



# Level 1 Award in Health and Safety in a Construction Environment

Student notes

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## **Acknowledgement**

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## **Publishing policy**

These student notes are periodically updated, for example when new statistics are published.

Centres will be informed when materials are updated and can access the latest version on our Online Qualifications System.

# A1

## The importance of health and safety

### Did you know?

In 2012/2013, in the UK, 148 people were killed at work and more than 21,000 were seriously injured.

### What is 'health and safety'?

Health and safety is very simple. It is about making sure that people are not injured or made ill at work. Employers should look at the work that you do and identify the things that might cause injury or illness. They should then put measures in place to try and prevent injury or illness from happening.

### What is the difference between 'health' and 'safety'?

By looking after your health, your employer can make sure you don't develop things like a bad back, lung disease, deafness or skin problems. By looking after your safety, your employer can prevent injuries such as cuts, bruises and broken bones. They might even save your life.

Health and safety is **NOT** about making things difficult (good health and safety should actually make things easier). And health and safety is **NOT** a replacement for common sense. In fact, most health and safety is common sense.

### Why is health and safety important?

A 37-year-old construction worker suffered life-changing injuries when he fell through a hole during a major refurbishment project. The worker landed on his back nearly four metres below. He suffered eight fractures of the vertebrae, two broken ribs and was in hospital for almost eight weeks. He had to undergo physiotherapy to learn how to walk again and has been diagnosed as having permanent damage to his lower back.

A 32-year-old construction worker was seriously injured when a temporary platform collapsed. He fell almost ten metres when the platform gave way, landing on a concrete staircase below. The worker suffered a shattered right elbow, broken vertebrae, fractured pelvis and ribs, and damage to internal organs. He is no longer able to work in construction.

A 23-year-old labourer was seriously injured in a fall when a temporary handrail gave way as she leant on it. The worker broke her right wrist, fractured her forehead, jaw and cheekbone, and sustained a hairline fracture to her right hip. She also severed tendons in her left hand and suffered extensive bruising to her face, neck and back. She had to have a metal plate inserted into her right arm and required further surgery to ease later complications. She was unable to return to work as a labourer for six months and still suffers constant pain.

# A2

## The reasons for good health and safety

### Did you know?

1.1 million people in the UK are suffering from an illness they believe was caused or made worse by their current or past work.

### Moral

No-one should be injured or made ill at work.

Employees have a right to be kept healthy and safe at work. Employers have a moral duty to look after the health, safety and welfare of their employees.

It is not acceptable for an organisation to put the health and safety of people at risk or to put profit ahead of protecting the workforce.

### Legal

Employers and employees must comply with health and safety laws.

If you or your employer break health and safety laws, you can expect some action to be taken.

A health and safety inspector can issue an improvement notice or prohibition notice.

An improvement notice is issued when the inspector thinks there has been a breach of health and safety law. The inspector identifies what needs to be done and gives the employer a certain amount of time to put it right.

A prohibition notice is issued when the inspector thinks there is a risk of serious injury. The inspector prohibits (stops) the activity until the problem has been sorted out.

An inspector can also prosecute a company, individual directors or employees in the criminal courts. This can lead to fines or imprisonment.

Individual employees or others can pursue a case against a company in the civil courts. If successful, the individual can be awarded compensation for an injury or loss they suffered.

### Financial

There are many costs associated with accidents and ill-health at work, and these will not be fully covered by the company's insurance. Examples of costs include:

- Production losses
- Sickness cover / sick pay
- Damage to plant, materials or buildings
- Fines and legal fees if there is a court case
- Contract penalties as a result of project delays
- Insurance costs - premiums are likely to increase following an accident or claim
- Reputational damage (loss of customers or new contracts)

# A3

## Key terms used in health and safety

### Did you know?

Workplace injury and illness costs the UK an estimated £13.8 billion each year.

### Accident

An accident is 'an unplanned event that results in harm'.

An example of an accident would be a brick falling from a scaffold and hitting a person below. It was unplanned and caused harm.

### Near miss

A near miss is 'an unplanned event that could have caused harm but didn't'.

This time the brick falls from the scaffold and misses the person below. It was unplanned. It could have caused harm, but didn't.

### Hazard

A hazard is 'something that may cause harm'.

Harm may be injury or ill-health to people, damage to equipment or property, or damage to the environment.

Workplace hazards can be divided into five main categories:

- **Physical** e.g. moving parts of machinery
- **Chemical** e.g. paints, glues, cement, cleaning products
- **Biological** e.g. bacteria from rats that can cause Weil's disease
- **Ergonomic** e.g. poor manual handling technique or repetitive movements
- **Psychological** e.g. stress or bullying at work

### Risk

Risk is the 'likelihood of harm occurring, together with an indication of how serious that harm could be'.

When considering risk we think about

- What are the chances (**likelihood**) of the hazard causing harm, and
- How serious the harm might be (**severity**)

### Competence

Competence is 'the ability to repeatedly carry out work to a desired standard under differing conditions'.

Competence is generally achieved by a mixture of experience, knowledge, training and qualifications.

# A4

## Legal responsibilities for health and safety

### Too young to die

A 17-year-old died in his first week at work after falling from a roof. He had received no training and had no safety equipment.

### Employers

Employers have many legal duties relating to health and safety. The main duties for employers are in the Health and Safety at Work Act 1974.

Employers must provide:

- A safe workplace
- Safe work equipment
- Adequate welfare facilities
- Suitable personal protective equipment
- Information, instruction, training and supervision

Under the Management of Health and Safety at Work Regulations 1999 employers must:

- Have an effective system for managing health and safety
- Carry out risk assessments
- Put control measures in place to reduce risks
- Produce emergency plans
- Communicate with the workforce on health and safety matters

Employers must not charge employees for anything which is provided for health and safety purposes. For example, they can't charge for personal protective equipment or health and safety training.

