth has been deemed to be stable. However, it is normally necessary to safeguard against collapse when working on small excavations where personnel are to work in a kneeling position, for example.

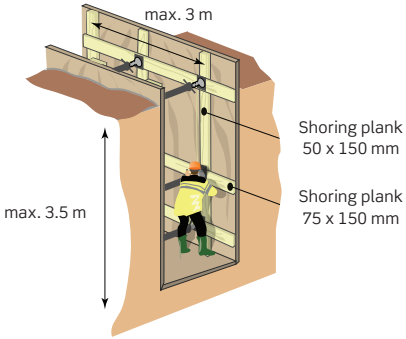
In the case of excavation work in connection with roadworks, the distance from the edge of the excavation to the carriageway must be at least the depth of the excavation.

Excavation with shoring

You must shore the excavation when it is not possible to create a slope. There are several ways in which this can be done:

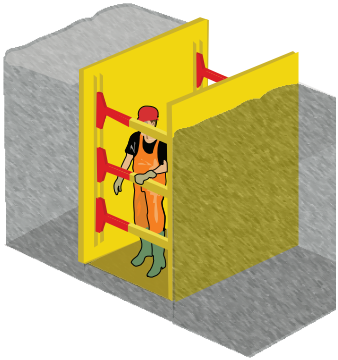


Use uprights if you will be excavating to a maximum depth of 2.25 m. Behind the uprights, there must be upright plywood sheets which protrude 0.15 m up over the edge.



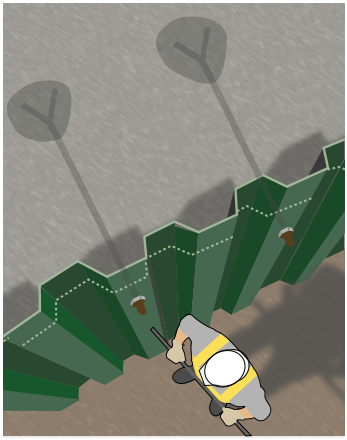
Use wales if you are to excavate to depths greater than 2.25 m.

Use a trench box. This must protrude at least 0.15 m up over the edge when it stands at the bottom of the excavation. The trench box must reach all the way down to the bottom of the trench.



When using a trench box, you must not leave the area safeguarded by the trench box. It must also be possible to get out of the trench box using a ladder.

The same is applicable to implementation of shoring using uprights or wales. Here, as much is prepared as possible at ground level when shoring work begins. After this, the shoring is established continuously from ground level and from the shored part of the excavation.



If there are to be guard rails along the edges of the excavation at ground level, these can be established as part of the shoring.

In the case of large excavation depths, it may be necessary to establish a sheet pile wall.

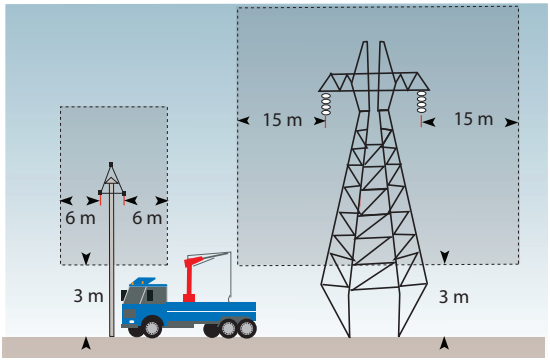
Excavation work close to existing pipework or cabling

If there are pipes or cables in the ground or overhead in the locations where you are to excavate, these must be taken into account in your planning of excavation work.

Make sure that:

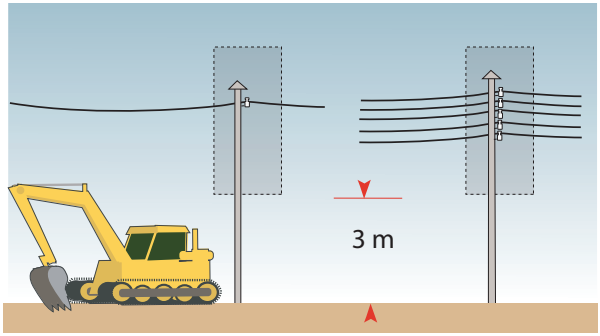
- You have information on all pipes and cables within 10 m of the excavation sites.
- Installations in the ground are clearly marked.
- Overhead cables, roads and cycle paths are clearly marked on drawings and similar.

Applicable safe distances when working close to overhead cables. The minimum distances shown must be respected.



High voltage overhead cable 10-40 kV

High voltage overhead cable 40-400 kV



The safe distance in the case of low voltage overhead cables is a 1.5 m radius from the cable suspension point plus 3 m from ground level and up to this point.

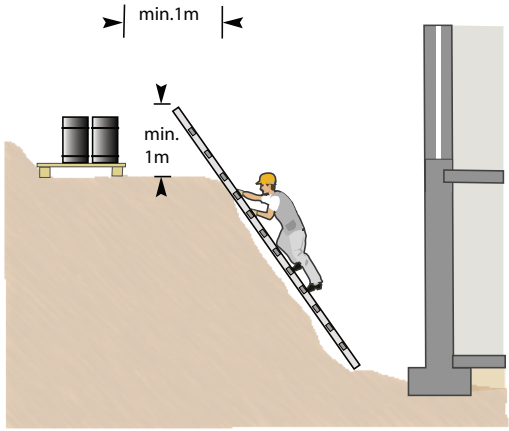
Breaking of overhead cables or ground cables

If an excavator strikes an overhead cable or ground cable, the driver must proceed as follows:

- Stay in the machine until the power has been switched off.
- Keep everyone away from the machine – see safe distance.
- Notify the local power supply company, and call the emergency services (112) if necessary.

Access and escape routes

All excavations must have proper access and escape routes.



For small excavations, there must be a ladder near to the work site.

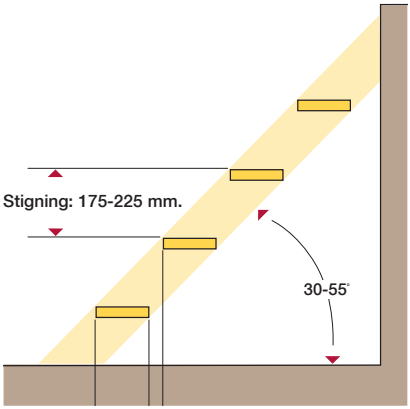
Open excavations

The risk of landslide is particularly great when work is taking place in an open excavation as the sides often have to remain where they are for a length of time and are so affected by the wind and weather.

Therefore, the faces must either be shored or have a slope when work is in progress between a foundation and a face.

The work area must be at least 1 metre wide (measured at knee height). The bottom of the open excavation must be flat and even so that people can work properly there. If necessary, put down a layer of road construction gravel.

Steps must ensure access to and from the open excavation. These must have handrails on both sides, with both hand and knee rails. If tools are to be transported using the steps, the latter must be at least 0.8 m wide.



The steps must slope according to the formula two risings and one going = 0.60 to 0.63 m, and the individual steps must rise by 0.2 m at the most.

In open excavations with sheet piling, a stair tower will be installed as an access route, or possibly an elevator.

There must always be a ladder close to work areas which can be used as an escape route between the foundation and the face.

It must not be possible for people to fall into the open excavation. Set up markers 2 m from the edge, or set up guard rails. The guard rails must only be open by the steps.

GAS PIPES

Working on gas pipes requires instruction and a knowledge of the applicable rules. Therefore, employees must be informed both verbally and in writing of the risk of accidents and illness. The same is true for instructions on how to prevent fire, explosion, poisoning and suffocation.

Work must be monitored by a person who can come to the rescue in hazardous situations.

Everyone must be familiar with "First aid in the event of accidents involving gas". This is available as an annex to the Working Environment Authority'S executive order on working on pipes filled with gas.

Always use meters which raise the alarm if the gas concentration becomes too high.

Use respiratory protection with an air supply when gases may occur in concentrations hazardous to health or displace ordinary air.

Working with respiratory protection requires planning. Physically demanding work may only continue for short periods and must be followed by breaks or other work.

CONSTRUCTION WORK NEAR TO WATER

There are special safety requirements for work near to water, e.g. harbors, quays, bridges, watercourses, lakes and dikes.

Planning of such work must prevent hazardous work processes. If this is not possible, there must always be several people involved in doing the work so that nobody works alone.

The Danish Maritime Authority is the authority for the working environment at sea.
Their guidelines for contract works at sea can be found at we. sofa.d.

In connection with construction projects near to water or at sea, or prior to such projects, you must:

- Describe how the project may affect navigational safety (risk of collision, etc.) and assess how any risk may be reduced.

- Hold a consultation with the users of the waters and the authorities, i.e. acquire statements from parties affected, e.g. the harbors authorities, pilots, the Danish Road Directorate, the Danish Coastal Authority, etc.

- Obtain permission from the Danish Maritime Safety Administration concerning marking by any buoys.

- Ensure that working boats offer good visibility and communication:
  - including the ability to communicate on the maritime VHF channels.
  - If the boat is less than 12 m long, it must be equipped with a radar reflector.
  - If work is to take place in busy waters in a boat more than 12 m long, it must be possible to transmit an AI-A signal (Automatic Identification System Signal).

- At the latest four weeks before you start work, you must inform Searchable Notices to Mariners of the names and callings of the ships, which VHF channels are monitored, and other relevant information relating to the activity so that mariners can be made aware of the activity.

- At the latest four weeks before you start work, you must submit an application to the Danish Maritime Authority if the project requires a temporary area with navigational restrictions.

- Be aware of special conditions if there are any submarine cables or pipelines in the area.

There are special planning requirements if there is any risk of drowning. Before work starts, the following must be done:

- the employer must prepare an assessment of the work with arrangements (work plan) so that the work can be carried out safely.

- If there is more than one employer, the developer must prepare a Health and Safety Plan, and emergency, evacuation and exercise plans must be coordinated and described in the plan.

It will normally be necessary to establish the requisite rescue equipment, and it may be necessary to work wearing lifesavers.

