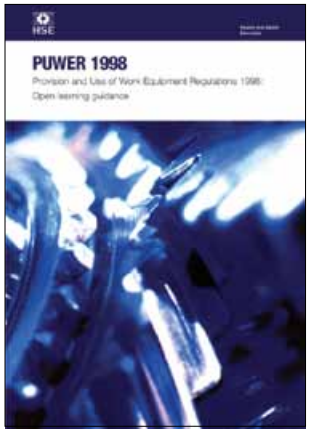
PUWER 1998

Provision and Use of Work Equipment Regulations 1998: Open learning guidance



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This open learning guidance explains the Provision and Use of Work Equipment Regulations 1998 (PUWER) to help you learn about and understand them. The Regulations deal with the work equipment and machinery used every day in workplaces: factories, offices, shops, hospitals, construction sites, farms – wherever equipment and machinery is used at work.

This second edition contains updated references to regulations and publications. It is intended for anyone who wishes to know the requirements of PUWER 1998 but is aimed specifically at:

- local authority health and safety inspectors, eg environmental health and safety officers and technical officers;
- health and safety enforcement officers;
- health and safety professionals providing health and safety services within medium to large companies, eg health and safety officers and health and safety training personnel;
- HSE inspectors; and
- legal professionals.

The guidance does not include PUWER Part IV, power presses, since these Regulations are specialised, nor Part V, miscellaneous:

36 Exemption for the armed forces;
37 Transitional provision;
38 Repeal of enactment; and
39 Revocation of instruments.

You will find it useful to read this open learning guidance alongside *Safe use of work equipment* L22

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This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.

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Introduction

About this open learning guidance

This guidance explains the Provision and Use of Work Equipment Regulations 1998 (PUWER) to help you learn about and understand them. The Regulations deal with the work equipment and machinery used every day in workplaces: factories, offices, shops, hospitals, construction sites, farms – wherever equipment and machinery is used at work.

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- 37 Transitional provision;
- 38 Repeal of enactment; and
- 39 Revocation of instruments.

Aims

The PUWER Regulations aim to make working life safer for everyone using and coming into contact with equipment: employers and employees, contractors, suppliers, and others. Like all regulations, they need to be studied closely. The words have been chosen carefully and sometimes have a precise legal meaning. At other times, you need to interpret the Regulations according to your own situation.

The guidance aims to clarify when terms are used precisely and when you need to interpret and apply the requirements of a regulation to your situation.

Where the regulation is new or has changed significantly in 1998, you will see this symbol. This has been done to help those who are already familiar with the previous regulations to identify the new material.

Who it's for

The main groups for whom this guidance is intended are:

- local authority health and safety inspectors, for example environmental health and safety officers and technical officers;
- health and safety enforcement officers;
- health and safety professionals providing health and safety services within medium to large companies, for example health and safety officers and health and safety training personnel;
- HSE inspectors; and
- legal professionals.

But anyone who wishes to know the requirements of PUWER 1998 should find this guidance useful.

How to use it

You can cover the units in your own time and pace, either working through in sequence, or selecting specific regulations as and when you need to know more about them.

Make sure that you have a copy of *Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance* L22 (ACOP) when working through this guidance.

Structure

Each regulation is described as follows:

Key points
A summary of the main areas covered by the regulation.

The text of the regulation
The text of the regulation is given verbatim; it has been drawn up by the Secretary of State for the Environment, Transport and the Regions, and by Parliament, and will be enforced by health and safety inspectors. It is precise and written in a formal style. Note that the word 'he' refers to both men and women, singular and plural.

Main commentary
The regulation is described in more detail, with practical examples. Sometimes the words IF, AND, BUT, OR and NOT appear in capital letters. This is because a great deal of law is based on what might happen (IF . . . and sometimes AND), and it also has to take account of exceptions (BUT), alternatives (OR) and prohibitions (NOT).

Sometimes the full version of the ACOP, which gives specific advice on what employers must do to comply with the regulation, is quoted. Where the text refers to 'guidance', the source is the ACOP. The guidance gives the kinds of precautions employers should take and explains in more detail how the Regulations should be applied.

Case studies
Real-life situations in a variety of industrial and commercial sectors are used to illustrate what could happen if the requirements of the regulation are not met.

Key terms
Important words and phrases used in each regulation are defined (not regulation 10).