### Employees

Employees also have some legal duties in relation to health and safety.

Employees must:

- Take reasonable care of themselves and others
- Not put themselves, or others, at risk by what they do (or don't do)
- Co-operate with their employer or the site manager on health and safety matters
- Report anything that they think is dangerous to their employer or person in charge of the site

# A5

## Fatalities, injuries and ill-health in construction

### Did you know?

In the UK construction industry there are 100 times as many deaths from work-related ill-health and disease as there are from injuries.

### Fatalities and injuries

According to the Health and Safety Executive (HSE) there were 39 fatal injuries to workers in the UK construction industry in 2012/13.

The main causes of fatalities were:

- Falls from height (59%)
- Being struck by a moving vehicle (10%)
- Electricity (5%)
- Collapse or overturning of equipment (5%)
- Being struck by moving/falling objects (3%)

The most common causes of major (serious) injuries to employees in construction were:

- Slips and trips (28%)
- Falls from height (28%)
- Being struck by moving/falling objects (15%)
- Manual handling (8%)

The most common cause of 'over 7-day injuries' (when a worker is unable to do their normal work for more than 7 days) was manual handling.

Members of the public are also at risk from construction activities. 18 members of the public have been killed in the last five years. 25% of fatal injuries to the public over this period were due to falls and 25% were due to slips and trips.

### Health risks

Safety risks in construction have been recognised for some time. Health risks have received less attention even though absence due to work-related ill-health is far greater than absence due to injuries at work.

The ill-health effects from some types of construction activity are not always immediately obvious and can take a long time, even years, to develop.

About 30,000 new cases of work-related ill-health are reported each year in the construction industry.

The main ill-health problems in construction are:

- Back problems and musculoskeletal disorders
- Hearing loss
- Hand-arm vibration
- Dermatitis and other skin problems
- Breathing problems such as asthma

# A6

## Risk assessments and method statements

### Remember

Organisations are not expected to eliminate all risks, but they must protect people as far as is 'reasonably practicable'.

### What is a risk assessment?

A risk assessment is a careful examination of what, in the workplace, could cause harm to people. This can be used to determine whether enough precautions have been taken or whether more should be done to prevent harm. The things that are introduced to help reduce health and safety risks are known as 'control measures'.

Organisations are not expected to eliminate all risks, but they are required to protect people as far as is 'reasonably practicable'.

### How is a risk assessment carried out?

The Health and Safety Executive (HSE) has produced a lot of guidance for carrying out risk assessments and suggests a process known as the 'Five Steps to Risk Assessment'.

**Step 1** – Identify the hazards

**Step 2** – Decide who might be harmed and how

**Step 3** – Evaluate the risks and decide on precautions

**Step 4** – Record your findings and implement them

**Step 5** – Review your assessment and update it if necessary

Employers must tell their staff about the risks from their work and the control measures in place to reduce those risks. To help with this process employers often write method statements.

### What is a method statement?

A method statement is a document, usually produced by a contractor or subcontractor, which describes the step-by-step sequence for carrying out a particular task in a manner which is safe and without risk to health. This enables the principal (main) contractor to check that the proposed working methods are suitable and that health and safety risks will be adequately controlled during the job.

A well written method statement contains essential information about potential risks, control measures and the correct and safest way to carry out each task.

Method statements should incorporate or refer back to the risk assessments. Sometimes these documents are combined and known as 'RAMS' (risk assessment method statements).

# B1

## Slips and trips

### Did you know?

Every year in the UK around 1,000 slips and trips on construction sites result in broken bones or dislocated joints.

Slips and trips are the most common cause of accidents at work.

In 2012/13, 43% of major injuries in UK workplaces were caused by slips and trips.

Slips and trips can be prevented through good housekeeping.

- Keep floor areas clean, dry and in good condition
- Keep walkways and stairways free of trip hazards
- Clear up spilt liquids immediately
- Cover holes in the floor or erect barriers

Good housekeeping also helps to reduce the risk of fire.

- Make sure that all combustible waste materials are cleared away
- Store paper and other combustibles away from sources of heat

Designated storage areas should be provided for plant, materials, waste, flammable liquids, gas cylinders and hazardous chemicals.

### Basic standards

In September 2013, the Health and Safety Executive (HSE) visited 2,607 construction sites where refurbishment or repair work was taking place. Inspectors found basic safety standards were not being met on 1,105 sites.

On 644 sites, practices were so poor that enforcement action was necessary to protect workers – with 539 prohibition notices served ordering dangerous activities to stop immediately and 414 improvement notices issued requiring standards to improve.

## Fact

In 2012/2013, in UK workplaces, falls from height led to 35 deaths and 4,654 major injuries.

Falls from height are the main cause of deaths in the UK construction industry and, in 2012/2013, accounted for 59% of all fatal accidents.

## Legal requirements for working at height

The Work at Height Regulations 2005 apply to all work at height where there is a risk of a fall that could cause personal injury. The regulations place duties on employers, the self-employed and any person that controls the work of others.

There is a simple 'hierarchy of controls' for managing risks for work at height:

- firstly **avoid** work at height wherever possible,
- then **prevent falls** from height and, failing that,
- **reduce the consequences** of a fall, should one occur.

Preference should always be given to control measures that protect everyone, like providing scaffolding or safety nets. These types of measures are known as 'collective measures' and are considered safer than measures which only protect individuals, like fall arrest equipment.

The risks from working at height must be assessed by the employer or person in charge and safe systems of work developed and followed. All work at height must be properly planned in advance to ensure the right equipment is used. Workers must be properly trained and in good health. Work at height should not be carried out in conditions which would create a significant risk, such as high winds or snow and ice.

All equipment provided for work at height must be suitable for the job and regularly inspected by a competent person to ensure it remains safe to use.

