

**Level 2**

# PLUMBING

**3rd edition**

**NVQ/SVQ and Diploma**

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## Introduction

This book is designed to support the new NVQ Level 2 Diploma in Plumbing. This new Diploma has been prepared by SummitSkills (the SSC) in consultation with employers, the main exam boards and training providers. This means that all exam boards offering this qualification will have the same unit structure and assessment strategy. Exam boards will then design their own assessment content.

This book is designed to support the following qualifications:

- 6189 City and Guilds Level 2 NVQ Diploma in Plumbing and Heating.
- 501/1752/X EAL Level 2 NVQ Diploma in Plumbing.

These qualifications are approved on the Qualifications and Credit Framework (QCF). The QCF is a new government framework which regulates all vocational qualifications to ensure they are structured and titled consistently and quality assured. SummitSkills have developed the new Diploma qualification with the awarding bodies.

### Who the qualification is aimed at

The new diploma qualification is aimed at both new entrants (such as apprentices or adult career changers) as well as the existing workforce (so those looking to upskill). It is intended to train and assess candidates so that they can be recognised as occupationally competent by the plumbing industry. Learners should gain the skills to:

- work as a competent plumber
- achieve a qualification recognized by the Joint Industry Board (JIB) for professional grading to the industry
- complete an essential part of the SummitSkills Advanced Apprenticeship.

### About this book

Each unit of this book relates to a particular unit of the Diploma and provides the information needed to form the required knowledge and understanding of that area.

This book has been prepared by expert JTL trainers, who have many years of experience of training learners and delivering plumbing qualifications. The content of each unit will underpin the various topics which you will be assessed on by your exam board.

Each unit has knowledge tests throughout, as well as a set of multiple choice questions at its conclusion, to allow you to measure your knowledge and understanding.

This book will also be a useful reference tool for you in your professional life once you have gained your qualifications and are a practicing plumber.

## Using this book

It is important to note that this book is intended to be used for training. It should not be regarded as being relevant to an actual installation. You should always make specific reference to the British Standards or manufacturer's data when designing plumbing installations.

## Features of this book

This book has been fully illustrated with artworks and photographs. These will help to give you more information about a concept or a procedure, as well helping you to follow a step-by-step procedure or identify a particular tool or material.

This book also contains a number of different features to help your learning and development.

### Key term

These are new or difficult words. They are picked out in **bold** in the text and then defined in the margin.

### Remember

This highlights key facts or concepts, sometimes from earlier in the text, to remind you of important things you will need to think about.

### Did you know?

This feature gives you interesting facts about the plumbing trade.

### Safety tip

This feature gives you guidance for working safely on the tasks in this book.

### Find out

These are short activities and research opportunities, designed to help you gain further information about, and understanding of, a topic area.

### Working life

This feature gives you a chance to read about and debate a real-life work scenario or problem. Why has the situation occurred? What would you do?

### Progress check

These are a series of short questions, usually appearing at the end of each learning outcome, which gives you the opportunity to check and revise your knowledge. Answers to the questions are supplied on the Training Resource disk.

## Getting ready for assessment

This feature provides guidance for preparing for the practical assessment. It will give you advice on using the theory you have learnt about in a practical way.

## Check your knowledge

This is a series of multiple choice questions at the end of each unit, in the style of the GOLA end-of-unit tests. Answers to the questions are supplied on the Training Resource disk.

## Acknowledgements

JTL would like to express its appreciation to all those members of staff who contributed to the development of this book, ensuring that the professional standards expected were delivered and generally overseeing the high quality of the final product. Without their commitment this project would not have been seen through successfully.

Particular thanks to Keith Powell, who revised the content of the previous editions of this book and prepared extensive new material to cover the diploma specifications.

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## Understand and carry out safe working practices in building services engineering

Health and safety forms a very important part of your everyday working life and is vital for all work situations, whether on a construction site or working in a client's home.

**This unit will cover the following learning outcomes:**

- Know the health and safety legislation that applies to the building services industry
- Know how to recognise and respond to hazardous situations while working in the building services industry
- Know the safe personal protection measures while working in the building services industry
- Be able to apply manual handling techniques
- Know how to respond to accidents that occur while working in the building services industry
- Know procedures for electrical safety when working in the building services industry
- Be able to apply basic electrical safety measures in the building services industry
- Know methods of working safely with heat-producing equipment in the building services industry
- Be able to work safely with gas heating equipment in the building services industry
- Know the methods of safely using access equipment in the building services industry
- Be able to safely use access equipment in the building services industry
- Know the methods of working safely in excavations and confined spaces in the building services industry

# 1. Know the health and safety legislation that applies to the building services industry

## Did you know?

In 2008/09 180 people were killed in workplace accidents and a total of 131,895 injuries were reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (see page 8). In addition, 29.3 million days were lost – 24.6 million due to work-related ill health and 4.7 million due to workplace injury.

(Source: *The Health and Safety Commission*)

## The aims of health and safety legislation

Health and safety is a very important aspect of your job. There are a number of legal health and safety requirements that have been put in place to keep you, your fellow workers and site visitors free from accidents. Having a good grasp of these requirements will help you to be aware of the potential hazards when working on site and in the plumbing workshop.