Activity
A practical task is provided to help you understand the regulation and apply it to your situation. The feedback gives additional information and things to think about. (Note that a single activity covers regulations 1–3, there is no activity for regulation 10, and the activity for regulation 27 also covers regulation 26.)

Self-assessment questions (SAQs)
These are provided to test your understanding of each regulation. You could use the questions before and after reading about the regulation to compare your progress.

The Regulations

The Secretary of State, with the agreement of Parliament, has brought out two sets of Regulations that have been issued to implement the Amending Directive to the Use of Work Equipment Directive (AUWED).

The Provision and Use of Work Equipment Regulations 1998 (PUWER) came into force on 5 December 1998. It implements the general non-lifting requirements of the Directive and replaces the Provision and Use of Work Equipment Regulations 1992 in their entirety.

Where the PUWER regulation is new or changed significantly in 1998 you will see this symbol next to it in this open learning guidance.

The other set of Regulations, which relates to lifting equipment, is the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), which came into force at the same time and is covered in a separate open learning guidance.

Regulations 1–30 of PUWER apply to all work equipment including that used to lift loads. All sectors of industry are affected by PUWER. Regulations 31–35 of PUWER deal more specifically with power presses.

To obtain a copy of the Statutory Instruments (the Regulations), contact:

The Stationery Office,
PO Box 29,
Norwich NR3 1GN
Tel: 0870 600 5522
Fax: 0870 600 5533
e-mail: customer.services@tso.co.uk
Website: www.tso.co.uk (They are also available from bookshops.) Statutory Instruments can be viewed free of charge at www.opsi.gov.uk.

The associated Approved Code of Practice includes the text of the Regulations and can be purchased at:

HSE Books
PO Box 1999
Sudbury
Suffolk CO10 2WA
Tel: 01787 881165
Fax: 01787 313995
Website: www.hsebooks.co.uk (HSE priced and free publications can be viewed online or ordered from www.hse.gov.uk or contact HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995. HSE priced publications are also available from bookshops.)

As well as the *Safe use of work equipment* ACOP, you may wish to obtain the most recent ACOPs for power presses and woodworking (see Further information, page 113).

For information about health and safety ring HSE's Infoline
Tel: 0845 345 0055 Fax: 0845 408 9566
Textphone: 0845 408 9577 e-mail: hse.infoline@natbrit.com or write to
HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

Regulations 1-3 Setting the scene

Regulations 1, 2 and 3 cover the preliminary legal formalities and background which are characteristic of statutory documents:

- what PUWER 1998 is about and the month it came into effect;
- how to interpret particular terms and expressions used in PUWER 1998;
- where PUWER 1998 applies;
- who is affected.

To understand the scope and intentions of PUWER 1998, you'll need to get to grips with the terms used in the context of the Regulations. Many familiar words are used in precise ways. It is important to know what is being referred to, and what is not included in the definition.

The activity and questions for regulations 1–3 follow the section covering regulation 3. After working through regulations 1–3 (pages 5–10) you should be able to explain:

- what PUWER is about;
- when the Regulations came into effect;
- how particular terms must be interpreted;
- where the Regulations apply;
- who is affected by them.

Regulation 1
Citation and commencement

Key points

Regulation 1 of PUWER sets the scene by informing you that a series of new Regulations have been developed during 1997. These Regulations came into force on 5 December 1998.

Regulation 1 focuses on the title of the Regulations and the date from which PUWER must be implemented.

Regulation 1 states:

These Regulations may be cited as the Provision and Use of Work Equipment Regulations 1998 and shall come into force on 5 December 1998.

The new Regulations that came into force on 5 December 1998 are designed to clarify the safe use of work equipment. Guidance covers the different kinds of equipment:

- new;
- existing;
- second-hand or leased.

Key terms		
PUWER		The Provision and Use of Work Equipment Regulations 1998.
Work equipment	NEW	Any equipment, machinery, appliance, apparatus, tool or installation for use at work.
Use of work equipment		'Use' includes, starting, stopping, programming, setting, transporting, repairing, modifying, maintaining, servicing and cleaning.

Regulation 2 Interpretation

Key points

This regulation is about how particular terms are used throughout PUWER and how they are interpreted.

The regulation focuses on:

- defining certain terms in the Regulations;
- explaining how to interpret the labelling and paragraph system used in the Regulations;
- identifying what is covered in specific regulations, and the various exceptions which are dealt with elsewhere.