## Edge protection and scaffolds

Suitable edge protection should be provided wherever there is a risk of falling from existing or temporary structures. This should consist of a top guard rail, a mid rail and toe boards. Edge protection is also required at the edges of excavations or where working next to deep water.

Scaffold platforms should be fully boarded with no sections missing or uneven. Working platforms should be kept tidy. Slip or trip hazards should be removed promptly.

If there is a risk of tools, materials or rubble falling from height, additional precautions should be taken such as fixing sheeting, brick guards or netting to the scaffold. Workers should store their hand tools safely and prevent them from falling by using a tool belt.



*Mobile tower scaffold*

## Mobile tower scaffolds

Lightweight aluminium tower scaffolds are common on construction sites and considered a lot safer than working from a ladder, but they are not without risk.

### Typical hazards include:

- Collapse of the tower, due to incorrect assembly
- Fall of people
- Falling objects
- Vehicles colliding with the tower
- Overturning of a tower that is unstable

Mobile towers can become unstable and overturn if they are built too high or overloaded with too many people, materials or heavy equipment. Use of towers in high winds, placing them on uneven ground or climbing up them the wrong way can cause a tower to topple over.

### Rules for the safe use of tower scaffolds:

#### DO

- Follow the manufacturer's instructions for assembly and use
- Position the tower on firm, level ground
- Lock wheels / castors in place when the tower is in use
- Ensure guard rails and toe boards are fitted to the working platform and platforms are fully boarded
- Keep the platform tidy with tools and materials stored away to prevent slips, trips and falls
- Keep a safe distance from overhead power lines or other structures
- Wear head protection if there is a risk of falling materials from above

#### DON'T

- Exceed the recommended safe working load
- Erect, modify or dismantle a tower scaffold unless you are trained and authorised to do so
- Exceed the recommended maximum height unless suitable outriggers / stabilisers are used
- Move the tower while people or materials are still on it
- Climb up the outside of the tower (ladder access should be internal and fixed to the narrowest side)
- Stand on the guardrails of the tower, overreach from the platform or use the tower to access other structures
- Use the tower in bad weather such as high winds, icy conditions or heavy rain



*Cherry picker*



*Mobile scissor lift*

## Mobile elevating work platforms (MEWPs)

Mobile elevating work platforms (MEWPs) are more commonly known as 'cherry pickers' or 'scissor lifts', depending on the type. MEWPs can provide excellent safe access for high level work. They are particularly suitable for short duration tasks where ladders would be unsafe and the use of scaffolding would not be cost effective or practical.

The hazards and risks from using MEWPs are similar to tower scaffolds, except there is also the risk of a crush injury from the moving parts of the machine.

### Rules for the safe use of MEWPs:

#### DO

- Follow the manufacturer's operating instructions
- Inspect the equipment before use to ensure it is safe to use
- Ensure guard rails and toe boards are fitted to the working platform
- Position the equipment on firm, level ground with the tyres properly inflated
- Extend the outriggers before raising the platform
- Ensure guards are in place around the base of the MEWP to prevent access to moving parts
- Restrict access around the MEWP while it is being used
- Wear a harness and lanyard if there is a risk of collision or being thrown from the MEWP
- Wear head protection if there is a risk of falling materials

#### DON'T

- Stand on the guardrails of the MEWP
- Climb out of the MEWP while it is elevated
- Exceed the safe working load
- Use a MEWP near overhead cables
- Operate a MEWP unless you have been trained and are competent

## Ladders

Where work at height is necessary you need to decide whether a ladder or stepladder is the most suitable access equipment compared to other options.

Ladders and stepladders should only be used if it is not reasonably practicable to use a MEWP or tower scaffold, and then only for short duration, light work.

### Rules for the safe use of ladders:

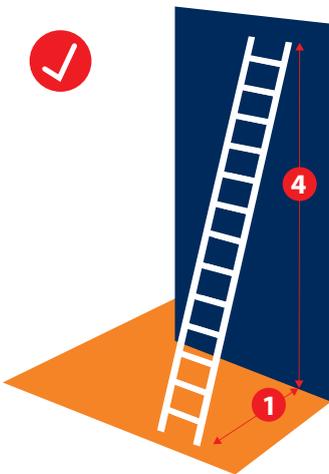
#### DO

- Only use industrial class ladders (Class 1 or EN 131), not domestic types, e.g. Class 3
- Inspect the ladder before use (it should be free from damage)
- Position the ladder on firm, level ground
- Position the ladder at the correct angle (75° or 1 in 4 ratio)
- Keep a safe distance from overhead power lines or other structures
- Secure the ladder by tying it at the top and bottom
- Protect the base from being hit by vehicles
- Clean wet, icy or greasy rungs before use
- Make sure footwear is clean and in good condition before climbing

#### DON'T

- Allow more than one person on the ladder at any one time
- Exceed the safe working load
- Use metal ladders near electric cables
- Overreach from a ladder (this is a common cause of accidents)
- Stand on the top two steps of a stepladder unless there is a handrail
- Use a ladder in bad weather such as high winds or heavy rain

If a ladder is used for access, there should be 1 metre of ladder above the stepping off point.



## Roof work

Many construction projects involve roof work. The main hazards are:

- Falls from edges of flat roofs or sloping roofs
- Falls through fragile roofs or fragile roof lights
- Falls from equipment such as ladders or scaffolds
- Objects like tools and materials falling from the roof or scaffold

All roof work should be pre-planned and properly supervised. A risk assessment should be carried out by the persons in charge of the work to identify hazards and ensure proper controls are in place.

A safe system of work should be developed and written down in the form of a method statement which is then communicated to all workers involved.

Roof work should only be undertaken by workers who are physically fit and have the necessary knowledge and experience of such work.

Roof work should not be carried out in weather conditions that threaten the safety of workers.

Suitable edge protection and a safe means of getting up to the roof and moving across the roof must be provided.