The Health and Safety Executive (HSE) is the independent watchdog responsible for enforcing health and safety laws in the workplace. Every year thousands of building-site accidents are reported to the HSE, some of which are fatal. By following health and safety guidance, you will help to minimise the risk of accidents. During this unit, you will learn more about the regulations designed to keep you safe at work. You will also learn about the various hazards you may face, safe methods of working and actions to be taken in the event of accidents.

## Health and safety responsibilities

Both employers and employees are responsible for health and safety at work. The Health and Safety at Work Act 1974 (HASAWA) is the main legislation covering health and safety in the workplace. As an employee you are legally bound to cooperate with your employer to ensure they comply with the Act. You are also expected to take reasonable care of your own health and safety and to act responsibly so as not to endanger other workers or members of the public. If you break safety laws, you may be prosecuted.

Below are some of the most important aspects of the HASAWA:

- In domestic premises, the occupier is normally covered by insurance (Occupier's Liability) for visitors. However, when working on domestic premises, as the plumber you become responsible for the health, safety and welfare of the occupant, because it is your place of work.
- It is an offence to misuse or interfere with equipment provided by your employer for your health and safety or that of others. Employers have a duty to ensure that safety equipment is kept in good condition and instruct employees on its use. You should always use health and safety equipment correctly and for its intended purpose.
- Substances such as oil, grease, cutting compounds, paints and solvents are hazardous if spilled on the floor. Items such as off-cuts of pipe, cables, tools and even food are also dangerous if left underfoot. You have a responsibility both to yourself and to others to keep the workplace hazard free.

## Remember

Accidents do not just happen: they are invariably the result of human failing. However, with knowledge and the application of common sense, there is no reason why you should ever become one of the statistics.

Health and safety responsibilities for many of those involved in construction projects are covered in the Construction (Design and Management) Regulations 2007 – see pages 5–8.

## Employers' responsibilities

The HASAWA requires employers to ensure, so far as is reasonably practicable, the health, safety and welfare of employees at work. Employers are responsible for:

- providing and maintaining plant and systems of work that are safe and without risk to health
- safety in the use, handling, storage and transport of articles and substances
- providing information, instruction, training and supervision as necessary to ensure health and safety
- providing access to and exit from the workplace that is safe and without risk
- providing adequate welfare facilities and arrangements.

Companies employing five or more employees must also have a health and safety policy statement – see page 5.

## Employees' responsibilities

Your legal responsibilities at work are listed below.

### Your legal responsibilities at work

- Take care of your own health and safety and that of others who may be affected by your actions.
- Do not interfere with or misuse anything provided for your health and safety.
- Cooperate with your employer on health and safety matters.
- Tell your employer about any potentially dangerous situations.
- Alert your employer to any weakness you might spot in their health and safety arrangements.

## Personal hygiene

Good personal hygiene at work will help to keep you healthy. To maintain hygiene in the workplace:

- keep your overalls as clean as possible, and wash them regularly
- wash your hands thoroughly before contact with food
- avoid washing with solvents (e.g. white spirits), which can cause dermatitis
- use a barrier cream before starting a job, and reapply it each time you wash your hands.



Employers should be familiar with their responsibilities

### Remember

You have a legal obligation to carry out your health and safety responsibilities throughout your apprenticeship and working career.

### Did you know?

Barrier cream fills the pores of the skin with a water-soluble antiseptic cream, so that when you wash your hands the dirt and germs are removed with the cream.

## Accident prevention

The best way to reduce the risk of accidents is to remove the cause. Wherever possible, the workplace should have clearly defined passageways, good lighting and ventilation, reduced noise levels and non-slip floorings. Materials should be stored correctly, for example storing lengths of tube and pipe horizontally to minimise the risk of them falling. Dangerous substances should be locked in an approved location.

### Remember

Your employer must provide protective clothing, free of charge, when the work process requires its use.

To guard against hazards that cannot be minimised:

- place safety guards and fences on or around machines
- follow safe systems of work
- wear safety equipment, such as goggles, safety helmets and safety shoes, and other protective clothing, e.g. ear defenders, respirators, eye protection and overalls.

## Personal attitudes to safety training

It is essential to have a positive attitude towards safety training to safeguard your own welfare, your workmates and the general public. You should be aware of your company's health and safety policies and procedures and always act and work carefully and responsibly. You will need to know the potential dangers, the protection available and how to use it, and how to prevent accidents. Personal habits such as drinking alcohol and drug abuse can cause a worker to be a hazard not only to themselves but also to others.

## Health and safety legislation

### Legal status of health and safety guidance

Health and safety in the construction industry is covered by legislation, regulations, Approved Codes of Practice and guidance notes, each of which has a different legal status.

### Acts of Parliament

All businesses are covered by laws that have been passed by the UK Parliament in Westminster. Acts of Parliament are the law of the land, which means it is compulsory to follow their contents.

### Regulations

Regulations identify major health and safety risks and then set out the actions that must be taken to control them. Some regulations apply to every business, such as the Manual Handling Operations Regulations 1992, and others apply to specific industries, for example the Water Supply (Water Fittings) Regulations 1999. Regulations are approved by Parliament, which means that they are law and any breach may result in legal proceedings being taken.