Regulation 2 states:

(1) In these Regulations, unless the context otherwise requires –

"the 1974 Act" means the Health and Safety at Work etc Act 1974;

"employer" except in regulation 3(2) and (3) includes a person to whom the requirements imposed by these Regulations apply by virtue of regulation 3(3)(a) and (b);

"essential requirements" means the requirements described in regulation 10(1);

"the Executive" means the Health and Safety Executive;

"inspection" in relation to an inspection under paragraph (1) or (2) of regulation 6 –

(a) means such visual or more rigorous inspection by a competent person as is appropriate for the purpose described in the paragraph;
(b) where it is appropriate to carry out testing for the purpose, includes testing the nature and extent of which are appropriate for the purpose;

"power press" means a press or press brake for the working of metal by means of tools, or for die proving, which is power driven and which embodies a flywheel and clutch;

"thorough examination" in relation to a thorough examination under paragraph (1), (2), (3) or (4) of regulation 32 –

(a) means a thorough examination by a competent person;
(b) includes testing the nature and extent of which are appropriate for the purpose described in the paragraph;

"use" in relation to work equipment means any activity involving work equipment and includes starting, stopping, programming, setting, transporting, repairing, modifying, maintaining, servicing and cleaning;

"work equipment" means any machinery, appliance, apparatus, tool or installation for use at work (whether exclusively or not);

and related expressions shall be construed accordingly.

(2) Any reference in regulations 32 to 34 or Schedule 3 to a guard or protection device is a reference to a guard or protection device provided for the tools of a power press.

(3) Any reference in regulations 32 or 33 to a guard or protection device being on a power press shall, in the case of a guard or protection device designed to operate while adjacent to a power press, be construed as a reference to its being adjacent to it.

(4) Any reference in these Regulations to –

(a) a numbered regulation or Schedule is a reference to the regulation or Schedule in these Regulations so numbered; and
(b) a numbered paragraph is a reference to the paragraph so numbered in the regulation in which the reference appears.

This regulation is concerned with how terms and expressions used throughout PUWER 1998 must be interpreted. You need to understand what the terms mean since they apply across the whole of the Regulations. Terms with specific meanings are:

- the 1974 Act;
- employer;
- essential requirements;
- the Executive;
- inspection;
- power press;
- thorough examination;
- use;
- work equipment.

Supporting guidance explains the meaning of 'inspection' contained in the ACOP under regulations 6 (Inspection), and 31 to 35 (on power presses). There is a separate ACOP for power presses entitled *Safe use of power presses*,[1] which is available from HSE Books (see Further information; page 104).

A note about regulations 31 to 35

These regulations concern power presses; this open learning training guidance covers only the first 30 regulations of PUWER relating to all other work equipment.

Labelling the different parts of the regulations

For clarity and conforming with practice in legal documents, the following are always numbered, or given a letter reference, in sequence:

- regulations;
- paragraphs;
- schedules.

How regulations are labelled is covered by law. Regulation 2 states that the regulation, paragraph and schedule numbers and lettering in PUWER have legal force. If a particular part of a regulation is quoted or referred to in court, for instance, the reference should not be in dispute.

Regulation 3
Application of the regulations

Key points

Regulation 3 covers where the Regulations apply, and who is affected – the categories of people at work covered. Although these Regulations apply to Great Britain, you will need to be aware of the kinds of activities on the Continental Shelf that are also included, for example offshore oil and gas installations. The regulation focuses on:

- the geographical limits of PUWER;
- the types of people to whom PUWER applies.

Regulation 3 states:

(1) These Regulations shall apply –

(a) in Great Britain; and
(b) outside Great Britain as sections 1 to 59 and 80 to 82 of the 1974 Act apply by virtue of the Health and Safety at Work etc Act 1974 (Application outside Great Britain) Order 1995 ("the 1995 Order").

(2) The requirements imposed by these Regulations on an employer in respect of work equipment shall apply to such equipment provided for use or used by an employee of his at work.

(3) The requirements imposed by these Regulations on an employer shall also apply –

(a) to a self-employed person, in respect of work equipment he uses at work;
(b) subject to paragraph (5), to a person who has control to any extent of –
(i) work equipment;
(ii) a person at work who uses or supervises or manages the use of work equipment; or
(iii) the way in which work equipment is used at work,

and to the extent of his control.

(4) Any reference in paragraph (3)(b) to a person having control is a reference to a person having control in connection with the carrying on by him of a trade, business or other undertaking (whether for profit or not).

(5) The requirements imposed by these Regulations shall not apply to a person in respect of work equipment supplied by him by way of sale, agreement for sale or hire-purchase agreement.