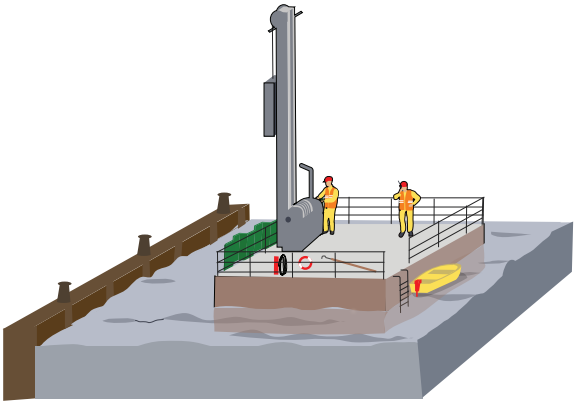
Planning of such work must prevent hazardous work processes. If this is not possible, there must always be several people involved in doing the work so that nobody works alone.

Working at sea

People working at sea are dependent on the equipment they have with them and cannot expect to receive assistance from land. The wind and weather conditions must always be taken into account in

the daily planning of work so that hazardous situations can be avoided. One option may be to suspend work completely or temporarily.

An unsinkable dinghy is mandatory on a piled or pontoon, and there must also be maritime VHF channels here which can be used in the event of an accident. These may be supplemented with flash signals and similar where necessary.



Signal rockets should be permanent equipment for particularly exposed tasks.

There must always be life with ropes, rescue hooks and fire extinguishers on all boats, pontoons and pile drivers. There must also be a ladder so that anyone who has fallen overboard can climb back aboard.

Everyone aboard must have received instructions on the use of the rescue equipment.

Life and first aid

Everyone aboard must wear lifesavers.

There must be a first aid case aboard which includes a sling which can be used if there is a risk of major blood loss from wounds on the arms and legs.

At least one person in the team must know how to give first aid, i.e. stop bleeding and give artificial respiration.

ROADWORKS

The safest way to proceed is to separate roadworks from the traffic if you are working on or next to a busy road. However, this is not always possible as there are a number of conditions which must be met.

Work which does not involve roadworks but is carried out near to and along a road, must also be planned and carried out in compliance with the road rules. This is applicable if, for example, a hoist, crane or other equipment is set up right by the road or partly on the road.

Any form of roadworks will almost always, to a greater or a lesser extent, cause inconvenience and hazards for road users and people working on the road. Therefore, accurate marking of roadworks is very important – and must be adjusted regularly so that people maintain full respect for the markings and hence ensure safety.

Roadwork markings or barriers must be matched to the specific roadworks and the speed of the traffic and be formulated in compliance with the rules laid down by the Danish Road Directorate.

Coloured workwear and reflectors (warning clothing) help to underpin safety as it makes you more visible to road users. The employer must

decide on the warning class required for workwear, and in most cases class 3 clothing will be necessary.

All parties bear responsibility when setting up roadworks. Formally, the rules on building sites also apply to roadworks, along with the Danish Road Directorate's rules. These must therefore be adhered to when you report and prepare Health and Safety Plans as part of the setup and operation of a building site.

In dense traffic, carbon monoxide or emissions (nitrous gases) and diesel particles may be hazardous to health. The employer is obliged to measure these gases and particles if excessively high concentrations are suspected.

A closed screen between the road and the work site may reduce the risk of emission gases. Another option is to divert the traffic so as to reduce the problem.

In a worst-case scenario, the work will have to be suspended or carried out in the evening or at night when there is less traffic. Here, on the other hand, it is particularly important to take care with roadworks marking and make sure you wear workwear which can be seen in the dark.

Roadworks marking plan

Before work commences, you must have a roadworks marking plan for the roadworks, and you must comply with this. This plan must also describe inspections, maintenance and access routes to the work site. The road authority, e.g. the Danish Road Directorate or the municipality, must approve the plan, and a copy of the plan must be kept at the work site.

The roadworks marking plan should be created at the same time as you plan the road project. This will make it easier to adapt working methods and processes to the markings so as to make these optimal.

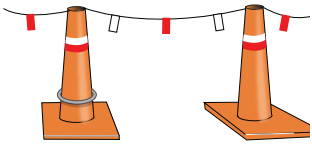
Equipment for roadworks marking must be compliant with the rules laid down in the executive order on roadworks marking.

Be aware that more stringent rules are applicable to work on major roads. Some road authorities, including the Danish Road Directorate, require anyone carrying out roadworks to have completed the course "Vejen som arbejdsplads" [The road as a place of work].

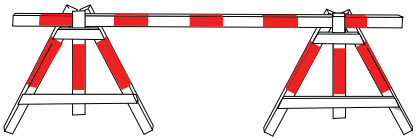
Signs

Signs and other equipment for marking roadworks must always be in the correct condition, properly maintained and used correctly. It is also important to select the right equipment which e.g. is of the correct strength and will not topple over so that it is able to perform its function even if it is subject to severe physical loads.

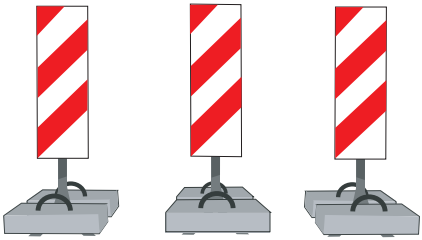
Examples of roadworks marking equipment:



Marker cones and marker tags



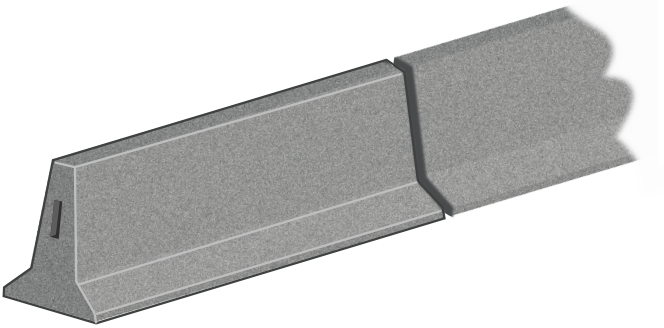
Wooden trestles with battens



Edge marker panels "lollipops". Signposting must show the traffic the correct route - traffic should pass to the left in the example here

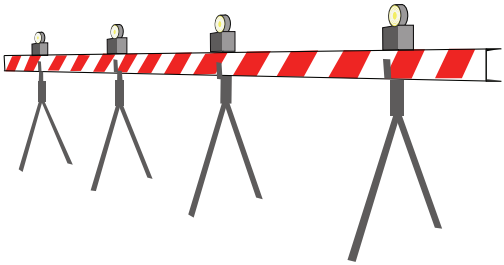
Traffic barriers

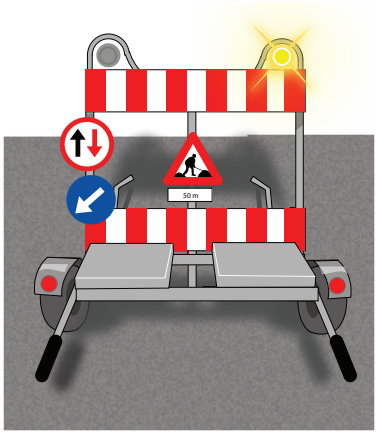
A traffic barrier is a strong barrier which is able to withstand collisions (steel barriers or concrete elements which are compliant with the test requirements in DS/EN 1317-2). Red/white plastic tape is not an approved marking material and must not be used.

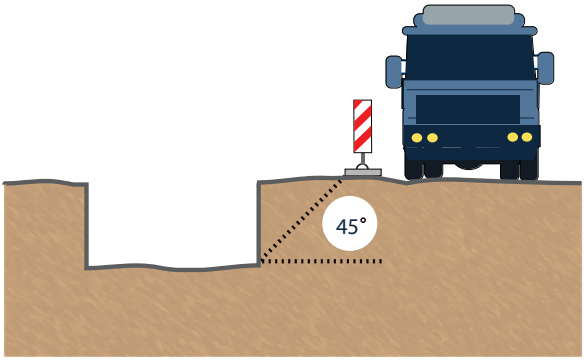


Illuminated signs

Illuminated signs of various kinds are another very effective form of roadworks marking equipment and are often used for short jobs (placed on vehicles, longitudinal row of lights, transverse lights, etc.). If powerful warning lights are required, you must ensure that you have access to the necessary amount of power and current.







In the case of roadworks where excavation work takes place, and this excavation work is carried out using a slope, the distance from the edge of the excavation to the carriageway must be at least the depth of the excavation. This distance is important as vibration from the passing traffic may cause the excavation to collapse.

Permanent and mobile roadworks

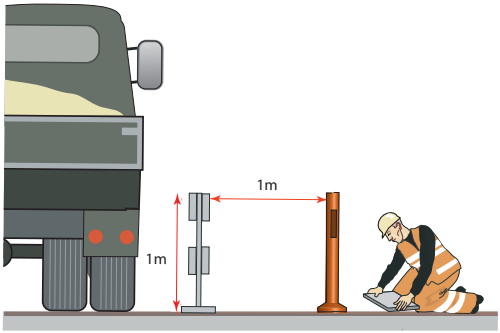
There are two types of roadworks:

1. Mobile roadworks involve both mobile work using machinery and short-term work where the roadworks marking does not remain in place the whole night.

2. Stationary roadworks are normally works where the roadworks marking must remain in place overnight.

The work site must be clearly divided into the work area and the non-work area.

A work area is the actual work site and the necessary free areas, traffic areas, verges, etc. where tools, materials and similar are placed.

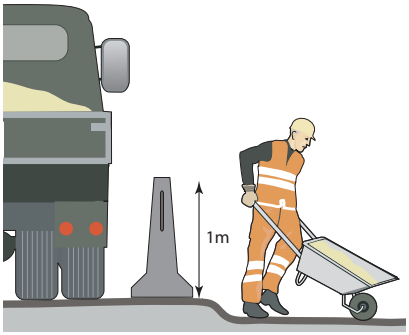


A non-work area can be found between the work area and the carriageway marking and must be kept free of equipment and people. The area may be used by pedestrians and cyclists.

Longitudinal markings are used to separate the traffic area and the work area/non-work area.

Specifically, this takes place by establishing a clear area of at least 1 m between the work area and the carriageway marking. No work may take place here, nor may materials be placed here.

The marking must consist of a transverse marking facing the traffic and a longitudinal marking between the traffic and the work site. There must be a visible marker so that the clear area can be kept free.



If it is not possible to establish a 1 m non-work area, there must be other suitable solutions.

This situation often occurs in the case of minor road repairs, work on refuges and work at junctions, and so other solutions have to be selected here. This is described in the Manual for marking of roadworks, etc., which can be found at www.bar-ba.dk.