Laws are passed in Westminster

## Approved Codes of Practice

An Approved Code of Practice (ACOP) offers practical examples of good practice to help businesses comply with the terms of an Act and is developed after consultation with the industry concerned. An ACOP applies to anyone who has a duty of care as outlined in the code, and may include employers, employees, the self-employed, principals to contracts, owners of buildings or plant, and so on. Failure to follow an ACOP is not, of itself, an offence. However, observing a relevant code of practice may be considered as evidence of good practice in court.

## HSE Guidance Notes

The HSE publishes Guidance Notes on a range of health and safety matters. The notes are designed to help businesses and individuals comply with the law and provide technical advice. Guidance is not compulsory. For further details go to [www.pearsonhotlinks.co.uk](http://www.pearsonhotlinks.co.uk), search for this title and click on this unit.

## The Health and Safety at Work etc. Act (HASAWA) 1974

The Act places duties on everyone connected with health and safety at work, including employers, employees, the self-employed and manufacturers or suppliers of plant and materials. Protection is also given to members of the public affected by the activities of people at work.

In addition to setting out the basic health and safety requirements of employers and employees, the HASAWA gives more detailed guidance to employers on aspects such as health and safety policy statements, which are required for companies employing five or more members of staff. Employers must make all staff aware of the company's health and safety policy.

Under the Act employers also have a duty to:

- carry out an assessment of risks related to work activities
- identify and implement control measures
- inform employees of the risks and control measures
- regularly review the assessments
- record the assessment if the company employs more than five people.

Employers must be prepared to consult a safety representative, if one is appointed by a recognised trade union, about matters affecting their employees' health and safety. Employers must also (if requested in writing by any two safety representatives) establish a safety committee within three months of the request being made.

## Construction (Design and Management) Regulations 2007

The Construction (Design and Management) (CDM) Regulations are the main set of health and safety regulations which apply to safety on

construction sites. The regulations require the HSE to be notified if a 'construction project' is likely to:

- last longer than 30 days  
or
- involve more than 500 person days of construction work.

The regulations place responsibilities on the 'dutyholders':

- **Clients** – anyone having construction or building work carried out as part of their business.
- **CDM coordinators** – have to be appointed to advise the client on projects that last more than 30 days or involve more than 500 person days of construction work. The CDM coordinator's role is to advise the client on health and safety issues during the design and planning phases of construction work.
- **Designers** – those who, as part of their work, prepare design drawings, specifications, bills of quantities and the specification of articles and substances, e.g. architects, engineers and quantity surveyors.
- **Principal contractors, usually the main or managing contractor for the work** – have to be appointed for projects which last more than 30 days or involve more than 500 person days of construction work. The principal contractor's role is to plan, manage and coordinate health and safety while construction work is being undertaken.
- **Contractors** – businesses involved in construction, alteration, maintenance or demolition work.
- **Workers** – anyone who carries out work during the construction, alteration, maintenance or demolition of a building or structure, e.g. plumbers, scaffolders, and so on.

#### Did you know?

The CDM Regulations apply to large construction projects, requiring all those involved in the project to work safely together.

The main aim of the regulations is to ensure that all parties involved in a construction project work together in a manner that will ensure that the work is properly coordinated, so providing a safe environment for the work carried out.

The CDM Regulations were changed in 2007 to incorporate a number of previously separate regulations, including the Construction (Health, Safety and Welfare) Regulations.

Other areas covered under CDM include:

- safe places of work
- good order and site security
- stability of structures
- demolition or dismantling
- explosives
- excavations
- cofferdams and caissons
- reports of inspections
- energy distribution installations
- prevention of drowning
- traffic routes
- vehicles

- prevention of risk from fire, etc.
- emergency procedures, including emergency routes and exits
- fire detection and firefighting
- fresh air
- temperature and weather protection
- lighting
- welfare facilities – sanitary and washing facilities, drinking water, changing/rest facilities.

## Summary of duties under the CDM Regulations

A summary of the duties and how they are applied is given in Table 1.1.

	All construction projects (Part 2 of the Regulations)	Additional duties for notifiable projects (Part 3 of the Regulations)
Clients (excluding domestic clients)	Check competence and resources of all appointees Ensure there are suitable management arrangements for the project holding welfare facilities Allow sufficient time and resources for all stages Provide pre-construction information to designers and contractors	Appoint CDM coordinator* Appoint principal contractor* Make sure that the construction phase does not start unless there are suitable welfare facilities and a construction phase plan is in place Provide information relating to the health and safety file to the CDM coordinator * There must be a CDM coordinator and principle contractor until the end of the construction phase
CDM coordinators		Advise and assist the client with their duties Notify the HSE Coordinate health and safety aspects of the design work and cooperate with others involved with the project Facilitate good communication between client, designers and contractors Liaise with principle contractor regarding ongoing design Identify, collect and pass on pre-construction information Prepare/update health and safety file
Designers	Check client is aware of the duties Eliminate hazards and reduce risks during design Provide information about remaining risks	Check coordinator has been appointed Provide any information needed for the health and safety file
Principle contractors		Plan, manage and monitor construction phase in liaison with the contractor Prepare, develop and implement a written plan and site rules (initial plan completed before the construction phase starts) Give contractors relevant parts of the plan Make sure suitable welfare facilities are provided from the start and maintained throughout the construction phase Check competence of all appointees Ensure all workers have site inductions, and any further information and training needed for the work Consult with the workers Liaise with CDM coordinator regarding ongoing design Secure the site