(6) Subject to paragraph (7) to (10), these Regulations shall not impose any obligation in relation to a ship's work equipment (whether that equipment is used on or off the ship).

(7) Where merchant shipping requirements are applicable to a ship's work equipment, paragraph (6) shall relieve the shore employer of his obligations under these Regulations in respect of that equipment only where he has taken all reasonable steps to satisfy himself that the merchant shipping requirements are being complied with in respect of that equipment.

(8) In a case where the merchant shipping requirements are not applicable to the ship's work equipment by reason only that for the time being there is no master, crew or watchman on the ship, those requirements shall nevertheless be treated for the purpose of paragraph (7) as if they were applicable.

(9) Where the ship's work equipment is used in a specified operation paragraph (6) shall not apply to regulations 7 to 9, 11 to 13, 20 to 22 and 30 (each as applied by regulation 3).

(10) Paragraph (6) does not apply to a ship's work equipment provided for use or used in an activity (whether carried on in or outside Great Britain) specified in the 1995 Order save that it does apply to –

(a) the loading, unloading, fuelling or provisioning of the ship; or
(b) the construction, reconstruction, finishing, refitting, repair, maintenance, cleaning or breaking up of the ship.

(11) In this regulation –

"master" has the meaning assigned to it by section 313(1) of the Merchant Shipping Act 1995;

"merchant shipping requirements" means the requirements of regulations 3 and 4 of the Merchant Shipping (Guarding of Machinery and Safety of Electrical Equipment) Regulations 1988 and regulations 5 to 10 of the Merchant Shipping (Hatches and Lifting Plant) Regulations 1988;

"ship" has the meaning assigned to it by section 313(1) of the Merchant Shipping Act 1995 save that it does not include an offshore installation;

"shore employer" means an employer of persons (other than the master and crew of any ship) who are engaged in a specified operation;

"specified operation" means an operation in which the ship's work equipment is used –

(a) by persons other than the master and crew; or
(b) where persons other than the master and crew are liable to be exposed to a risk to their health and safety from its use.

This regulation covers three topics:

- where PUWER applies;
- employers' responsibilities – including those who control work;
- those who are excluded from the Regulations.

Where PUWER applies

Regulation 3 defines the geographical and human limits of PUWER. It explains that the Regulations apply to work activities throughout the whole of Great Britain. They also apply to offshore installations such as oil rigs and gas supply platforms which are covered as a result of the Health and Safety at Work etc Act 1974 (Application outside Great Britain) Order 2001 by sections of the Health and Safety at Work etc Act 1974.

Employers' responsibilities

The groups covered by PUWER are:

- employers;
- self-employed people and the equipment they control or use;
- those who are employed to supervise or manage the use of equipment operated by others.

It is not only large businesses that are subject to the Regulations: everyone who uses or controls work equipment, including self-employed people (sole traders) operating for profit or not, has to follow them.

The regulation refers to 'extent' of control of equipment. This means that, in relation to the equipment in question, a person is bound by the Regulations to the extent of their:

- knowledge;
- training; and
- experience.

In the case of complex equipment, it may be necessary to nominate several people and give each responsibility for a specific aspect of the equipment, such as electrics or electronic controls.

Case study: Clothing manufacturer

A machine room supervisor for a small firm making rainwear for a large chain store was responsible for making sure that all the machinists produced their daily quota of garments to the high standards which were the company's hallmark.

A faulty connection in one of the sewing machine motors caused the motor to overheat, and an operator burnt her arm when she brushed against it during her work. She raised the injury with her representative, who claimed that the supervisor was at fault for asking machine operators to work on machines that were not safe. The machine in question had recently been serviced but not checked. After the accident, the company agreed to implement a work permit scheme so that equipment was approved as checked by appropriate individuals – in this case an electrician – before going into production.

Those excluded from the Regulations

The Regulations do NOT apply to those who have supplied or sold equipment. It's up to the purchaser of equipment to make sure that it is specified, installed and used so that it does not present a risk to those at work.

Case study: Garden centre

A garden products company claimed that a recently installed machine for filling sacks of mulch did not adequately filter out dust. The dusty atmosphere in the company's bagging area was responsible for chest problems among employees, and absenteeism was increasing. Following a site investigation, the supplier of the equipment established that the company had changed their source of mulch and was operating the equipment outside its specification. The equipment's filtration system had become inadequate for the particular mulch used.