Reflective workwear

Visible workwear is mandatory for everyone working and remaining close to and in traffic.

Requirements for visible workwear:

Class 3 clothing
You must wear class 3 clothing at roadworks where there is no effective separation from the moving traffic, and where the traffic is travelling at its usual speed.

These may include, for example:

- During rescue operations following a road traffic accident.
- If signs and other markers are being set up or removed.
- When working on road and rail tunnels with heavy traffic or without effective separation from the moving traffic.

Class 2 clothing
You must wear class 2 clothing if you:
- are inspecting areas in which class 3 clothing is a requirement,
- are working in a marked-off area, but where the risk of collision cannot be entirely ruled out,
- are working in areas without effective separation from the moving traffic, but where the moving traffic is reducing its speed to a responsible level.

Class 1 clothing
You must wear class 1 clothing if you are visiting (with an escort) areas where class 2 or 3 clothing is required.

Always wear class 3 clothing if you are in any doubt or if needs change.

You should only use either class 2 or class 3 in the case of roadworks. The part of the fabric which reflects the light must be yellow, orange or red.

Cleaning

Poor or incorrect cleaning of reflective workwear makes it less visible. This can generally only be seen when a light is shone on the clothing in the dark. Impaired effectiveness can lead to serious accidents, and so it is important to follow the guidance of the manufacturer in respect of cleaning and washing.

Protective footwear

You should wear especially protective footwear during all types of roadworks as there is almost always a risk of injuring your feet.

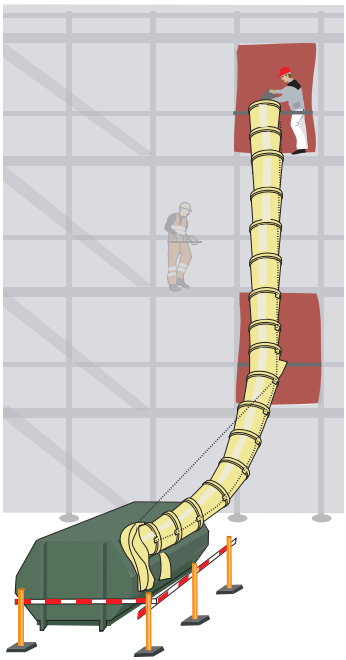
See section 6 for more information on personal protective equipment.

DEMOLITION

Demolition of buildings requires planning and preparation. Review the building or structure before work starts.

Anyone planning a building or construction task which includes demolition is obliged to formulate the project such that demolition can take place safely. The project planner must advise the developer of necessary surveys, e.g. surveying for asbestos in the building.

In many instances, demolition of buildings or major partial demolitions will have to be regarded as particularly hazardous work. This means that the developer on building sites where there is more than one employer at the same time will have to prepare a Health and Safety Plan for this work.



The employer must assess the work, specifying arrangements so that the work can be done safely and appropriately from the point of view of health and safety. This assessment must be presented in writing.

The building or structure must be assessed with regard to the following:

- Are there any materials, building elements or things left behind, e.g. asbestos, PCBs, syringes used for drugs, batteries or faecal matter (waste) from humans and animals, which may be hazardous to health?
- Could the ground be contaminated?
- Could selective demolition weaken the stability of the structure?
- Does demolition require special measures for the surrounding areas, e.g. in the event of vibration, noise or dust?
- Are there any electricity, gas, water or other installations requiring special handling?
- Can you carry out the work in a different way which is less stressful for the working environment, e.g. blasting or cutting in place of hammering or drilling?
- Do you have to remove the insulation granules prior to demolition so as to prevent problems with dust?
- Is there any pre-stressed concrete with wires?

If the assessment shows that there is e.g. asbestos, PCBs, mineral wool or faecal waste, this must be removed before you commence the actual demolition work.

Demolition work must be managed and monitored by an experienced person who can assess whether the building elements remaining are stable. The people carrying out the actual demolition work must also include people with experience.

Minors under 18 may only work with demolition in connection with industrial skills training (e.g. as apprentices), and if they receive the proper instruction.

Checklist prior to demolition

Before demolition work commences, the contractor must ensure that:

- Electrical cables, gas pipes and similar are disconnected (by an authorised installer).
- The work area is cordoned off and that temporary shoring and securing arrangements are installed on an ongoing basis.
- The necessary shoring equipment is available.
- Doors and windows are covered so that no materials fall out.
- Appoint someone to keep watch, if necessary.
- Transport and access routes are safeguarded by means of covers, where necessary.
- The work is carried out in the sequence specified in the tender documentation and schedule.
- The necessary signs are put up.
- Non load-bearing structures are secured.
- The necessary scaffolding and other technical aids are put in place.
- Employees have the necessary personal protective equipment

available to them and do actually use it, e.g. helmets and protective footwear.

- Waste is positioned and disposed of as per the tender documentation.

Dust

Reduce the amount of dust in the air by means of extraction, cleaning with a suitable vacuum cleaner and spraying with water. If necessary, wear dust masks, goggles and dust-repellent workwear.

As a dust mask, you can wear a half mask fitted with a class P2 dust filter or - even better - a full mask. It is a good idea to use a coarse dust filter to protect the fine dust filter.

Traditional single-use masks will not normally be suitable for demolition and similar very dusty work.

As demolition work often creates a lot of dust, even if attempts are made to restrict this, it will be necessary in many situations to use respiratory protection throughout the entire work period. Here, it will not be possible to use ordinary filtered respiratory protection as this may only be used for three hours over the course of an entire working day. Instead, you could use a suitable turbo filter mask or respiratory protection with an air supply. See section 6 for more information on the use of respiratory protection.

RENOVATION

Before renovating a building, you must carry out a condition assessment of the property. This must document the working environment-related risks and describe a realistic time schedule as early as the tender phase.

The condition assessment should include the following:

- Stability of the structure if altered.
- The load-bearing ability of the building at points where work is being carried out.
- Locations of electricity, gas and water installations.
- Risk of contact with substances and materials which are harmful to health, such as:
  - asbestos, mineral wool and PCBs,
  - wet rot and dry rot,
  - animal and human waste.

Renovation jobs typically take place in existing buildings, where the work may be heavy, difficult and physically demanding. Therefore, it is important to establish good access and transport routes. This makes it easier to move building materials around and makes it possible to use technical aids to transport them.
Limit the dust by:

- Using a vacuum cleaner connected to a central extraction facility.
- Having an extractor on tools for drilling or cutting.
- Sprinkling areas with water to bind the dust.
- Avoiding hammering or drilling concrete. If you blast, crush or cut concrete, this causes less dust.

- Cleaning the work area regularly.

It is always a good idea to involve users and residents in the planning of renovation jobs. According to the Rent Act, they must at least be told that the work is to take place.

REMOVAL OF CONCRETE

A lot of quartz dust can be generated when removing concrete, particularly when a chisel hammer or similar is used. Crushing, cutting or or blasting the concrete away is a better idea.

Blasting may only take place when a trained blasting expert manages the work. Minors under 18 may under no circumstances take part in work where there is a risk of explosion.

PRECAST PANEL INSTALLATION

Precast panel installation is regarded as hazardous work for which the developer must create a Health and Safety Plan (PSS) if there is more than one employer working on the building site at the same time.

In the case of particularly hazardous work, the employer must also draw up a written assessment with arrangements (work plan) so that the work can be carried out safely and appropriately from the point of view of health and safety, and it should be included in the basic information for the startup meeting and instructions for employees.

Project planning

A lot of parties are involved in a project with precast panels. The developer's coordinator for the project phase should check that the temporary statics of the building are taken into account while it is being constructed. This includes creating a plan for temporary propping and when it has to be removed.

It is important to coordinate the work prior to installation and at the same time to review every detail of the project. This should take place at a meeting at which the Health and Safety Plan may be adjusted.
The agreement basis will be established according to the models in BIPS 113A.

Start-up meeting

The installation gang must have instructions on installation at a startup meeting. Here, the project documentation, Health and Safety Plan, supplier information, special elements, control points, crane placements, etc. must be reviewed.
Roads, storage locations and work areas for cranes must be described in the developer's Health and Safety Plan.

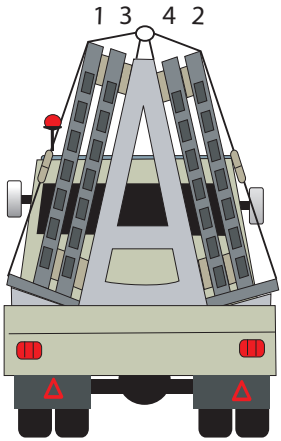
The installation guide must describe correct installation and propping.

Transport and unloading of elements

There must be a flat, horizontal surface with sufficient bearing capacity where pallets/flats or similar can be placed.

Precast panels must be unloaded according to the supplier's instructions.

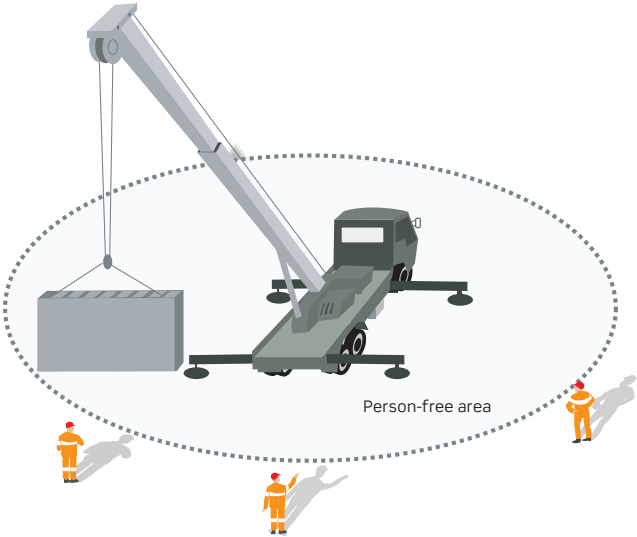
If a pallet is defective on delivery to the site, e.g. if the panels do not engage in dowels, the supplier MUST specify an alternative way of unloading the panels. Otherwise the panels must be returned to the supplier. If reloading the panels is necessary, this must take place on empty racks/pallets. Loading must always take place according to the supplier's instructions.



An assembly coordinator must approve the temporary positioning of precast panels against buildings or structures. Make sure that the panels cannot fall over.