Table 1.1: Duties under the CDM regulations ▼

Contractors	<p>Check client is aware of the duties</p> <p>Plan, manage and monitor own work and that of workers</p> <p>Check competence of all their appointees and workers</p> <p>Train own employees</p> <p>Provide information to their workers</p> <p>Comply with the specific requirements in Part 4 of the Regulations</p> <p>Ensure there are adequate welfare facilities for their workers</p>	<p>Check a CDM coordinator and a principle contractor has been appointed and HSE notified before starting work</p> <p>Cooperate with principle contractor in planning and managing work, including reasonable directions and site rules</p> <p>Provide details to the principle contractor of any contractor engaged in connection with carrying out the work</p> <p>Provide any information needed for the health and safety file</p> <p>Inform principle contractor of problems with the plan</p> <p>Inform principle contractor of reportable accidents, diseases and dangerous occurrences</p>
Everyone	<p>Check own competence</p> <p>Cooperate with others and coordinate work so as to ensure the health and safety of construction workers and others who may be affected by the work</p> <p>Report obvious risks</p> <p>Comply with requirements in Schedule 3 and Part 4 of the Regulations for any work under their control</p> <p>Take account of and apply the general principles of prevention when carrying out duties</p>	

**Table 1.1:** Duties under the CDM regulations (cont.)

### *Responsibilities of the client*

The client has one of the biggest influences over the way a project is run but, because they may not know much about health and safety, they are not expected to plan or manage the project. In the case of a notifiable project the client must appoint a competent CDM coordinator to advise them and manage the process. The client remains responsible for ensuring that client duties are met.

Domestic clients have no client duties under CDM 2007. This means that there is no legal requirement for the appointment of a CDM coordinator or principal contractor when such projects reach the notification threshold.

### **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995**

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) set out the requirements for an employer reporting any of the following to the HSE:

- **Injuries** – fatalities (including members of the public) or injuries resulting in at least three days off work.
- **Diseases** – if a doctor advises that an employee is suffering from a work-related disease listed under RIDDOR.
- **Dangerous occurrences** – things that happened that could have resulted in a reportable injury (e.g. the collapse of an excavation).

Details of reportable accidents should be forwarded by the employer to the HSE on form F2508. If a fatality is being reported, then this must take place within ten days.



Accidents and injuries may occur in the workplace

The HSE, based on the report form, will make a decision on the level of investigation and subsequent action required, which may include legal action for breaches of health and safety regulations.

A firm should maintain an **accident book** for recording details of all types of injury, however minor, that occur at work. The accident book is used by the employer to monitor the level of accidents that occur and establish whether any additional safety controls are required to do the work.

If an accident occurs (whether it is RIDDOR reportable or not) an employee may be required to complete an accident report form. This should preferably be completed by the injured employee as soon after the accident as possible. If the form is completed by a third party, then the employee must carefully check that the details are accurate. Once signed, an accident report may be used in legal proceedings.

#### Key term

**Accident book** – a document where detail of all accidents, no matter how minor, is recorded.

## Regulatory Reform (Fire Safety) Order (FSO) 2005 The Fire Precautions Act 1971

The health and safety requirements for fire safety are set out in the CDM Regulations 2007. Fire safety is also covered by the Fire Safety Order (FSO), which brought together fire safety precautions from earlier legislation. The FSO applies to commercial properties including factories, shops and offices.

The employer is responsible for the safety of employees and other people on site where they may be at risk from fire, both from the work processes and activities carried out, as well as for general fire safety in the workplace. Employers must carry out a fire risk assessment, to enable them to identify – and then take steps to eliminate, reduce or control – safety risks (including risks from fire) to make sure that no one gets hurt or becomes ill. Any property at which more than five people are employed will require a written fire risk assessment.

Employers must provide the following general fire precautions:

- means of detecting and giving warning in case of fire
- escape routes
- firefighting equipment
- training of staff in fire safety.

## Health and Safety (Safety Signs and Signals) Regulations 1996

These regulations standardised safety signs at work. Employers must provide specific safety signs whenever there is a risk that cannot be avoided or controlled by other means, for example by engineering controls or safe systems of work. Where a safety sign would not help to reduce the risk, or where the risk is minimal, signs are not required.

The regulations require, where necessary, the use of road traffic signs within workplaces to regulate road traffic. Employers must also:

- maintain their safety signs
- explain unfamiliar signs to employees and inform them what to do when they see a safety sign.

The regulations apply to all places and activities where people are employed, but exclude signs and labels used in connection with the supply of substances, products and equipment or the transport of dangerous goods.

## Electricity at Work Regulations 1989

The Electricity at Work Regulations require all dutyholders – employers, the self-employed and employees – to take action to avoid the risk of death or injury from electricity at work. Employers and the self-employed have a duty to comply with the regulations, in respect of systems, electrical equipment and conductors, while employees have a duty to cooperate with their employers. As a plumber you will need to be especially careful when dealing with electricity. The Electricity at Work Regulations provide the full safety standards requirement; more will be said about the practical use of electricity on site in a later section. The regulations are made under the HASAWA 1974 and penalties may be imposed on anyone found guilty of malpractice or misconduct.