Key terms	
Employer	Someone who employs people under a contract of employment. In PUWER this also includes self-employed people.
Self-employed person	Someone who works for him or herself or who is contracted by others to carry out work.
Control of equipment at work	People must be adequately trained and competent to use – or control – work equipment. They can only be in control to the extent of their training and competence.

Self-assessment questions

1 What does PUWER 1998 stand for?
2 When do the Regulations come into force?
3 What categories of equipment do the Regulations cover?
4 What is the key aspect of PUWER 1998 suggested by its second letter?
5 What purpose is served by having particular terms and expressions defined within regulation 2?
6 List three of the definitions given under regulation 2.
7 Who is defined as an 'employer' under regulation 3?
8 What are the geographical limits of PUWER?
9 What groups of people do the Regulations apply to?

Answers on page 91.

Regulation 4
Suitability of work equipment

Key points

Regulation 4 states the need to assess risks to health and safety, and the suitability of the equipment for the use to which it is being put. It introduces a particular meaning of the term 'suitable'.

The regulation focuses on:

- the construction **or** adaptation of work equipment to make it suitable;
- when selecting work equipment, bearing in mind the risks which exist in its intended surroundings and any additional risk posed by using the equipment;
- using equipment for operations for which it is suitable, in suitable conditions;
- the specific meaning of the term 'suitable'.

Regulation 4 states:

(1) Every employer shall ensure that work equipment is so constructed or adapted as to be suitable for the purpose for which it is used or provided.

(2) In selecting work equipment, every employer shall have regard to the working conditions and to the risks to the health and safety of persons which exist in the premises or undertaking in which that work equipment is to be used and any additional risk posed by the use of that work equipment.

(3) Every employer shall ensure that work equipment is used only for operations for which, and under conditions for which, it is suitable.

(4) In this regulation "suitable"-

(a) subject to sub-paragraph (b), means suitable in any respect which it is reasonably foreseeable will affect the health or safety of any person;
(b) in relation to –

(i) an offensive weapon within the meaning of section 1(4) of the Prevention of Crime Act 1953 provided for use as self-defence or as deterrent equipment; and
*(ii) work equipment provided for use for arrest or restraint, by a person who holds the office of constable or an appointment as police cadet, means suitable in any respect which it is reasonably foreseeable will affect the health or safety of such person.**

The regulation addresses four separate topics:

- the work equipment and its fitness for the conditions in which it is used;
- the choice of work equipment and the need to take into account employees' health and safety and any increased risk they might face while using that equipment;
- the need for equipment to be suitable for use under the conditions in which it is used;
- definition of 'suitable'.

* Regulation 4, paragraph (4) amended by regulation 5 of the Police (Health and Safety) Regulations 1999.

Making the equipment right for the conditions of use

All work equipment has to have been made or adapted so that, in the conditions in which it is to be used, it doesn't pose an unacceptable risk to people's health and safety. This means that employers have to ask themselves questions before using any new piece of equipment, such as:

- Will it work and be safe as it is?
- Will it have to be adapted in some way to ensure safety?

Case study: Public leisure amenity

A local authority decided to make available to town residents a small piece of rough grassland to increase the facilities of the excellent park next to it. The park manager advised the council to make sure that any new mowers ordered were fitted with out-rigger wheels to stabilise the equipment for use in mowing the steeply inclined grass banks on the new area of the park. In her experience, older mowers had a tendency to roll and tilt on any grass that was not almost completely level. She believed that if her operators used their existing machines, there was a high risk of toppling over and injury to operators. Members of the public in the vicinity would also be at risk.

In the circumstance, the manager implemented a safe system of work for using mowing and cutting equipment. The park was divided into zones according to risk. Equipment was designated as suitable or unsuitable for each zone. Job cards were introduced on which appropriate equipment was specified for each job, and the equipment had to be approved by a supervisor before use. Some zones also required warning notices and barriers to protect members of the public while mowing equipment was being used.

Risk to employees

Regulation 4 states that employees must not be put at any additional risk as a result of using the work equipment. Employers must assess the risks in the conditions that exist in their business and ensure that their choice of work equipment does not pose any added risk to their employees. The PUWER ACOP gives advice on the need to carry out a risk assessment and on the special needs of young workers in line with regulation 19 of the Management of Health and Safety at Work Regulations 1999.