Crane selection

When using a crane, its lifting capacity must be great enough to allow the precast panels to be positioned correctly and safely. Be aware that the tolerance for precast panels is +/–10%.

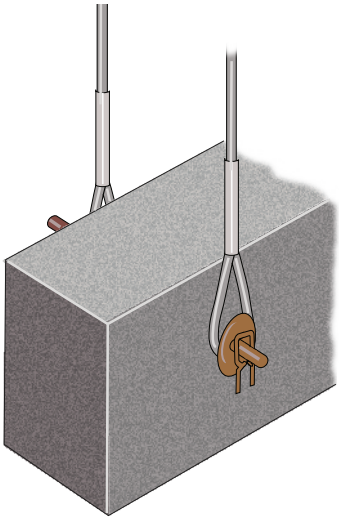


Dowels

There is a "standard" for dowel sizes:

- 40 mm, max. 4.5 tonnes, 100–800 mm panel width
- 60 mm, max. 10.5 tonnes, 200–800 mm panel width
- 90 mm, max. 25.5 tonnes, 200-1200 mm panel width

One dowel of grade 34CrNiMo6 is required.



Webbing or a chain must be placed as close as possible to the panel to be lifted so that the dowel does not bend. Use spacer tubes.

Installation

To plan safe, correct installation, you need to use all the information that may influence the temporary propping of the concrete panels. It is the responsibility of the installation manager to acquire this information. This information must include a calculation and decision on the overall temporary statics and hence for the temporary propping as well.

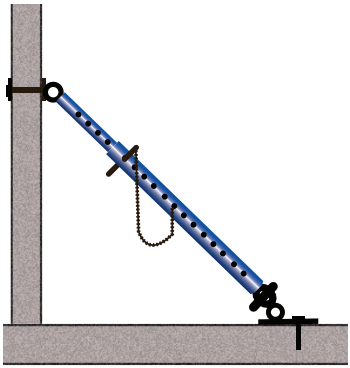
The supplier must provide the necessary instructions for installation of individual elements.

The sequence of the precast panels and the temporary propping is determined on the basis of this information.

While installing concrete panels, other work must not take place nearby at the same time. The employer's written assessment of the work must define where and when other work may be carried out, including grouting.

Propping

Temporary propping of the concrete panels must take place in compliance with the propping plan, which will be formulated on the basis of the structure's temporary statics and the instructions for the individual concrete precast panel suppliers.



It is good practice in the industry to ensure that there are at least two props during the installation of wall and column elements; either two inclined braces or one inclined brace and a connecting fitting for linking with an adjacent element. This stops them falling over.

Columns must also be secured at the base.

When securing in situ concrete or hollow core floors, it may be necessary to check whether the necessary holding value can be chieved.

Concrete screws should only be used once – a defective thread will impair the holding value.

Torques for bolts are dependent on the inserts used and must be implemented in compliance with the supplier's usage instructions. A good 16 mm insert can withstand 16 kN in the pull direction. Under normal design conditions, a torque of 30–40 Nm would give a tensile force on the bolt of approx. 10–12 kN.

Ask the supplier if you are in any doubt about the torque.

You have to use torque wrenches for tightening.

The end surfaces of the panel supports must abut fully against the precast panel and the floor.

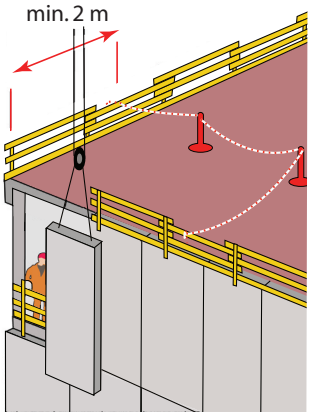
If the design of the project makes specially shaped fittings necessary, the project planner must provide information on this.

Removal of props

Do not remove props until the building is stable. This will only be the case when foundations, etc. have set sufficiently. This must be specified in the project documentation.

Façade and wall elements

When installing outer walls, the guard rails must be in position prior to installation.



Remove the guard rails again either as installation progresses or at a later date. The structure has to be secured to prevent falling when the guard rails are removed, e.g. by using fall protection equipment.

Installation of floor/roof elements

When installing floors, the load-bearing structures must be grouted beforehand or the load-bearing capability must be assured in some other way.

There must be guard rails along the façade which can easily be continued to the front of the installation.

There must always be guard rails behind and along the outer side of the front of the installation.

Floor elements must be laid in parallel as this minimises the risk of falling and tilting.

During installation work measures must be taken to prevent falling, with fall protection equipment as a minimum.

CRAWL SPACES, ATTICS AND ROOF SPACES

Work in enclosed spaces can be split into two groups:

1. Installation work in new construction (also including major reconstructions and renovations).

2. Repair and maintenance of installations in existing buildings.

Employees are subjected to extremely high ergonomic stresses throughout the body during both installation work and repairs.

It is often necessary to crawl in poor positions, and in many instances across various obstacles such as installations at varying heights.

Therefore, there is often a greater risk of industrial accidents, long-term injury occurs (the knees are one very vulnerable area), and the work can be mentally stressful.

When working in enclosed spaces, it may be necessary to supplement the workplace assessment with a description of the conditions at the workplace, including access conditions.

It may also be necessary to create an emergency, evacuation and exercise plan. This must describe how any injured people can be evacuated and be approved by the local rescue corps.

New construction

In the case of new construction, the problem is more or less resolved. Here, the Building Regulations state that the access height must be at least 1.9 m and a free width of at least 0.7 m in crawl spaces with installations requiring servicing, inspection or maintenance.
If the installations can be serviced via a removable floor, setting up a crawl space is fine.

Existing buildings

In existing buildings, it is often impossible to alter enclosed spaces. Here, it is necessary to plan the work so that the amount of time spent in stressful working positions is as short as possible.

This can be implemented by:

- Limiting daily working hours.
- Employees being given the opportunity for extra breaks in addition to their regular breaks for eating and drinking.
- People not working alone (regular contact with the person working).
- Employees being given special workwear, if necessary suitable respiratory protection and other personal protective equipment (including knee pads, helmets and soft, insulating pads to lie/sit on as they work).
- Ensuring that the orientation and work lighting is working and connected to two different groups in the electrical cabinet.
- Using small trolleys to transport tools and materials to the places that they can access.
- Ensuring that equipment is available which makes it possible to get any injured workers out.

- Ensuring that the distance between the access points is no more than approx. 15 m (it may be necessary to make more holes in the existing buildings or to the open air).
- Ensuring that the access holes are at least 60 x 80 cm in size.
- Ensuring that there is a convenient access route to the access holes in the places where such holes are above or below ground level.
- Cleaning the work area thoroughly before work commences.

The distance between the work site and the exits should be shorter than the maximum limit if there is a risk of fire, fumes and similar, if there are pipes and similar which obstruct the escape routes, or if visibility is limited.

Use the assessment schedule (see below) to help establish the maximum daily working hours in a crawl space.

Crawl space height	Maximum working hours over the course of one day	Factors which may further limit the daily maximum working hours
Between 60 and 90 cm	1 hour	• Use of personal protective equipment which may, for example, limit free height when standing • Particularly stressful working positions or access positions • Mentally stressful working conditions • Personal criteria, e.g. health and weight
Between 90 and 120 cm	2 hours	
Over 120 cm	4 hours	
The actual standing height for anyone working in the crawl space	General length of working day	

Emergency lighting is mandatory when working in a crawl space. This can e.g. be a battery light which can be used as an orientation light in the event of a power failure.

Dust, asbestos, etc.

When working in basements or roof spaces, there is a greater risk of dust, insulation materials and construction material remains which can be harmful to health. In buildings dating back to before 1975, there is a risk of contact with insulation materials which contain asbestos. Asbestos may also be found in other materials used until the mid-1980s.

If asbestos is present, the work area must be cleaned before work may commence. This cleaning must be undertaken by people trained in the removal of asbestos.

In other situations, it may be necessary to tidy up before work can begin, e.g. if there is too much dust, animal excrement or construction waste.

Do not crawl around in rubble and other construction waste as this may damage your hands and knees.

Work in lofts, roof spaces and crawl spaces requires a lot of attention and must always be planned. The necessary aids, protective equipment and technical aids must be in place before work commences.

WORKING IN ENCLOSED SPACES AND GULLIES

Always make sure that accidents involving suffocation, poisoning and similar are prevented.

Be particularly vigilant when working in:

- gullies,
- pumphouses,
- tunnels,
- pipelines,
- silos,
- shafts and similar locations.

Minors under 18 must not work in enclosed spaces, gullies, pipes, etc., if there is a risk of suffocation or explosion.

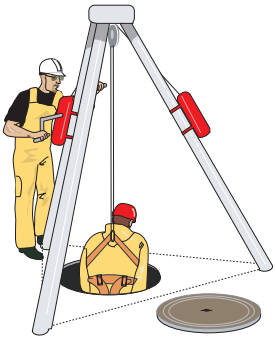
A lot of this work will be particularly hazardous work. This means that the employer must compile a written assessment which includes arrangements so that work can be carried out safely.

If people on the work site are employed by more than one employer, the developer must prepare a Health and Safety Plan for the work.

Working in gullies

There must always be at least one person on watch when people work in gullies and similar. He must remain in constant contact with the people working in the gully. An assistant is often required as well whom the person on watch can summon quickly.

Before work begins:



- Check whether the sides of the gully, vertical ladders, etc. are intact.
- Any damage must be repaired immediately.
- The gully must be vented effectively – blow in fresh air if necessary.
- Before entering the gully, check whether the air in the gully is clean and contains sufficient amounts of oxygen. Repeat this measurement while work is in progress in the gully.
- Measure for oxygen content, hydrogen sulphide and explosive substances.
- It must be possible to rescue people working in gullies. Always use a hoisting harness and line. The line must be connected to shear legs with a winch or similar.
- Employees must have received instruction and training on the use of rescue equipment, etc.

If it is necessary to go down into a gully which cannot be vented properly, the following is applicable:

- Use suitable respiratory protection (with an air supply).
- Tools, equipment, lighting and clothing must be prevented from generating sparks.
- The person on watch must be equipped with additional respiratory protection with an air supply.