### *Definitions relevant to people who have responsibilities under these regulations*

#### 1 Employer

For the purpose of the regulations, an employer is any person or company that (a) employs one or more individuals under a contract of employment or apprenticeship, or (b) provides training under the schemes to which the HASAWA applies.

#### 2 Self-employed

A self-employed person is an individual who works for gain or reward other than under contract of employment, whether or not he or she employs others.

#### 3 Employee

Regulation 3(2) (b) reiterates the duty placed on employees by the HASAWA. This clause places duties on employees equivalent to those placed on employers and self-employed people where these matters are within their control. This will include apprentices – like you – who will be considered as employees under these regulations.

This arrangement recognises the level of responsibility that many employees in the plumbing trade are expected to take on as part of their job. The ‘control’ that they exercise over the electrical safety in any particular circumstances will determine to what extent they hold

responsibilities under the regulations to ensure that the regulations are complied with.

A person may find that they are responsible for causing danger to arise elsewhere in an electrical system, at a point beyond their own area of work. This situation may arise, for example, if you are working on a circuit while somebody else is working in a different room on that same circuit. This is obviously a dangerous situation. Because such circumstances are 'within [your] control', the effect of Regulation 3 is to bring responsibilities for compliance with the rest of the regulations to you, thus making you a dutyholder.

#### Remember

You have responsibilities under the HASAWA. Can you remember them all?

### 4 Absolute/reasonably practicable

Duties in some of the regulations have a qualifying term: 'reasonably practicable'. Where qualifying terms are absent, the requirement in the regulation is said to be absolute. The meaning of 'reasonably practicable' has been well established in law. The interpretations below are given only as a guide.

#### 5 Absolute

If the requirement in a regulation is 'absolute' – for example, if the requirement is not qualified by the words 'so far as is reasonably practicable' – the requirement must be met regardless of cost or any other consideration.

#### 6 Reasonably practicable

Someone who is required to do something 'so far as is reasonably practicable' must think about the risks presented by a particular work activity or site and weigh these against the costs – in terms of the physical difficulty, time, trouble and expense – which would be involved in taking steps to reduce these risks. For example, in your own home you would expect to find a fireguard in front of a fire to prevent young children from touching the fire and being injured. This is a cheap and effective way of preventing accidents and would be a reasonably practicable situation.

If the cost or technical difficulties of taking certain steps to prevent those risks are very high, it might not be reasonably practicable to take those steps.

In the context of the Electricity at Work Regulations, where the risk is often that of death from electrocution, and where the necessary precautions are often very simple and cheap – for example, insulating surrounding cables – the level of duty to prevent danger approaches that of an absolute duty.

### Provision and Use of Work Equipment Regulations 1998

The Provision and Use of Work Equipment Regulations (PUWER) require risks to a person's health and safety, from equipment that they

### Remember

The safe condition of hand tools such as hammers and spanners is covered by PUWER.

### Did you know?

The use of abrasive wheels is now covered by PUWER: all staff using such equipment need to be properly trained, informed and supervised.

### Did you know?

PUWER has laid down new requirements for the use of cartridge fixing devices based on a risk assessment of the work and proper training of staff. Any age restriction detailed in previous legislation has been removed.



**Figure 1.1:** A sack trolley is an example of a mechanical lifting device

use at work, to be prevented or controlled. Work equipment includes all tools (power or hand) and equipment such as threading machines and bending machines. Equipment must be:

- suitable for the intended use
- safe for use, maintained and, where necessary, regularly inspected
- used only by people who have received information, instruction and training
- accompanied by appropriate safety measures, e.g. protective devices, markings, warnings.

## Manual Handling Operations Regulations 1992 (as amended)

These regulations lay down requirements for moving loads by hand, which could involve pushing, pulling, lowering the load, etc. They include:

- avoiding hazardous manual handling operations so far as is reasonably practicable, e.g. by using a mechanical lifting aid such as a sack trolley to move the load
- carrying out a risk assessment of any hazardous manual handling operations that cannot be avoided
- reducing the risk of injury from manual handling so far as is reasonably practicable, providing staff training in safe lifting techniques.

A risk assessment for manual handling must take into account the following five factors:

- the task
- the load
- the working environment
- individual capability (of the person carrying out the lifting)
- other factors, e.g. use of protective clothing.

## Personal Protective Equipment at Work Regulations 1992 (as amended)

Personal protective equipment (PPE) is defined in the Personal Protective Equipment at Work Regulations as all equipment (including clothing affording protection against the weather) which is intended to be worn or held by people at work and which protects them against one or more risks to health or safety. PPE includes safety helmets, gloves, eye protection, high visibility clothing, safety footwear and safety harnesses. The provision of respiratory and hearing protection is covered by separate legislation.

The main requirement of the regulations is that personal protective equipment is to be supplied and used at work wherever there are risks to health and safety that cannot be adequately controlled in other ways.

PPE must be:

- suitable for use
- maintained and stored properly
- provided with instructions on how to use it safely
- used correctly by employees
- provided to employees free of charge and replaced if damaged.

## Lifting Operations and Lifting Equipment Regulations 1998

The regulations aim to reduce risks to health and safety from lifting equipment (such as cranes, pulleys, ropes, slings, etc.) provided for use at work. Lifting equipment should be:

- strong and stable enough for the particular use and marked to indicate safe working loads
- positioned and installed to minimise any risks
- used safely, i.e. the work is planned, organised and performed by competent people
- subject to an ongoing thorough examination and, where appropriate, inspection by competent people.