## Sloping roofs

Sloping roofs require scaffolding and edge protection to prevent people or materials falling from the edge. Where work is of short duration (a few minutes only), properly secured ladders may be used.

## Flat roofs

Falls from flat roof edges can be prevented by providing fixed or temporary edge protection or barriers to prevent workers from reaching within 2 metres of an open edge. For very short duration work, like carrying out an inspection, travel restraint equipment can be used, which prevents the worker from actually reaching the edge of the roof as they are anchored to a fixed point.

## Fragile surfaces

Work on or near fragile roof surfaces is high risk and requires careful planning and proper control measures.

Always follow a safe system of work using a platform beneath the roof where possible. Sometimes it is possible to reach the roof safely using a MEWP. Otherwise a combination of platforms, guard rails, fall arrest equipment and safety nets will be needed.

All roof surfaces should be treated as fragile unless a competent person has confirmed they are not. Do not trust any sheeted roof, whatever the material, to bear the weight of a person. This includes the roof ridge and purlins (supporting framework under the roof surface).

Fragile roof lights are a particular hazard. Some are difficult to see in certain conditions and others may be hidden by paint, moss or algae. Protection must be provided in these areas, either by using barriers or covers to prevent falls.

In addition to roof lights, typical fragile surfaces include fibre cement sheets (including asbestos cement), glass (including wired glass), metal sheets (where corroded), rotten chipboard and liner panels. Even slates and tiles can become fragile.

Buildings with fragile roofs should have a warning notice prominently displayed at the approaches to the roof.

Many roofs on older industrial or agricultural buildings are made of asbestos cement sheets. These are fragile but can also, if damaged or disturbed, release harmful asbestos fibres.

# B3

## Moving vehicles and mobile plant

### Fact

On average, each year, 7 workers in the UK die as a result of accidents involving vehicles or mobile plant on construction sites. A further 93 are seriously injured.

### Construction site traffic

Numerous vehicles visit or move around construction sites during the course of a project. These include cars, vans, lorries, low-loaders and mobile plant such as excavators, lift trucks and dumper trucks.

#### Hazards from vehicle movements include:

- Collision between vehicles and pedestrians
- People falling from vehicles
- Objects falling from vehicles
- Overturning of vehicles
- Vehicles striking stationary objects

The best way to reduce transport accidents on construction sites is by organising and controlling sites so that vehicles and pedestrians can move around safely and are kept apart as much as possible.

#### Key controls include:

- Providing separate entry and exit gateways for vehicles and pedestrians
- Installing barriers between roadways and walkways where possible
- Providing clearly signed and lit crossing points where drivers and pedestrians can see each other clearly
- Making sure drivers exiting on to public roads can see both ways along the pavement before they move on to it
- Keeping vehicle and pedestrian routes clear of obstructions
- Making sure there is adequate clearance around slewing vehicles
- Ensuring that everyone on site wears high visibility clothing
- Providing adequate lighting throughout the site

The number of vehicle movements should be kept to a minimum. Reversing vehicles are particularly high risk. Providing one-way systems and turning circles can reduce the amount of reversing needed. It may be necessary to use a 'reversing assistant' to guide and direct vehicle movements.

All workers should be instructed in the safe pedestrian routes on site, the meaning of signs and notices and any site rules controlling traffic and pedestrian movements.

## **Communication between drivers and others**

Many construction vehicles have significant blind spots (areas that the driver cannot see) in various locations around the vehicle. In some cases this can create risks to both pedestrians and to the vehicle when the vehicle is moving.

Workers may at some time need to approach a moving vehicle. They should be instructed in a safe procedure for making the driver is aware of their intention to approach, and ensuring that the vehicle is safely at rest before they approach.

## **Additional safety rules for operating mobile plant**

- People who drive vehicles and operate mobile plant, including those that direct vehicle movements (signallers), must be competent and trained.
- Only workers who are authorised should operate plant. Access to keys should be controlled and keys should never be left in an unattended vehicle.
- No-one should ride on vehicles or mobile plant except where the vehicle has been designed to carry a passenger.
- Loads should be properly secured to prevent objects falling off or dropping while being transported. Plant and equipment should never be loaded beyond the safe working load.
- Plant should be well-maintained. Drivers should check their vehicle daily and report any defects immediately.
- Using mobile plant on sloping, uneven or unstable ground can be hazardous and cause vehicles to overturn. Safe systems of work should be followed to ensure equipment is not used on dangerous slopes. Wearing seat belts and providing 'roll over protection' like roll bars and cabs on vehicles, can help prevent serious injuries in the event of a vehicle overturning.

# B4

## Work equipment

### That's helpful

The Health and Safety Executive website has a wide range of information that is free to download ([www.hse.gov.uk](http://www.hse.gov.uk)).

Every year in construction, there are a number of accidents involving work equipment. Many are serious and some are fatal.

### What is work equipment?

The term 'work equipment' means almost any equipment used at work. Examples include hand tools, power tools, abrasive wheels, ladders, tractors and dumper trucks. It also includes lifting equipment such as fork lift trucks, hoists, cranes and MEWPs.

Employers must ensure that all work equipment is suitable for use, provided with the necessary safety devices such as guards and emergency stops, and properly maintained. Some equipment, such as lifting equipment, must also have a thorough examination by a competent person at set intervals. Plant and equipment that is hired should only be obtained from reputable hire companies who can prove they have serviced and maintained it properly. Hired equipment should always be inspected before use.

Suitable instruction and training must be provided to ensure any worker using work equipment and machinery can do so safely, without putting themselves or others at risk.

You should only use your own tools and equipment at work if this is agreed with your employer. This equipment must be in good condition and properly maintained and inspected, including electrical (PAT) testing where required. It must be suitable for the task and for use in a construction environment.