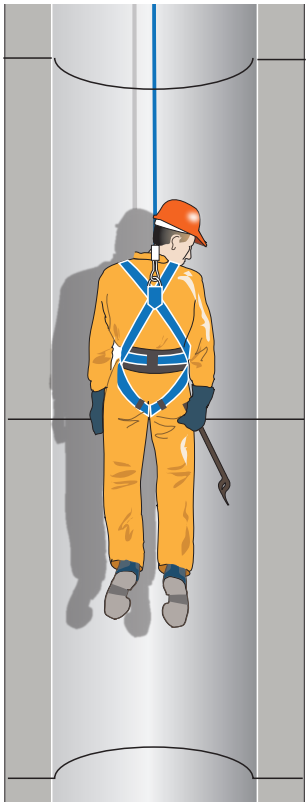
If there is a risk of explosion, smoking and naked flames are prohibited near the gully.

Hoisting harness

A hoisting line secured to a hoisting harness is often the only way of rescuing someone from a gully. This may be the case if, for example, the person in question has been injured or rendered unconscious due to gas or insufficient oxygen in the gully.

An unconscious person cannot be hoisted up out of the gully by manual force. Therefore, suitable hoisting gear must be installed over the gully.

A vehicle with a mechanical winch can also be used as hoisting gear if it is possible to place the vehicle sufficiently close to the gully. This must take place before someone crawls down into the gully, and it must also be possible to operate the winch manually if the mechanical drive fails.



The person on watch must be trained on how to use the rescue equipment correctly and be aware of how he can summon help quickly.

Drain work

Special rules apply to work on drainage facilities used. This requires a knowledge of and instruction on how to work in drains. People who spend most of the day working in drains must have been vaccinated in compliance with the requirements of the Working Environment Authority.

Always wear the most suitable workwear for the task in hand. If clothing is made wet, it must be possible to change into clean, dry workwear.

There are special requirements for separate showers, changing facilities, separate workwear/everyday clothes and requirements for shower after work ends. Personal hygiene is very important, and rules for changing, regular handwashing, etc. must be complied with.

Enclosed spaces, pipes, etc.

Work must not take place in pipelines less than 1.2 m in diameter. However, exemptions to this can be applied for from the Working Environment Authority. Such permission is granted only in special cases, and a long list of special arrangements has to be complied with. Among other things, there must be a detailed plan which shows arrangements for other ways of countering risks to health and safety at work.

The work must be short-term and working hours in the pipeline must be limited.

In the case of disasters, it is possible to deviate from the special arrangements if absolutely necessary. In such instances, the working environment organisation has to have compiled guidelines and procedures, and an evaluation within the working environment organisation should always take place afterwards.

In such special cases, it will normally be possible to use crossover harnesses with ankle ties to be able to pull the person out.

There must be an intermediate post if the person on watch is unable to maintain contact with the people in the pipeline or gully. He must remain between the work site and the person on watch and be able to communicated with both.

District heating facilities

When working in district heating facilities, it is necessary to prevent the risk of scalding while at the same time complying with the general rules for working in gullies, pipes and enclosed spaces.

Employees must have access to cold water when working in areas with temperatures above normal.

Working in enclosed spaces is demanding. Working hours should therefore be limited. Workers must take regular breaks and swap to different tasks.

HOT WORK

Hot work covers all work which involves a risk of igniting building elements and similar. Thus the term "hot work" covers all work involving naked flames. However, it also applies to work with tools which give off heat where there is a risk of fire starting, e.g. angle grinders, circular saws, tools for drying and soldering, etc. Therefore, the rules and practice mentioned can also be used in connection with such work.

Hot work is often the cause of fire because employees are unaware of how they can prevent fire. Therefore, it is important to prepare effective safety procedures and ensure that everyone understands the fire risks and has received good instruction.

Insurance companies make demands in respect of hot work. Typically, any company carrying out hot work will be covered by the developer's building insurance.

Complete an agreement form on hot work before work commences. This form is available from the Danish Institute of Fire and Security Technology at www.brandteknisk-institut.dk.
Good planning can prevent the risk of fire and explosions. How this must specifically be implemented must be stated in the tender documentation or described in the Health and Safety Plan.

In many instances, it will be necessary to have a person on watch for a time after the hot work has been completed.

The employer is obliged to notify employees of the risk of fire and to instruct them on how to prevent fire and fight any fire occurring.

Risk of fire

There are two categories of fire risk during hot work:
1. Faulty tools, or incorrect use of tools.
2. Heat from work which ignites inflammable materials.

In both situations, the risk of fire can be averted by simple means:

- Check that the tool has been correctly maintained and is only used as specified by the manufacturer.
- Remove all inflammable materials. Cover such materials if removing them is not possible.

Examine buildings for anything particular which has to be taken into account before work commences.

- Are inflammable materials, liquids or gases being stored?
- Are there any cavities containing inflammable materials?
- Are there any concealed cable conduits or extraction ducts which open out beneath or just over the roof, from which inflammable vapour or dust could blow out?
- Are there any old papers, spiders webs, etc. which could easily catch fire and start a major fire?

Other conditions which require attention:

- Waste and empty packaging must be thrown regularly into suitable containers.
- Always keep the escape routes free.
- Store welding equipment properly once work is finished.
- Smoking is prohibited in any location where solvents and mixtures containing solvents are used and stored.
- Place foam extinguishers on every floor.

- Put up signs near to foam extinguishers, and add arrows showing where they are.
- Inform employees of fire protection.

Beside all telephones, put up the telephone numbers of alarm centres and the address of the site. Store any alarm centre numbers on the mobile phone.

In the case of cutting, grinding and welding, the heat is mainly propagated in the form of sparks from the material being worked with (there is no such thing as "cold" sparks).

Extinguishing equipment

Regularly check extinguishing equipment and make sure that fire extinguishers have no visible faults or defects, that the seals are intact and that the pressure gauge is displaying the correct pressure.

Extinguishers in poor condition give a false sense of security and cannot stop a fire before it develops.

Extinguishers must be approved and labelled "DS". According to the law, a DS-approved filling station must handling extinguisher filling and pressure testing at least every five years.

If an extinguisher is used outdoors, is subject to changeable weather or is often transported, it must undergo a service inspection by a DS-accredited servicing company at least every six months.

Working with naked flames

Using naked flames, also known as hot work, includes work such as roofing and welding.

The employer is obliged to notify employees of the risk of fire and to instruct them on how to prevent fire and fight any fire occurring.

Avoid naked flames that may come into contact with inflammable materials or building elements. Also make sure there are no cracks or joints in building elements and covers which burning/glowing materials can penetrate.

Watch out in particular for fire in small cavities, e.g. during roofing and metalwork. Fire can make a lot of progress in small cavities and ignite inflammable materials far from the work site.

Divide up the planning of the work as follows:

- Precautions before work commences.
- Setup of the work site.
- Execution of the work.
- Precautions during work.
- Precautions in the event of a fire.
- Precautions when the work is finished, including fire watch.

WELDING AND CUTTING

Welding and cutting smoke contains gases and a number of heavy metals which together can cause chronic bronchitis and cancer of the airways. Therefore, this smoke must always be removed effectively. Make sure you protect your skin from ultraviolet light and sparks. The light from welding can also cause permanent eye damage.

Materials with surface coatings

Grease, paint and other surface coatings must be removed before starting to weld. Clean mechanically as far as possible, and use only organic solvents if you are unable to get the surface clean in any other way. Make sure solvent residues are removed before welding.

Welding smoke

Remove welding smoke and grinding dust using suitable ventilation and extraction facilities. Use a portable system if it is not possible to set up a central extractor. If this is not possible either, use suitable respiratory protection.

If it is not possible to set up effective process ventilation with extraction to the open air, it is necessary to decide on how to prevent dispersion to other persons at the work site, and signs must be put up which state that working and moving around in the area are permitted only if suitable respiratory protection is used.

Noise

Metalworking such as cutting and grinding typically involve noise that could damage the hearing, and this noise must be countered by means of enclosure, noise damping or similar. It may be necessary to use suitable ear defenders. Other people must not be subjected to noise which is unnecessary or could be harmful to health. Areas in which ear defenders are to be worn must be demarcated, and signs must be put up stating requirements for the use of ear defenders.

Training

Special health and safety training is required to be able to carry out welding and thermal metal cutting and associated grinding work. There are no special training requirements for other kinds of grinding. The same training requirements apply to operators of welding and cutting machines that may give off smoke.

This training must be approved by the Working Environment Authority and is offered in many locations.

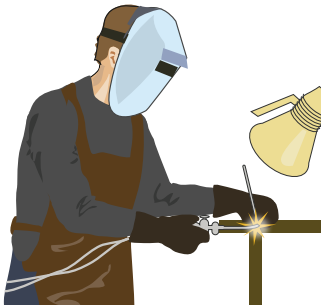
Gloves

Wear gloves for welding. These will protect you from radiation or burns from the welding flame.

If you are welding in a kneeling position, you must use knee protectors/pads and suitable ankle cuffs and an apron to protect against sparks and glowing drops of metal.

Eye protection

Wear a welding helmet, hand screen or suitable goggles with side protection if you are going to weld or are working near to the welding site. Use the right type of filter glass in welding helmets, hand screens or suitable goggles. Using a fixed or moving screen where the density is the same as in the protective glass is even better.



Light from welding/photo-ophthalmia

Hypersensitivity to light, runny eyes, swollen eyelids and severe pain in the eyes are typical symptoms of photo-ophthalmia.

Eye ointment

Use Cinchocaine eye ointment (formerly known as Cincaine) to alleviate eye pain. This is available to buy from your pharmacy. However, it must not be used at work or when driving as this ointment acts as an anaesthetic on the eyes.

Risk of fire

Inflammable objects must be removed from the welding site. If you need to weld near to inflammable materials which cannot be removed, you should have both a person on watch and a fire extinguisher.

Check neighbouring rooms which are linked via pipes to the room where welding is taking place. Also check whether any fire would block escape routes. Always carry out a final inspection when you have finished welding.

Electric welding

Do not touch conductive objects which are often found between pipes, behind containers, etc. Damp soil may conduct electricity. Therefore, be particularly careful if you are wet because of rain or sweat.

When you are to carry out welding:

- Wear undamaged, dry welding gloves (any assistants must also do so). You must only touch the electrode with insulated gloves.
- Do not place the electrode between your arm and chest when swapping it.
- Do not place the welding cable across your neck or arm.
- Keep your working clothes dry and in one piece.
- Immediately replace any damaged welding equipment.