### Did you know?

Lifting equipment is not just cranes and machines – it is also ropes and pulleys used in lifting.

## Work at Height Regulations 2005 (amended)

The regulations apply to all **work at height** where there is a risk of a fall liable to cause personal injury. They place duties on employers, the self-employed, and any person who controls the work of others. Dutyholders must ensure:

- all work at height is planned and organised
- all work at height takes account of weather conditions that could endanger health and safety
- those involved in work at height are trained and competent
- the place where work at height is done is safe
- equipment for work at height is inspected
- the risks from fragile surfaces and falling objects are controlled.

### Key term

**Work at height** is usually described as work taking place at a height of 2 metres or more, above ground level.

## Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended)

The COSHH Regulations require employers to control exposure to hazardous substances to prevent ill health. Employers have a duty to protect employees, and others who may be exposed. To comply with COSHH an employer must:

- carry out an assessment of the risk to health arising from working with a substance
- decide what precautions are needed
- prevent exposure or control the risk

### Did you know?

Hazardous substances can be in the form of solids, liquids, dusts, fumes, vapours, gases or micro-organisms that may present a risk to health.

- introduce control measures to ensure equipment is maintained and the correct procedures followed
- monitor the level of exposure to the substance
- carry out health checks where required
- have procedures to deal with accidents and emergencies
- ensure employees are informed, instructed and where necessary receive training about the risks and precautions to be followed.

## Control of Asbestos Regulations 2006

The regulations bring together the three previous sets of regulations covering the prohibition of asbestos, the control of asbestos at work and asbestos licensing. They prohibit the importation, supply and use of all forms of asbestos. The ban applies to new use of asbestos.

If existing asbestos-containing materials are in good condition, they may be left in place as long as their condition is monitored and managed to ensure they are not disturbed.

### *Duty to manage*

Both employers and the self-employed have responsibilities under the regulations. In addition, regulation 4 imposes a duty on people with responsibility for non-domestic premises (owners, occupiers, managing agents, etc.) to manage asbestos. This covers anyone who has, through a contract or tenancy, an obligation to maintain or repair non-domestic premises, including any means of access to or from the premises.

Where there is no contract or tenancy, every person who has, to any extent, control of a part of non-domestic premises, or any means of access to or from them, also has a duty to manage asbestos.

### *Key requirements of the regulations*

- Insulating materials or linings of white, blue and brown asbestos must only be removed/worked on by licensed contractors.
- On identifying high-risk white, blue or brown asbestos, work must be stopped and a risk assessment carried out in relation to working with or working close to asbestos.
- Prior to working with asbestos, a risk assessment must be carried out and suitable control measures put in place, e.g. on site washing facilities.
- Workers who may come across asbestos in the workplace (including plumbers) must attend mandatory asbestos awareness training sessions.
- Asbestos materials must be properly disposed of in approved packaging (preventing the spread of any fibres) and at approved waste sites.
- Workers removing asbestos materials or carrying out work near to asbestos must be properly informed, instructed and trained.

### Remember

Breathing in asbestos dust can lead to chronic (long-term) illness or fatal diseases such as mesothelioma (cancer of the inner chest lining), lung cancer or asbestosis (scarring of the lung).

## Asbestos cement-based materials

Work with asbestos cement-based materials is not as high a risk. This may be carried out by non-licensed contractors, provided a risk assessment is undertaken, effective control measures are used to prevent the spread of any material and workers are protected (for example by the use of effective protective clothing and respiratory protective equipment).

### Did you know?

Asbestos may be found in properties built before 2000, for example in pipe insulation and boilers.

## Control of Lead at Work Regulations 2002

The Control of Lead at Work Regulations cover the following:

- **Duties** – employers and employees are responsible for protecting themselves and other people on premises where lead work is taking place.
- **Training** – workers should be provided with information, instruction and training on the safe use of lead.
- **Assessment of risk of exposure** – if there is a risk of exposure through inhaling or ingesting (swallowing) lead, the level of risk must be assessed and recorded. Correct working practices and proper controls should be put in place and protective and safety equipment provided.
- **Control measures** – the employer and employee must ensure, as far as is reasonably practicable, that all measures are taken to restrict and control exposure.
- **Protective clothing** – employees should be provided with and wear protective clothing.
- **Respiratory equipment and ventilation** – masks or respiratory equipment must be provided and used where there is a risk of exposure to airborne lead dust or fumes.
- **Washing facilities and canteen areas** – adequate washing and changing facilities should be provided. Hands and face should be washed and contaminated clothing changed before eating, drinking or smoking and before leaving the workplace. Food and drink should not be consumed in any area where lead work is being carried out.
- **Spread of contamination** – both employer and employee should take such steps as are reasonably practicable to prevent lead contamination from spreading beyond the workplace or storage area.
- **Waste and scrap** – old lead sheet should be removed with care, and any scrap and dust taken to approved collectors for recycling. Vehicles transporting scrap and dust should be thoroughly washed and cleaned after use.
- **Lifting lead** – lead is heavy. Proper lifting equipment and additional staff should be used to ensure the safety of workers lifting and moving lead sheet.
- **Medical surveillance** – the blood lead level of employees working with lead should be monitored at regularly.