### Hazards from work equipment

Some of the hazards from work equipment are from the moving parts of machinery like blades, rotating drill bits or moving belts and chains. These include:

- Crushing or shearing between parts of machines or the machine and a fixed object, like a wall
- Cutting or severing from contact with sharp surfaces of tools or machines, e.g. circular saw blade
- Entanglement from rotating equipment, e.g. drills or projecting engine shafts
- Drawing in or trapping from being caught and pulled into machinery, e.g. moving rollers, gears or transmission belts
- Impact ejected components or machine parts, e.g. a damaged abrasive wheel which bursts
- Puncture wounds, e.g. from a cartridge operated nail gun which has misfired
- Friction or abrasion from contact with rough surfaces, e.g. sanding machines

Suitable guards and safety devices must be provided to minimise the risk of contact with dangerous parts of machinery. Regular inspections should be carried out to check guards are still in place, in good condition and properly adjusted.

**Additional machine hazards include:**

- Flying objects during machining, e.g. dust and grit
- Electrical hazards
- Hot surfaces
- Noise
- Vibration
- Chemical hazards, e.g. fumes from welding
- Fire hazards, e.g. sparks from cutting

**Rules for the safe use of work equipment and machinery:**

- DON'T operate a machine unless you have been specifically trained
- DON'T operate a machine with any guards or safety devices removed
- DON'T remove any guards or safety devices unless authorised to do so
- Follow a safe system of work and the manufacturer's guidance
- Always wear the necessary personal protective equipment
- Learn how to stop a machine before you learn how to start it
- Stop the machine and disconnect the power before making an adjustment, clearing a blockage by hand or undertaking maintenance
- Report any faults to your manager as soon as possible

# B5

## Fire

### Did you know?

If you get caught in a fire, you may be dead before the fire even reaches you due to smoke and toxic gases. Smoke injuries account for 75% of fire-related deaths, although some people die due to burns.

Every year there are a number of large fires on construction sites. Fires can and do kill, injure and cause serious human suffering and financial loss. Death is more often caused by smoke inhalation rather than by the fire itself.

Fire can be a particular hazard in refurbishment work when there is a lot of dry timber and at the later stages of building jobs where flammable materials such as adhesives, insulating materials and soft furnishings are present. Hot work such as welding, cutting and use of bitumen boilers is also a common cause of fire.

Fire starts when three things come together in the right amount at the same time. These are:

- A source of **fuel** (something that will burn)
- A source of **heat** (or ignition)
- **Oxygen** (present in the air around us)

These three things are known as the '**fire triangle**'.



### Sources of fuel on construction sites include:

- Combustible materials, e.g. wood off-cuts
- Waste packaging materials
- Flammable liquids, e.g. varnishes, paints and solvents
- Petrol for portable tools and equipment
- Wall and ceiling linings
- Cloth, e.g. soft furnishings, dust sheets
- Liquefied petroleum gas (LPG)
- Welding gases, e.g. acetylene
- Combustible parts of the building structure
- Scaffold sheeting

Anything that burns is fuel for a fire. Many materials which can burn have to be used during construction work. Reducing the quantity of combustible or flammable material on site reduces the chances of fire occurring and limits the extent of a fire should it start.

### **Sources of heat (ignition) on construction sites include:**

- Hot work, e.g. grinding, welding
- Metal cutting where flames/sparks are produced
- Plant and equipment
- Light fittings and lighting equipment
- Faulty or misused electrical equipment, e.g. overloaded sockets
- Portable heaters
- Naked flames and bonfires
- Smoking materials
- Heat from the sun, especially if reflected on to something combustible
- Deliberate ignition (arson)

### **Fire precautions**

The main control measure for preventing fire is to ensure that fuel and heat sources are kept well apart. In practice, this could mean:

- Close control of hot work, e.g. through use of a permit-to-work
- Maintaining electrical and mechanical equipment
- Safe storage of flammable substances, e.g. in a metal bin, cage or compound
- Locating portable heaters away from combustible material
- Keeping fire doors closed, where these are installed
- Regularly clearing up and removing rubbish
- Proper storage of waste awaiting collection
- Controlling smoking
- Not allowing bonfires on site

Arrangements must be made for fire safety on all construction sites and workers and visitors should be informed of the fire procedures during their site induction. Precautions must be in place to allow people to get to a place of safety should a fire start. These precautions include:

- A means of raising the alarm (a fire alarm, bell, gong or similar)
- An emergency evacuation plan and designated fire marshals
- Designated fire escape routes with suitable lighting and signage
- Suitable fire fighting equipment such as fire extinguishers
- Regular inspection and servicing of fire safety equipment
- Regular fire drills

## Did you know?

An overhead wire does not need to be touched to cause serious injury or death as electricity can jump, or arc, across small gaps.

Because electricity is used in almost every workplace it is easy to forget how potentially dangerous it is.

Exposure to electricity can lead to electric shock and burns, and is a common cause of fires. Electric shocks are caused by touching either a live conductor or something that has become live due to a fault. Electric shocks can be fatal.

Examples of where a live conductor might be touched include:

- Bare wires on an electric power tool
- Damaged plugs
- Damaged extension cables
- Contact with overhead or underground cables

Even minor shocks can lead to injury if they cause a worker to fall from a ladder, scaffold or other working platform.

The law requires employers to take precautions against the risk of injury or death from electricity. Electrical equipment must be safe and properly maintained.

Only in exceptional circumstances should work be carried out on live electrical systems, and then only by a competent authorised person.