If there is any risk of your body coming into contact with conductive parts (e.g. in boilers or containers), the following requirements are laid down for the welding equipment:

- The open circuit voltage must be reduced to 12 V AC or converted to a maximum of 100 V DC within 0.2 seconds of the arc being switched off.
- There must be a monitoring device so that the protection can be checked.

Gas/oxyacetylene welding

Checklist for gas welding (oxyacetylene welding):

- Make sure that the steel cylinders are safeguarded against shocks, blows, falling over and heat.
- Store them in such a way as to protect them from the sun and rain.
- Store full and empty cylinders separately.

- The cylinder valve on empty cylinders must be closed and the protective cap must be on.
- Gas and oxygen hoses must be entire and have no joints.
- Cylinder valves must not be lubricated or subject to force.
- Cylinders with defective valves must not be used.
- Cylinders should be transported with a suitable trolley.
- Check whether the cylinders have undergone periodic inspection. The date of the next inspection will be stamped onto each individual cylinder.

MIG welding

During MIG welding, ozone is formed in a sphere around the arc for a distance of up to 1 metre.

Ozone, which is hazardous to health, can only be captured effectively by means of low pressure extraction, which has a much greater capture zone than high pressure extraction.

Protect yourself from spatter and optical radiation by wearing a helmet with loose neck protection, as well as gloves and workwear to cover your body.
The helmet must be fitted with self-darkening welding glass which automatically changes the imperviousness of the welding glass when the arc is struck. Self-darkening welding glass reduced the risk of photo-ophthalmia as this prevents the effect that may arise if the helmet is closed too late once the arc is struck.

Also, set up screens to protect your colleagues from direct and reflected optical radiation.

At high current strengths and when welding aluminium, the ozone is formed so far away from the arc that low pressure extraction has problems capturing the ozone effectively. Therefore, in this situation low pressure extraction must be combined with the use of suitable respiratory protection to counter ozone. Respiratory protection with a turbo unit (turbo mask) is accepted by the Working Environment Authority only if the low pressure extraction effectively captures all the smoke, otherwise respiratory protection with a fresh air supply must be used.

Oxygen

Oxygen cylinders must be of a blue distinguishing colour with white shoulders. Cylinders, pipes and devices must not come into contact with oil or other greases as this may cause spontaneous combustion.

Acetylene (gas)

Acetylene cylinders must be of a red-brown distinguishing colour. Acetylene is highly explosive. Never use any cylinder with a leaky or defective valve. The cylinder should remain upright when in use. To prevent blowback in the acetylene cylinder, you must fit a blowback safety valve at the pressure relief valve. Blowback or strong heating may cause the cylinder to explode.

Soldering and flux

During heating, most fluxes give off unpleasant vapours (often acid vapours) which are harmful to health. These vapours must be removed by extraction before they reach your nose and mouth. Fluxes and solders must not contain more than 0.1% cadmium due to the risk of poisoning.

GENERAL INFORMATION ON PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment includes safety helmets, respiratory protection and similar items which protect employees as they work. See the drawing.

Personal protective equipment is a last resort

Working environment problems must in principle be resolved at source. Personal protective equipment will be selected only when all other options have been tried.

If an adhesive is to be used which contains solvents, for example, you must examine whether:

1. The adhesive can be replaced with a less hazardous one, e.g. a water-based adhesive.
2. If not, effective process ventilation (extraction) must be provided.
3. If this is unable to protect you effectively against inhaling the solvents, you must also use suitable respiratory protection.

Requirements for protective equipment

Protection: Make sure that the item of protective equipment offers the necessary protection.
Example: Respiratory protection must have the right filters. For instance, dust filters cannot be used if you are working with solvents.

Discomfort: Protective equipment must not cause more discomfort than is necessary to allow it to work.
Example: Not everyone can wear the same footwear, so just having one type to choose from is not enough.

Suitability: Protective equipment must be suitable for the task in hand.
Example: If you work somewhere there is water, such as near to or in an excavation, you must wear rubber safety boots and not safety shoes.

Protective equipment must not have more properties than it needs to have, as extra properties may cause unnecessary discomfort.

Delivery, payment, maintenance and ownership

It is the job and responsibility of the employer to ensure that employees are given the right protective equipment. The employer is also responsible for cleaning and maintenance.

One exception may be responsibility for safety footwear and special workwear. Here, employers' organisations and the trade unions (or the employer and his employees, when these are not covered by collective agreements) may have agreed that employees should contribute towards the payment.

If the employer pays for and owns the protective equipment, he may demand that employees leave their protective equipment behind at the place of work when they go home.

Responsibility for protective equipment

The employer is responsible for:

- Ensuring that employees use the protective equipment as they work.
- Instructing staff on the use of protective equipment and ensuring that employees follow his instructions.
- Explaining to employees about the consequences for safety and health of failure to follow the instructions.

Employees are responsible for:

- Using protective equipment from the start of work until it is completed. Of course, this assumes that they have been supplied with the protective equipment and received instruction on how to use it.
- Telling the supervisor or employer if there are any faults or defects in the protective equipment.

Limits for use
Using protective equipment may cause discomfort and make it necessary to limit working time by including breaks, for example. Some respiratory protection has a set limit as to how long it may be used at a stretch.

Usage instructions and labelling

The supplier must ensure that he always follows usage instructions when supplying personal protective equipment.

The usage instructions must be in Danish and written in a clear, comprehensible language.

The usage instructions must include information on:

- How the item of protective equipment is to be used.
- Storage, use, cleaning, maintenance, repair and disinfection.
- Resistance to stresses determined during technical testing.
- What accessories can be used together with the protective equipment.
- Limits in the use of the protective equipment.
- The expiry date of the protective equipment.
- Suitable packaging for transporting the protective equipment.
- The meaning of any labelling.

CE 01 All personal protective equipment and accessories must bear CE labelling.

HELMETS

If there is a risk of injury to your head, you must always wear a protective helmet.

This risk can be divided into four areas:

- Materials, tools or other items which may fall over or down.
- Objects which protrude, or heavy materials or equipment which are hanging or swinging.
- Electricity cables which are not insulated.
- Narrow spaces which make it difficult to move without bumping into something.

Always wear a helmet when a sign indicating a helmet enforcement notice is displayed.

Selection of protective helmets

The special conditions at the place of work generally determine which helmet is to be worn. For example, if there is a risk of getting your head trapped, you must choose a helmet which specifically protects against this.

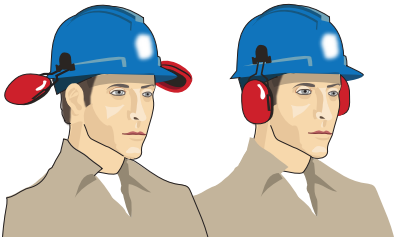
The colour and shape of the helmet must sometimes be suitable for the job function. For example, the helmets of ground assistants to crane operators must be of a bright colour which makes it easy for crane drivers to see them.

It is important for the helmet not to weigh more than necessary.

When working in cold surroundings, you can wear a hat under the helmet, fit it with an insulating cover or insulate it inside.

You must wear your helmet with a chin strap if there is a risk of the helmet falling off due to a special working position or windy weather, for example.

Only use equipment which fits the helmet. This ensures that the protective properties are not destroyed. Helmets which are to be used together with respiratory protection, ear defenders or eye protection must be suitable for the purpose.



Adjustment and maintenance

Helmets must be discarded if they are cracked or have been subject to strong blows or been trapped.

Helmets must sit firmly on the head, and there must be a suitable safe distance between the outside of the helmet and the head.

The helmet lining is subject to perspiration, dirt and heat and so breaks down more quickly than the outside of the helmet. Therefore, the lining must be checked regularly and always be replaced in accordance with the supplier's instructions, but at the latest when the lining is showing signs of wear. Always discard the lining if you are in any doubt.

All helmets can be cleaned using soapy water at temperatures of up to 45°C.

Durability

Helmets must not be painted/sprayed or cleaned using solvents as this may weaken the helmet. Cold, heat, strong light, moisture and perspiration can also weaken the helmet's ability to provide protection if it is subjected to such for any length of time. The same is true for any products used on the skin or hair.

Information on the properties of the helmet after long-term use is available from the supplier.

Helmets should not be stored in sunlight.

EAR DEFENDERS

Requirements for the use of ear defenders

If the employer is of the view that employees are exposed to risks as a consequence of noise, the workplace assessment must include an assessment of the noise load. Measurements are carried out insofar as this is necessary in order to clarify what loads are involved.

Measurements can ensure correct assessment of whether ear defenders should be used. A rule of thumb is that if two people with one metre between them can only understand one another when they shout, ear defenders must be worn, unless the noise load can be reduced in some other way.

It is the responsibility of the employer to ensure that suitable ear defenders are provided to personnel if the noise load exceeds 80 dB(A), or if the peak values of impulses exceed 135 dB(C), and otherwise if the noise load is harmful or causes significant discomfort.

Personnel must wear ear defenders if it is not possible to eliminate the noise load or reduce it to below 85 dB(A). The same is true if the peak values of impulses cannot be brought below 137 dB(C). Even if the noise load is below 85 dB (A), ear defenders must still be worn if it is assessed that the work may damage hearing.

BAR Bygge & Anlæg recommends under all circumstances that ear defenders be worn between 80 and 85 dB(A) to be sure of not damaging hearing.

Ear defenders must be worn the whole time you are exposed to noise. Even a short time without ear defenders in noisy surroundings can cause significant hearing impairment.

Ear defenders in general

Ear defenders must be CE-labelled. The packaging and usage instructions must include attenuation values at various frequencies.

This makes it possible to assess which ear defenders will attenuate the noise sufficiently.

Ear defenders must not damp the noise as much as possible, because the user has to have the opportunity to communicate with his surroundings and hear warning signals.

Therefore, attenuation must not prevent the user from hearing what it happening around him; i.e. the noise must be damped to a level of approx. 75-80 dB(A).

If several different types of ear defenders meet requirements, individual employees may select the ear defenders that suit them best.