### Did you know?

As a plumber you may come across lead in the form of old lead pipe, or sheet lead, usually used on the outside of buildings.

### Remember

When lead welding indoors for long periods it may be necessary for a local exhaust ventilation system to be provided. Alternatively, proper respiratory protection devices may be required.

### Did you know?

In Northern Ireland this duty is performed by the Health and Safety Executive for Northern Ireland.

### Key terms

**Enforcing authorities** – an organisation of people who have the authority to enforce certain laws or Acts, as well as providing advice or guidance.

**Inspector** – someone who is appointed or employed to inspect/examine something in order to judge its quality or compliance with any laws.

**Prosecution** – accusing someone of committing a crime, which usually results in the accused being taken to court and, if found guilty, being punished.

- **Maintenance records** – the employer must maintain records of risk assessments, information and training provided, precautionary measures taken, medical surveillance and ventilation and respiratory equipment provided.

## Enforcing authorities and inspectors

### Enforcing authorities

HASAWA is enforced by the Health and Safety Executive (HSE). It is an independent regulator responsible for encouraging, regulating and enforcing health and safety in the workplace in the UK. It also has responsibility for researching any occupational risks in England, Wales and Scotland.

The HSE's duties include:

- helping and encouraging anyone who is working with the objectives in HASAWA
- carrying out research, publication and training for health and safety at work
- ensuring that employers, employees, suppliers and all other relevant people are kept informed and advised on health and safety matters.

The HSE's enforcement role is usually delegated to the local government bodies, such as county or district councils.

Local authorities can be **enforcing authorities** for several types of workplaces including offices, shops, retail and wholesale distribution, hotels, petrol filling stations, residential care homes and the leisure industry.

### Powers of inspectors

An enforcing authority may appoint **inspectors**, who have the power to:

- enter any premises in order to enforce the Act, or in a dangerous situation
- be accompanied by the police if it is likely that they may be stopped from carrying out the enforcement
- bring any equipment or materials required and any other person authorised by the enforcing authority
- examine and investigate any circumstance in order to enforce the Act
- give orders that the premises, or anything inside, should be left undisturbed while the investigation takes place
- take measurements, photographs and make recordings
- take samples of any items or substances and of the atmosphere in or close to the premises
- have an item or substance which appears to be a danger to health or safety, dismantled, tested or destroyed if necessary
- ensure items or substances are not tampered with and kept for use as evidence in any **prosecution**

- interview or question any person believed to have information, and ensure all statements are signed as being true
- inspect and take copies of any book or document required for the investigation
- invoke any other power that is necessary to enforce the Act.

Inspectors will also advise on improvements and changes that could be made to a workplace in order for it to meet statutory requirements. Inspectors will meet and speak with both employers and employees during a visit and provide them with information related to health, safety and welfare. This can be done more informally, through oral communication (especially when a breach is very small) or more formally through written communication.

Inspectors have three clear procedures they can follow when they encounter a serious breach of health and safety law. These are outlined below.

### Improvement notice

When a breach of the law is serious, the inspector may issue an improvement notice to tell the dutyholder to comply with the law. The note will explain what needs to be done, why and by when, usually within 21 days. After this, the inspector can take further action.

### Prohibition notice

Where an activity involves a risk of serious personal injury, the inspector may serve a prohibition notice. This will order that the action is stopped (prohibited) immediately or after a specified time period. The action will not be allowed to resume until remedial action has been taken. As with the improvement notice, the prohibition notice will explain why the action is necessary, and the dutyholder will be told in writing about the right of appeal to an industrial tribunal.

### Prosecution

For some very serious breaches of the law, the inspector may decide to prosecute the dutyholder as set down in the HSE's *Enforcement Policy Statement*. Health and safety legislation gives the courts power to punish offenders, as this will help to deter other offenders.

#### Did you know?

The dutyholder can appeal to an industrial tribunal about the improvement notice if they believe it is unfair or incorrect.

#### Remember

A failure to comply with improvement and prohibition notices can be punished by a fine of up to £20,000 or six months' imprisonment.

#### Progress check

- |   |   |
|---|---|
| 1. Which regulations cover who is responsible for the health and safety of those involved on construction projects? | 6. Whose responsibility is it to supply equipment under the Personal Protective Equipment at Work Regulations 1992? |
| 2. What is an employer's legal responsibility with regard to the HASAWA?  | 7. What does the phrase 'working at height' mean?   |
| 3. What should an accident book contain?  | 8. When welding lead indoors, what precautions must be taken?   |
| 4. Under the Fire Safety Order 2005, what are the main general fire precautions that an employer must provide?      | 9. What is an 'enforcing authority'?  |
| 5. Who do the Electricity at Work Regulations 1989 apply to?  | 10. When would a prohibition notice normally be served?   |

## 2. Know how to recognise and respond to hazardous situations while working in the building services industry

### General site hazards

Most accidents are caused by human error. Failure to keep the workplace tidy and in good condition can create a number of hazards. Below are several general types of hazard that you may encounter.

### Trips and fire hazards

Tools, equipment and materials left lying about, trailing cables and welding hoses, spilled oil and so on may cause people to trip, slip or fall. Clutter and debris, oily rags and paper should be removed to prevent fire hazards. As an individual always make sure your own work area is kept clear and tidy.