### Rules for the use of electrical equipment:

- Low voltages should be used (battery operated tools or equipment connected to a 110 volt supply via a transformer)
- All cables and leads should be protected from damage
- Connections to the system should be properly made using suitable plugs
- Visual checks on casing and leads should be carried out by equipment users on a daily basis, with damage reported to the site supervisor
- All portable electrical equipment and appliances should be tested and maintained at suitable intervals and records kept (PAT testing)
- Only trained and competent people should work on electrical installations
- Suspect or faulty equipment should be taken out of use, labelled 'DO NOT USE' and kept in a secure place until examined by a competent person
- Workers should be made aware of all overhead and underground electricity lines in the working area

## Overhead power lines

Every year people at work are killed or seriously injured when they come into contact with live overhead power lines. These incidents often involve:

- Machinery, e.g. cranes
- Equipment, e.g. scaffolding
- Work activities, e.g. lifting and stacking

Any work near overhead power lines must be carefully planned and carried out to avoid danger from accidental contact or from being too close to the lines.

Typical precautions include getting the supply turned off or, if this is not possible, providing 'goal posts' markers and signs.

## Underground cables and buried services

Damage to underground cables can cause fatal or severe electric shock and burns. Contact with other buried services such as gas pipes can cause fires and explosions. Damaged water or sewer pipes can lead to flooding and, in severe cases, a risk of drowning.

Steps must be taken to avoid these hazards:

- **Plan** – the work to be done (a safe system of work / method statement should be developed and followed)
- **Locate** – the services before digging (obtain utility plans and use cable locating devices)
- **Dig safely** – using safe digging practices and the correct tools for the job

# C1

## Manual handling

### Remember

Wherever possible, try to eliminate the need for manual handling by using a trolley.

Manual handling involves lifting, carrying, pushing or pulling a load.

Manual handling is the biggest cause of 'lost time' accidents in the UK, accounting for almost a third of all lost time injuries.

Typical injuries include:

- Back injuries, including 'slipped' discs
- Cuts and bruises
- Sprains and strains
- Hernias

Many of these conditions lead to time off work. In the worst cases, injuries can lead to long-term disabilities. Even when no-one is hurt, a near miss like dropping a load can lead to damage to equipment and materials.

Under the Manual Handling Operations Regulations 1992 employers must assess the risks from manual handling and take steps to reduce the risk of injury as far as is reasonably practicable. This can be achieved by purchasing materials in smaller quantities, providing suitable lifting aids and arranging for materials to be delivered as close to the point of use as possible. Very heavy items should be lifted using mechanical equipment such as fork lift trucks, cranes or hoists.

You should be provided with instruction in how manual handling injuries occur, correct lifting techniques and the use of any equipment provided for lifting. Wearing personal protective equipment like thick gloves and safety footwear can reduce some risks, such as when handling objects with sharp edges, or if there is a risk of dropping a load on your toes.

Employees must co-operate by:

- Never lifting anything that they are not capable of lifting safely
- Getting help when necessary
- Using the equipment provided
- Following any instruction and training given
- Following safe systems of work
- Reporting any problems promptly

## The principles of safe lifting

If manual handling must be carried out, it is important that the correct lifting technique is used:

- Feet hip-width apart with one foot slightly in front of the other
- Bend the knees keeping the back naturally straight
- Grasp the load firmly
- Stand up using the leg muscles



**Think before lifting** – How heavy is the load? Will help be needed with the load? Where is the load going to be placed? For a long lift, consider resting the load midway on a table or bench to change grip and have a rest.

**Don't lift more than you can easily manage** – There is a difference between what people can lift and what they can safely lift. If in doubt, ask for help.

**Keep the load close to the body** – Keep the load as close to the body as possible for as long as possible. Keep the heaviest side of the load next to the body.

**Avoid twisting the back** – Turn by moving the feet, rather than twisting and lifting at the same time.

**Keep your head up** – Look ahead, not down at the load.

**Move smoothly** – Don't jerk or snatch at the load as this can make it harder to keep control and can increase the risk of injury.

**Put down, then adjust** – If precise positioning of the load is necessary, put it down first, then slide it into the desired position.

## Fact

17,000 people in the UK suffer deafness, ringing in the ears or other ear conditions caused by excessive noise at work.

Exposure to loud noise over a prolonged period can lead to:

- Tinnitus (ringing in the ears)
- Stress-related illnesses such as stomach upsets

Other problems caused by noise are:

- Loss of concentration
- Inability to hear instructions
- Inability to hear approaching vehicles

The longer the exposure and the higher the noise level, the greater the degree of hearing loss. Work-related hearing loss, once it becomes permanent, is irreversible as there is no cure.

Noise on a construction site usually comes from machinery used for demolition, excavation or piling work and from equipment like compressors and concrete mixers.

Workers at most risk are those who use tools such as concrete breakers and compactors, sanders, grinders and disc cutters, hammer drills, chainsaws and cartridge-operated tools.

Heavy plant operators and those who control machines on site, and anyone who works nearby, are also at risk.

The risk from noise on construction sites can be reduced by:

- Doing jobs in a different way that does not involve using noisy equipment or uses a quieter item of equipment. When buying or hiring equipment the quietest model should be chosen.
- Doing noisy jobs well away from where other people are working. Workers who are not involved in the job and don't need to be there should move out of the noisy area.
- Maintaining equipment and any noise reduction devices, e.g. silencers.
- Wearing suitable ear defenders whenever you are in a noisy area or doing a noisy job, even if just for a few minutes.
- Being aware – understand the risks and how they can be reduced.

## Remember

Hand-arm vibration syndrome is preventable, but once the damage is done it is permanent.

Vibration is transmitted into your hands and arms when you use powered work equipment like concrete breakers, angle grinders or hammer drills. Too much exposure to vibration can cause hand-arm vibration syndrome (HAVS) and carpal tunnel syndrome.

Nearly two million people in the UK are at risk, particularly in the construction industry.

HAVS affects the nerves, blood vessels, muscles and joints of the hands, wrists and arms. It can become severely disabling if ignored. It includes 'vibration white finger' which can cause severe pain in the affected fingers.