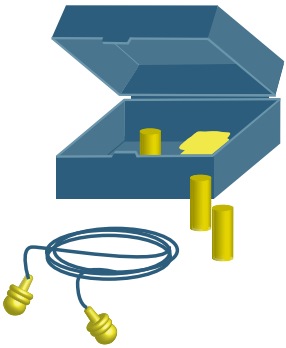
You can normally achieve slightly greater protection if you combine different kinds of ear defenders, such as earplugs and earmuffs. This means that the earplugs continue to offer protection when the earmuffs are removed.

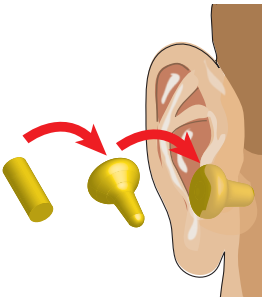
Earplugs

Single-use or multiple-use earplugs are available. Most types can be shaped and so be made to fit different people's ears.

There are also various types of shaped earplugs which are produced to users' specific dimensions.

Only touch earplugs with clean hands as dirt in the ears may irritate the skin and cause eczema.





Earmuffs

Earmuffs are ear defenders which enclose and cover both ears and are kept in place by a strap or headpiece which can be adjusted to fit the head. They must fit tightly.

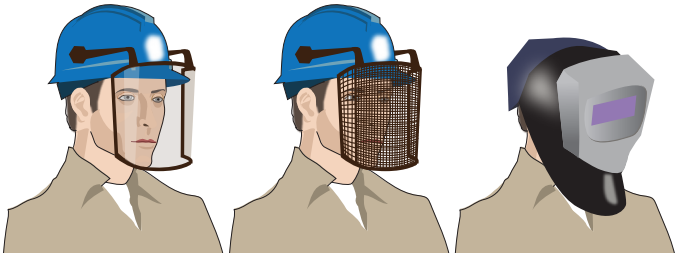
You should regularly check the sealing rings (pads) on earmuffs and replace them as soon as they start to go stiff or if they break into pieces.

You can get earmuffs which can be fitted to helmets. You can also get earmuffs with built-in electronics or filters which ensure that the sound inside the ear defenders is restricted and regulated. Electronic muffs or muffs with filters have the advantage of only damping the noise once it reaches a certain level (75–80 dB(A)).

EYE PROTECTION

Eye protection may include protective goggles, face shields or welding helmets. You must always wear eye protection when working or entering places where there is a risk of being struck by flying particles or spatter, or if you are exposed to corrosive gases and vapour or harmful radiation.

Eye protection must sit firmly without arms or headband pinching or cutting.



If you need airtight eye protection, this has to be treated so that it does not mist up.

If you wear eye protection together with respiratory protection or other personal protective equipment, overall protection must not be impaired. If this is the case, you must use special combination equipment instead.

Eye protection must be sufficiently large and give clear vision so that you can work properly. If you already wear glasses, your eye protection must be large enough to leave space for your glasses, or else you must use eye protection with corrective lenses.

Protective goggles

RESPIRATORY PROTECTION

There are three main types of respiratory protection:

- Respiratory protection with filtration and respiratory resistance.
- Respiratory protection with turbo filter and without respiratory resistance.
- Respiratory protection with an air supply.

Filter type respiratory protection filters inhaled air through a filter. There are lots of different types.

Respiratory protection with an air supply supplies air from uncontaminated areas or from cylinders. You must use this type when you need protection from heavy contamination, when you do not know the composition of the contamination, or if there is a risk of an oxygen shortage.

For both types, you have to wear this protection from the time you start work to the time you finish.

Whether you should wear a full mask or a half mask depends on what work you are going to go. Also consider whether you should wear goggles, a helmet, ear defenders and suchlike.

Respiratory protection must sit closely against your face. If you have a beard, therefore, you must always use respiratory protection with an air supply or a turbo mask.

The durability and degree of protection offered by respiratory protection is entirely dependent upon you closely following the usage instructions of the supplier - which must be provided and be written in Danish. Here, you can find out about how to use, store, clean, maintain, repair and disinfect your respiratory protection.

Restrictions in working hours

Working with respiratory protection is always stressful. It is particularly stressful to work with respiratory protection with filtration, which places a strain on the respiration. This is why restrictions are set for the amount of time this protection can be used. Observe these, as your circulation (heart) will be placed under strain otherwise, and you could end up with fluid on your lungs.

If you use respiratory protection with filtration but without a turbo unit, it must be used for no more than three hours a day. If you have to work for more than three hours, you must either use respiratory protection with a turbo unit (fan) or respiratory protection with an air supply.

As working with respiratory protection is always stressful, irrespective of type, work periods using respiratory protection must be restricted by taking suitable breaks. Other work may be done during these periods which does not require use of respiratory protection.

When working with asbestos and code-numbered products, you may work for a maximum of six hours a day using respiratory protection with an air supply or turbo units, including suitable breaks. In demolition work this time is further reduced to a maximum of four hours, including suitable breaks.

Minors under 18 may only work for four hours a day using respiratory protection with an air supply, and only when this is a necessary part of their industrial skills training.

Respiratory protection with filtration

You may use respiratory protection with filtration against dust and aerosols.

Advantages:

- Free mobility.
- Simple solution for individual tasks and work at changing workplaces.

Issues:

- Does not protect against all substances.
- Limited durability.
- Can only be used for three hours a day if it places a strain on the respiration.

Respiratory protection with filtration
Twin filter half mask

Respiratory protection with filtration
Full mask

Respiratory protection with filtration is available as single-use masks or full and half masks with particulate filters which can be replaced. There are different types of filter:

- Class P1 provides limited protection against dust. Must not be used at limits below 5 mg/m^3. Provides no protection against asbestos fibres and quartz dust.

- Class P2 provides protection against most types of dust which are harmful to health. These filters can provide protection against just solid particles or against both solid particles and liquid aerosols. If the filter is tested to EN149:2001, the filter provides protection against both solid particles and liquid aerosols, such as spray mist. Provides no protection against bacteria and viruses.

- Class P3 provides protection similar to Class P2, but also protects against radioactive dust, bacteria and viruses.

Dust filters provide no protection against harmful gases or vapours.

Respiratory protection with gas filter

Full or half mask with gas filter which can be replaced. There are various types of filter which are categorised according to their ability to absorb gases and vapours:

- Filter type A provides protection against mineral turpentine, toluene, xylene and butyl acetate and other vapours from organic solvents with a boiling point of at least 65°C.
- Filter type AX provides protection against vapours from organic solvents with a boiling point below 65°C. These filters must be discarded the same day as they are used.
- Filter type B provides protection against chlorine and hydrogen cyanide and similar gases.
- Filter type E provides protection against sulphur dioxide and similar gases.
- Filter type K provides protection against ammonia and similar gases.
- Filter type Hg-P3 provides protection against vapour from mercury and particles.
- Filter type NO-P3 provides protection against nitrous gases and particles.
- Filter type SX provides protection against special substances.

The filters are available in various classes:

- Class 1 are low capacity filters.
- Class 2 are medium capacity filters.

- Class 3 are high capacity filters.

You should not use respiratory protection with a gas filter if the air contains gases or vapours other than those for which the filter provides protection. Nor may the content of gases or vapours in the air exceed what the filter is able to cope with.

Some filters provide protection against several types at the same time.

If you want to protect yourself against both particles and gases at the same time, you have to use two filters; a suitable dust filter on the outside and a gas filter on the inside.

When spray painting and similar, it is also a good idea to use a prefilter which can protect the particulate filter.

Respiratory protection with an air supply

Always use respiratory protection with an air supply when:

1. There may be a shortage of oxygen (oxygen concentration below 17% in the air inhaled).

2. There are high concentrations of air contamination.

3. The air contamination is unknown or too great.

4. There is no suitable filter.

5. The mask is unable to form a seal.

6. Work will continue for a total of more than three hours.

7. The work is arduous and breathing is difficult.

8. This is required by the working environment legislation.

Always make sure that clean air is supplied from an uncontaminated area when using respiratory protection with an air supply.

Turbo respiratory protection

Turbo respiratory protection (with a fan and battery) pulls the air through a filter (respiratory protection with filtration), which is then blown into the mask/hood. This means that there is no respiratory resistance, and so the respiratory protection can be used for up to six hours in a working day.

Turbo filter respiratory protection may only be used where general respiratory protection with filtration could normally be used.

It is easier to breathe with a turbo mask, and you are generally also more mobile than when you use general respiratory protection with an air supply.

Select types with the greatest possible air capacity. This helps to prevent the visor from misting up, and it increases the actual protection offered by the mask/hood as it creates overpressure inside it.

Protection factor

A protection factor describes how well respiratory protection can reduce the concentration of a harmful substance in the air inhaled. The protection factor specified by the manufacturer is set by means of laboratory measurements.

Such good protection cannot be anticipated when the equipment is used in the place of work. The actual protection depends on a number of factors, including the extent to which the mask fits snugly on the face. A lot of dust masks do not fit sufficiently snugly on the face, and so they are not suitable for use for many tasks on building sites. This is true of many single-use masks.

The protection factor may also be reduced if you have a beard or wear glasses. You may need to wear respiratory protection with an air supply with an overpressure hood or turbo unit.

Replacement of the particulate filter (dust filter)

Read the supplier's usage instructions.

When buying turbo filter respiratory protection, a test kit is often included for checking the filter. The service life of the filter can also be extended by using a prefilter.

In the case of general respiratory protection with filtration (with respiratory resistance), the rule of thumb is that the filter must be replaced when respiratory resistance increases noticeably.

Gas filter replacement

Read the supplier's usage instructions.

A gas filter can only absorb a certain amount of air contamination before it is exhausted, and so it has to be replaced in good time.

If you start to smell gas it is time to replace the filter, unless the smell is due to the mask not fitting snugly. This is applicable even if the supplier has stated that the usage time should be longer.

It is important for you to know whether the gas has any kind of smell.

A1 filters should only be used as single-use filters for short-term work (1/2 hour) at low concentrations (approx. 3 x limit).

If the service life of a filter is not specified, you should instead use respiratory protection with an air supply.

Labelling

Particulate filters (dust filters) are labelled P1, P2, P3 and have a white colour code.

Filters which only provide protection against solid particles must be labelled "Kun til brug mod faste partikler" [For use against solid particles only] and be marked with an S.

Gas filters are labelled with their type and class and also have a colour code:

- Brown for A filters
- Grey for B filters

- Yellow for E filters
- Green for K filters

Filters for several different gases and combinations of particles and gases are colour coded for each individual type.