### Using equipment and tools

When carrying out practical work check that you are using the correct tools and safety equipment. Using the wrong, damaged or inadequate personal protective equipment (PPE) may lead to injuries and endanger your health. PPE should be regularly maintained and CE marked. PPE is covered in depth on pages 33–37.

Plumbing tools and equipment are potentially dangerous if misused or neglected. Practical instruction in the proper use of tools and equipment will form part of your training on site and in your training centre. (Tools and equipment are covered in greater detail on pages 200–207.) You should always use the right tool for the job. Below are some guidelines to follow.

#### Safety tip

Never be tempted to just 'make do' with whatever tool you have to hand.

#### Safe use of hand tools and manually operated equipment

- Never use a hammer on a tool with a wooden handle (e.g. wood chisel) as you may damage the wooden handle and release dangerous splinters. If the handle splits as you hit it, the hammer could slip off and damage your hand.
- Cutting tools, saws, drills and similar tools must be kept sharp and in good condition. As a plumbing apprentice, you will frequently be asked to use cutting tools such as hacksaws and wood saws: you should ensure that the blades are always fitted properly and are sharp. Hacksaw teeth should be pointing in the forward direction of cut. After use, guards should be fitted where possible.
- Handles should be properly fitted to tools such as hammers and files, and should be free from splinters. Hammerheads should be secured correctly using metal or wooden wedges.

- Mushroom heading' of chisels is a dangerous condition, which can lead to serious eye injury. Unprotected file tangs present a serious danger of cuts and puncture wounds.
- The plugs and cables of hand-held electrically operated power tools must be kept in good condition. Frayed cables and broken plugs should be replaced.
- Electric power tools of 110 or 230 volts must be PAT tested in accordance with your employer's procedures. It is good practice to check all electrical equipment and test labels to ensure they are in safe working order.
- Other common items of equipment, e.g. barrows, trucks, buckets, ropes and tackle, are all likely to deteriorate with use. If they are damaged or broken they will sooner or later fail in use and may cause an accident. Unserviceable tools and equipment should not be used. They should be repaired or replaced and the unsafe equipment removed from the site.
- You may have to use cartridge-operated tools during your career. If you do, you will be given the necessary instructions on the safe and correct methods for using them. These can be dangerous, especially if they are operated by accident or used as toys; this could cause ricochets, which may lead to serious injury.

**Key term**

**PAT (Portable Appliance Testing) tests** – Checking for safety and keeping maintenance records of all portable electrical equipment to ensure it is in safe working order.

## Personal conduct

To be safe when working as a plumber, you will need to follow health and safety advice and guidelines, in particular when manual handling (see pages 37–40) and working at height (see pages 64–70).

## Potential dangers to workforce and members of the public

### On construction sites

Construction sites are one of the most dangerous areas you will work in. You will need to watch out for trip hazards, scaffolding and moving traffic to name a few.

### In industrial commercial premises (occupied and unoccupied refurbishment)

Empty premises that are being refurbished may be similar to a construction site. Where premises have been empty for some time, they may have been vandalised and there may be other dangers such as broken windows or contamination from vermin.

Manufacturing, processing or production activities may be taking place in occupied premises, so you will need to be aware of additional hazards such as machinery operating, chemicals and forklifts.

**Find out**

You have been asked to go to an occupied house to fit a new bathroom suite. There are two children aged 16 and 12 and there is a pet dog. Make a list of potential dangers you might come across.

## In dwellings (occupied and unoccupied refurbishment)

A dwelling can have similar hazards to that of a construction site or commercial/industrial premises. While these are likely to be on a smaller scale, potential dangers are no less serious. In occupied properties you may need to take into account other hazards such as pets or children.

The list below shows some of the most common risks faced by plumbers.

### Checklist

#### Possible hazardous operations

- Working with electrically powered plant, e.g. power transformers; extension cables; plugs and sockets; portable tools; electric arc welders; threading machines; large hammer drills; specialist equipment; and fixed equipment.
- Working with non-electrically-powered plant, e.g. hand tools, specialist tools, pneumatic tools, hydraulic tools.
- Working with non-powered tools, e.g. specialist equipment, manual handling of loads, specialist tools, general lifting.
- Working with hazardous substances.
- Working in excavations, e.g. think about physical conditions and interruption of gas, water or electrical services.
- Working with powered industrial trucks, e.g. forklift trucks; dump trucks; JCB/tractors; tail-lift vehicles; and road vehicles.
- Working with highly flammable liquids and liquefied petroleum gases.
- Working with lead, e.g. think about manual handling and lead hygiene.
- Working at heights, e.g. ladders, scaffolds, ropes/harnesses.
- Working with demolitions.
- Working with electrical installations.
- Controlling work with fumes, noise or dust.
- Working with asbestos.
- Working within vessels.
- Working in confined spaces.
- Clearing hazardous waste.
- Working with cartridge fixing devices.
- Working on suspended timber floors.

## Methods to prevent accidents or dangerous situations

### Method statements

Method statements are used for high-risk activities such as working at height to line a flue system. The method statement draws together the findings and control measures of all the risk assessments associated with the activity (for instance, working at heights, working with flue liner materials, working with mortar mixes, etc.) into one document, which is then given to employees, co-contractors, etc. to provide guidance on how the activity is to be carried out.