The early signs and symptoms are:

- Tingling and numbness in the fingers
- Not being able to feel things with your fingers
- Loss of strength in your hands
- In the cold and wet, the tips of your fingers going white then red and painful (vibration white finger)

Employers must assess the risk from vibration on a construction site and put in place control measures such as:

- Doing jobs in a way that does not involve using vibrating equipment or uses equipment that vibrates less
- Making sure cutting tools are kept sharp so that they remain efficient
- Limiting the time workers are using vibrating tools, rotating jobs if possible
- Providing training to workers on the risks and how to avoid them

Employees should:

- Avoid gripping or forcing a tool or workpiece more than they have to
- Store tools so that they do not have very cold handles when next used
- Encourage good blood circulation by:
  - keeping warm and dry
  - massaging and exercising fingers during work breaks
  - giving up or cutting down on smoking

# C4

## Hazardous substances



**Harmful**



**Toxic**



**Corrosive**



**Flammable**

Many hazardous substances are found on construction sites. Suppliers must provide information about the hazards in the form of a suitable warning label on the product and a material safety data sheet.

A new system of international symbols is being introduced for hazardous substances. The symbols will gradually start appearing on packaging over the coming years and, while most are fairly self-explanatory, there are some slight changes that your employer should tell you about.

The ill-health effects of hazardous substances include:

- Chemical burns to the skin
- Asthma
- Dermatitis (skin irritation)
- The lung disease 'silicosis', from breathing in silica dust
- Infection from bacteria found in water contaminated with rat urine

Your employer must provide you with information, instruction and training in the safe storage, handling and use of substances at work.

### **Rules for working with hazardous substances:**

- Familiarise yourself with any hazardous substance you work with and know what to do to prevent exposure and ill-health.
- If using a substance at work, check the label, as this provides information about the type of hazard, the chemicals present and will also include some basic information on precautions to take to prevent harmful exposure.
- Always use substances at the recommended concentration. Never mix substances together unless this is recommended by the supplier.
- Use the correct personal protective equipment for each job – this will be determined by the risk assessment for the work being undertaken. If in doubt, ask your manager.

## Asbestos

Every year in the UK around 4,000 people die from work-related asbestos diseases. This is more than are killed on the roads and the number is still rising. Construction and maintenance workers are among the groups most at risk from asbestos.

### What is asbestos?

Asbestos is a tough fibrous material which is naturally occurring. It was popular as a building material between the 1950s and 1980s because of its insulation, fire proofing and sound protection qualities. Asbestos was banned in the UK in 1999. However, a lot of buildings still contain asbestos. Materials containing asbestos can look the same as those that do not, or they may be covered up or painted over.

### Ill-health effects of asbestos

When asbestos fibres are breathed into the lungs they can cause serious diseases. These diseases can take many years to develop. There are no symptoms in the early stages so you do not know you have been affected until it is too late.

The main diseases caused by asbestos are:

- Lung cancer – which is often fatal
- Mesothelioma – a cancer of the lungs and abdomen, which is always fatal
- Asbestosis – scarring of the lungs which leads to severe breathing difficulties

Common uses of asbestos include:

- Pipe lagging
- Roofing sheets
- Ceiling tiles
- Textured ceiling coatings
- Sprayed coatings
- Insulating boards
- Gaskets and other seals

## **Disturbance of asbestos fibres**

One of the biggest problems associated with asbestos-containing materials is the potential to disturb and release asbestos fibres into the air, with the risk that they will then be breathed in. This can happen when cutting or grinding materials, disturbing asbestos insulation or during demolition work.

People in control of buildings, such as employers and landlords, have a legal duty under the Control of Asbestos Regulations 2012 to find out if there are any asbestos-containing materials in the building. If asbestos is found it should be identified and its condition assessed. Asbestos does not have to be removed if it is in good condition, but a plan must be put in place to regularly check the condition of the asbestos and inform anyone who might work in the area of the potential risks.

Work with asbestos must only be carried out by trained, competent workers following safe systems of work that do not generate asbestos dust. Most work involving asbestos can only be carried out by a licensed contractor, although some smaller low-risk jobs can be done without a licence.

For anyone working in construction, there is always the potential for accidental exposure to asbestos. If you discover an unknown substance that could contain asbestos, you must stop work immediately and tell your manager.

Asbestos waste is classed as hazardous. It must be handled safely, double-bagged and disposed of by a licensed contractor and taken to a licensed tip.

## **Dust**

Inhalation of dust can cause breathing problems like asthma, or make existing conditions worse.

Some dust is particularly hazardous to the airways, such as wood dust and silica dust.

The risks from dusty work can be reduced by fitting tools with dust extraction, keeping the area damped down with water or, as a last resort, wearing personal protective equipment like a suitable dust mask.

Dust should never be swept up with a broom as this disturbs the dust and increases the chance of breathing it in. Instead a suitable industrial vacuum cleaner should be used.

# C5

## Alcohol and drugs

### Did you know?

If someone drinks 2 pints of beer at lunchtime, they will still have alcohol in their bloodstream three hours later.

The misuse of alcohol and drugs at work can have the following effects:

- Reduced productivity and poor performance
- Increased mistakes and accidents
- Regular lateness and absence from work
- Bad behaviour or poor discipline
- Negative effect on team morale and relationships at work
- Negative effect on company image and customer relations

Alcohol and drugs can affect our mood and concentration, reduce our ability to recognise risks and dangers and increase our reaction times. In addition, some prescription medicines can cause drowsiness.

The effects of alcohol and drugs on the body are particularly hazardous when operating machinery, driving or working at height. The effects of drugs and alcohol on the body can remain for several hours after consumption.

Prolonged alcohol or drug misuse can cause serious health and social problems as well as repeated sickness absence.

You should be aware of and always follow your employer's policy on alcohol and drugs, and the policy of the site where you are working.

Some companies have introduced alcohol or drug screening as part of their policy. This will generally apply to all workers who work on their sites.