Signs

Signs must be used to indicate work sites where respiratory protection must be used. These signs can be supplemented with information on what type of respiratory protection should be used.

Signs are particularly important on building sites where several enterprises are working at the same time so that the employees of other enterprises are warned against entering the area where respiratory protection has to be used.

FALL PROTECTION

If there is a risk of falling, proper facilities must be put in place to prevent this. This can be done by fitting guard rails, setting up scaffolding, establishing barriers or hanging up safety nets, for example. Work can also be organised differently, for example, so that it can be done from a personnel lift with a working platform.

For short-term work (maximum 4 hours), or where it is not possible to establish other safety measures, personal protective equipment in the form of fall protection equipment can be used.

If you use fall protection equipment, you must use it according to the supplier's usage instructions.

- Select equipment suitable for the task.
- Select equipment to prevent falls in preference to equipment to arrest falls.
- Fall limiters must always be used with equipment to arrest falls.
- The anchor point must be able to absorb a dynamic load of at least 10 kN (1000 kg).
- In the case of equipment to arrest falls, it must be possible to rescue - from above or below - any person who has fallen and is hanging on the line.

Checking and inspection

Checking, inspection, use and storage of fall protection equipment must be carried out according to the usage instructions of each individual supplier. Usage instructions in Danish must be supplied when the equipment is purchased.

Always check all individual parts before using the equipment, even if it is completely new:

- Captivation devices and slide systems must be clean.
- There must be no broken wires, cracks or visible wear.

Immediately discard the equipment or have it repaired if it has any faults which may impair its function. If the equipment has been used to prevent a fall, it must always be replaced.

The equipment must be inspected by a skilled person at least once a year, and more frequently if the equipment is used a lot. Read the usage instructions if the equipment is to be checked more frequently.

The equipment must be labelled with the date of the last inspection.

Fall protection equipment will remain usable for the longest time if it is stored clean, dry and protected from daylight. Metal parts must not be allowed to rust. The equipment will normally not last more than five years.

Harnesses

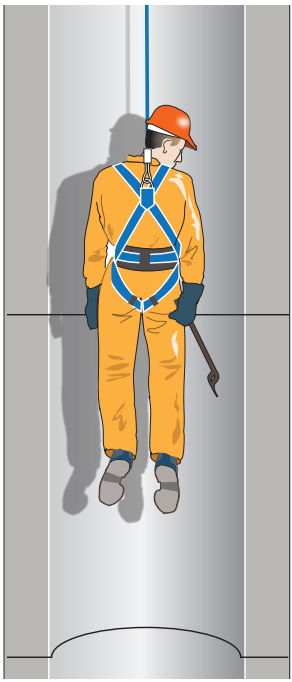
Harnesses must catch people who are falling. It is important to ensure that the line is attached to the harness in such a way that the person falling will hang vertically after falling.

The harness must be adjusted to fit the user, and loose clothing beneath the harness should be avoided.

If there is a risk of freefall, an H harness and fall limiter must be used.

Use a harness with a line to raise or lower people:

- when working in containers with narrow openings.
- when working in deep wells or silos.



Support belts/corsets

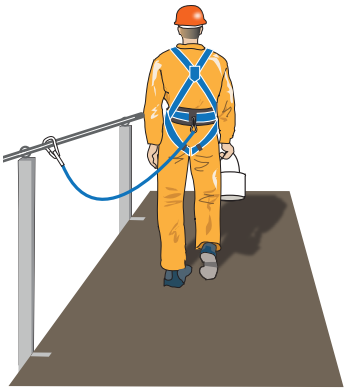
If you have to be able to use your hands while you work, such as when working on a mast, it is a good idea to use a support belt which restricts your working range so that you cannot overbalance (fall prevention equipment).

A support belt must not be used where there is a chance of freefalling. If there is a risk of freefalling, you must use an H harness and fall limiter.

Lines

The line which connects the harness to the rest of the fall protection equipment must be made of a synthetic rope, steel cable or rope.

The line must be as short as possible, including the fall limiter, connectors, etc.



Gedetøjr

A running line (gedetøjr) is a steel cable (see the drawing on the previous page) which is secured via guard rail posts. There are gedetøjr connections which can pass across the posts. If it is not possible to use such equipment, two short lines with snap hooks are used so that you can secure one before undoing the other if you have to pass a guard rail post. Guard rail posts and lines used in a fall protection system must normally be replaced if they have been subject to any stresses.

Fall arrest blocks

An automatic captivation device (fall arrest lifeline block) keeps the line taut while you work, thereby limiting any fall as much as possible.

Fall arrest blocks must normally always be placed above the person's head, although some types/makes can be used on flat roofs if a number of precautions specified by the supplier are observed.

Fall limiters

A fall limiter reduces the force of any fall by absorbing some of the energy from the fall so that braking of the fall is not too sudden.

Fall limiters may, for example, include a line with an integral fall limiter or other form of energy absorber.

Fall limiters must always be used in fall protection systems. Harnesses and lines must not be used alone.

Connectors, e.g. snap hooks

The individual parts of the equipment are typically connected using snap hooks or other connectors. These must be self-closing and be lockable, either manually or automatically.

It is important to make sure that you can operate these with one hand and open them with two movements at the most. Do not use a manual lock if you have to lock and unlock the device several times over the course of a working day.

Always use a suitable anchor point for your fall protection. Do not use installation pipes, radiators or similar as these are not suitable.

The anchor point must be able to absorb the force generated if a person falls. This is equivalent to a load of 10 kN (1 000 kg). The line, rail, etc. must not be able to work loose from the anchor point.

The anchor point should ideally be located above the place of work and not too far out. This ensures the shortest freefall.

Signs

If you are using a collective protection system with guard rail posts and lines, the work area must be signed.

PROTECTIVE CLOTHING

Protective clothing includes arm protection, one-piece suits or similar to provide protection against chemicals or cold, for example.

If the suit is to provide protection against chemicals, it is necessary to know how long it will take the chemical in question to penetrate the suit - the penetration time. This determines how long you can use it.

Check the penetration time for the suit in the usage instructions or on the label, or ask the supplier.

Be aware of whether the suit has to provide protection against several effects at the same time, e,g, chemicals, temperature, wear, etc.

When using a chainsaw, you must wear trousers with a cut-resistant insert which effectively protects the front of the legs.

Thermal clothing is well suited to working in cold and draughts as it ensures the temperature inside the suit stays more or less constant.

You can wear a suit made of metallic woven textiles in strong heat. Before wearing protective clothing, it is important to check that it is fault-free.

If you are going to work in traffic or anywhere else where it is important for you to be seen, you must wear hi-viz clothing (see the section on roadworks).

GLOVES

Direct skin contact with harmful substances may cause contact eczema. Acids, alkalis, solvents, detergents and cutting oils are some of the substances which often irritate the skin. Chromate, epoxy products, preservatives and nickel can all cause allergies and in some cases even skin cancer.

How to protect your skin:

- Avoid using substances which may irritate the skin or cause allergies. If this is technically impossible, select the least irritating substances.
- Prevent your skin coming into direct contact with harmful substances or with workwear which is contaminated or soaking wet.
- Avoid soaps and creams with unnecessary additives such as perfume. Select products with full product declarations.
- Do not clean or wash your hands in any detergents that are stronger than necessary, and avoid keeping them in water for any length of time.

- Remove watches, rings and other jewellery before you start work.

Skin care

You should apply cream to dry, stressed skin. This will make your skin supple until it recovers.

Use a cream containing as few additives as possible, and avoid creams containing disinfectants as these are not necessary in ordinary workplaces.

Protective creams, also known as "barrier creams", or skin care creams cannot replace gloves or other preventive devices.

Choosing gloves

Ask your glove supplier which gloves are suitable for the work to be done.

It is the responsibility of the employer to ensure that the right type of gloves can be used when work commences.

It is important, for example, to make sure that the gloves are the right size. If they are too small, they may impede the circulation and their ability to insulate against cold or heat may be reduced.

You can wear undergloves made of cotton to absorb moisture.

Protection against chemicals

Protective gloves can only keep out chemicals for a certain time until the chemical penetrates them. This is known as the penetration time. Be aware that this effect starts from the first moment your gloves come into come into contact with the substance, even if the gloves do not appear to be dirty or contaminated.

One type of glove may offer good protection against one chemical, but not necessarily against other, similar ones.
Be aware that mixtures of chemicals may sometimes have different properties to the ones you would expect, given what you know of the properties of the individual components.

Hazardous use of gloves

In some situations, it may be hazardous to wear gloves; such as when working with rotary tools, where there is a risk of the tool grabbing hold of a glove and pulling your hand in.

PROTECTIVE FOOTWEAR

Wear shoes or boots with steel toecaps if there is a risk of your feet being trapped or injured by falling objects, such as when working with heavy, unwieldy objects weighing in excess of 16-20 kg.

You must wear steel toecaps in the following cases:

- When attaching items.
- Installation and removal work involving concrete elements, shuttering leaves or blocks, plasterboard and electrical cabinets.
- When handling drain elements, gullies, district heating pipes, LECA blocks, roofing panels, doors, windows, kitchen units, white goods, washbasins, toilet bowls, bath tubs, radiators, oil-fired boilers and hot water tanks.

- When erecting and dismantling scaffolding.

- When positioning kerbstones and paving stones.

Footwear with protective soles must be worn when there is a risk of treading on pointed or sharp object such as nails and shards of glass.

In the building and construction industry, a combination of steel toecaps and protective soles is normally necessary.

In general, you should select your footwear on the basis of conditions on the work site. For instance, is it cold and damp, and is the ground uneven, hard or slippery?
Your needs will also vary depending on whether you move around while you work or stand still to work.

For instance, it is best to wear footwear with shock absorbing soles and footwear which remains firmly in place if you are working on an uneven surface (which is often the case at building sites).

Protective footwear must also be suited to individual employees and their needs. Shoes or boots must remain firmly in place and fit well. This is particularly important for footwear with steel toecaps, which is unable to mould itself to the shape of the feet.

Therefore, it is a good idea to give employees the chance to choose from different kinds of footwear so that they can change their footwear depending on what work they are doing.

When working on ladders, steps, reinforcement steel and similar surfaces, or when doing work which involves a lot of walking, protective footwear with flexible soles and separate heels should be worn.

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