# D1

## Health and safety signs

### Remember

Making someone wear a dust mask doesn't solve the problem. Control the source of exposure and they might not need the mask.

Where there is a risk to workers that hasn't been fully controlled, employers and site managers must provide health and safety signs to highlight the risk.

There are four main types of health and safety sign. Each colour means a different thing.

- Blue (things you must do)
- Red (things you must not do)
- Yellow (warning of danger)
- Green (indicating a safe condition)

Examples of health and safety signs:



# D2

## Personal protective equipment

### Remember

PPE must be provided free of charge by your employer.

You must wear any PPE that is given to you.

If PPE gets damaged, ask for it to be replaced.

PPE does not remove the hazards, but it can help protect against them.

Personal protective equipment (PPE) is equipment that protects a person from one or more health and safety hazards.

### Safety helmets

Designed to protect you from falling objects or banging your head on objects. They are not designed to protect you if you fall.



### Ear defenders

Designed to protect against loud noise. Prolonged exposure to loud noise can cause permanent hearing damage.



### Safety glasses

Designed to protect your eyes. They can also offer protection against impact or chemicals depending on the type.



### Dust masks

These are used where there is something like dust or vapour in the air that may be breathed in.



### High visibility jackets

These are very common in the workplace and are used to make the wearer more visible. They are often used when people are working in areas where there is traffic movement.



### Gloves

Depending on the type of glove they can protect your hands against cold, sharp objects, rough objects and chemicals.



### Safety boots

Designed to protect the feet from something dropped on them. Many safety boots protect the feet if you stand on a sharp object.



# D3

## Welfare facilities and personal hygiene

### Did you know?

Young workers are 50% more likely to have an accident than older workers.

### Welfare facilities

Everyone who works on a construction site must have:

- Access to adequate toilet and washing facilities, with a hot and cold water supply, soap and towels
- A supply of drinking water
- Somewhere to rest and eat meals
- Somewhere for storing and drying clothing and equipment

These facilities must be easy and safe to reach and must be kept clean. They should be properly maintained, well-ventilated and well-lit.

If mobile teams work at a number of locations over a few days (e.g. road repair and cable-laying gangs), these facilities can be provided at a central location accessible within a reasonable distance.

### Personal hygiene

Good personal hygiene is something that should be part of everyday life. Keeping yourself clean can reduce the chances of becoming ill and spreading disease. It becomes even more important in the workplace, particularly when you might be working with chemicals, cement, soil or other things that can potentially cause health problems.

One common problem is transferring germs from hand to mouth when drinking, eating or smoking. To prevent this, always wash your hands before taking breaks. Use a good hand cleanser and make sure your finger nails are clean.

To help prevent skin problems it is advisable to use a good hand lotion or cream at the end of the working day to replace the moisture.

It is good practice to regularly check your hands (and other parts of the body) for any signs of rashes, spots or anything else that might indicate a health problem. Always get medical advice if you find something that causes concern.

If you wear work clothing such as overalls make sure they are washed or cleaned regularly. This will help to prevent any substances on the overalls affecting you. If you have to change clothes at work, keep your day clothes separate from your work clothes.

# D4

## Emergencies and first aid

### Remember

All employees must be provided with adequate information, instruction, training and supervision. This is particularly important for young workers.

### Procedures for dealing with emergencies

Every construction site will have procedures for dealing with incidents and emergencies. All workers need to be fully aware of what to do in the event of an emergency.

### Actions in the event of a fire / emergency

If you discover a fire:

- Raise the alarm to set the evacuation in progress
- Contact the emergency services (or inform your supervisor, who will do this)
- If safe to do so, and if you know what you are doing, make one attempt to extinguish the fire
- Leave the premises or site by the quickest and safest designated route
- Report to the assembly point

If you hear the alarm:

- Leave the premises or site by the quickest and safest designated route
- Report to the assembly point

### First aid

All construction sites must have suitable first aid arrangements.

As a minimum, there must be a trained '**appointed person**' who can take charge in an emergency. Higher risk workplaces, like construction sites, should also have trained '**first aiders**' who hold a first aid qualification.

The trained person will be able to:

- Take control of a situation until medical assistance arrives
- Deal with unconscious casualties including applying CPR
- Treat burns and broken bones

First aiders are not allowed to administer drugs without specific authorisation.

At least one properly stocked first aid box should be provided. There should be no medication or tablets in a first aid box.

# D5

## Reporting accidents and ill-health

### Remember

No-one should be injured or made ill at work.

It is everyone's duty to report accidents, near misses and incidences of ill-health and you should be told how to report these during your site induction. All injuries requiring first aid must be recorded in an accident book or similar.

All incidents should be reported to both your employer and the principal contractor, if there is one for your workplace.

This allows:

- An investigation to take place to find out the cause
- Measures to be put in place to reduce the risk of it happening again
- Management to identify any trends, for example a number of near misses in the same area

Near miss reporting is a requirement in most companies and is good practice. If the standard of near miss reporting is good then it may prevent an accident or ill-health from occurring in the future.

Following an accident, incidence of ill-health or significant near miss, risk assessments, systems of work (including method statements) and training should be reviewed to identify any gaps or improvements that can be made.

Under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 certain accidents and incidences of ill-health must be reported to the enforcing authority.

If a worker sustains an injury as a result of an accident and they are off work or unable to do their normal work for more than seven days, the injury must be reported to the Health and Safety Executive (HSE) by their employer. In the case of a self-employed person or member of the public being injured, the responsible person (usually the principal contractor) must report the accident to the HSE.

Other things that must be reported include:

- Fatalities at work
- Major injuries, e.g. broken bones
- Occupational diseases, e.g. asthma and dermatitis
- Dangerous occurrences, e.g. collapse of a scaffold or failure of a crane
- Injuries to members of the public, if they are taken to hospital



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