Risk assessment

For each job using work equipment, you need to build in health and safety by carrying out a risk assessment. This involves:

- identifying hazards – anything that can cause harm;
- assessing risks – the chance of harm actually being done (this helps you to work out what action to take to eliminate and reduce those risks);
- eliminating and reducing the risks – ask yourself whether it's possible to eliminate any of the risks, perhaps by working out different ways of doing things; if it's not possible to eliminate all the risks, list ways to reduce them and identify the precautions to take.

For more about risk assessment, get hold of the free HSE leaflet *Five steps to risk assessment*[2] (see Further information, page 104). It has useful information on assessments, including a way of recording significant findings.

The ACOP states:

106 You should ensure that work equipment is installed, located and used in such a way as to reduce the risks to users of work equipment and for other workers, such as ensuring that there is sufficient space between the moving parts of work equipment and fixed or moving parts in its environment.

107 When determining the suitability of work equipment, you should ensure that where appropriate:

(a) all forms of energy used or produced; and
(b) all substances used or produced

can be supplied and/or removed in a safe manner.

Suitability for specific conditions

Regulation 4 says that work equipment must be used only for tasks that it is fit for and in conditions for which it is suitable. So the equipment should only be used to carry out those tasks for which it was intended and in the conditions for which it was intended.

Suitability

'Suitable' means that the employer has to foresee any likely problems that might arise which could affect the health and safety of operators while they are using the equipment. The regulation highlights the particular problem of petrol- or diesel-powered mobile work equipment.

The ACOP states:

108 You should ensure that where mobile work equipment with a combustion engine is in use there is sufficient air of good quality.

Extensive guidance covering a wide range of relevant topics is available in the ACOP and guidance. It includes:

- the ergonomic considerations of the equipment;
- when and where problems are likely to occur;
- appropriate control measures;
- ventilation requirements;
- the health and safety risks likely to be caused by exhaust fumes.

Case study: Dry cleaner

The owner of a dry-cleaning shop saw an opportunity to expand the business by buying an extra machine to handle very fine and delicate fabrics. The premises were already quite cramped, so she had to give careful thought to changing the layout of the shop to find a space for the new machine. She also realised that the additional chemicals needed to carry out this new operation would have to be stored in a place with adequate ventilation. Otherwise, there was the risk that her employees could be affected by fumes in the event of chemical leakage.

Given the space problems, the only place for the machine was a small cupboard without a window, right at the back of the shop. Before taking delivery of the new machine and chemicals, she arranged for the shop's ventilation system to be extended to include this cupboard.

Key terms	
Suitable	Work equipment should only be used under conditions that will not affect the health or safety of those using it, and should be for the purpose.
Risk	Exposure to the chance of injury.
Additional risk	An increase in the chance of injury caused by specific conditions.

Activity

The essence of regulation 4 is the need to consider the risks posed to people's health and safety in using equipment. Risk assessment is an established process in managing health and safety and you should familiarise yourself with it. Consider a particular item of equipment as it is currently used and list everything which poses a risk to health or safety.

Feedback on page 91.

Self-assessment questions

1 Outline the four main points covered in regulation 4.
2 What does regulation 4 say about risk?
3 What does the ACOP say about using mobile work equipment with a combustion engine?
4 What does 'suitable' mean in the context of regulation 4?

Answers on page 91.

Regulation 5 Maintenance

Key points

Regulation 5 sets out general requirements for ensuring that work equipment is kept in a suitable condition. It focuses on three terms:

- 'an efficient state';
- 'in efficient working order';
- 'in good repair'.

To fulfil the regulation's requirements, employers have to show that they comply with all three. Regulation 5 also covers maintenance logs.

The regulation focuses on:

- maintaining work equipment in a suitable condition;
- ensuring that work logs for machinery are kept up to date.

Regulation 5 states:

(1) Every employer shall ensure that work equipment is maintained in an efficient state, in efficient working order and in good repair.

(2) Every employer shall ensure that where any machinery has a maintenance log, the log is kept up to date.

The two parts of regulation 5 outline the general requirements for keeping work equipment and machinery in a condition which does not pose a risk to employees' safety. It highlights the employer's duty to ensure that maintenance logs are kept up to date.

Ensuring that work equipment is kept in a suitable condition

Although the three terms 'an efficient state', 'in efficient working order' and 'in good repair' might appear similar, they actually set three requirements. The regulation requires people to take a broad look at the equipment to see that they have an approach in place for maintenance which is comprehensive and minimises risk. It's not enough to put things right when they fail or break down; a number of things need to be done to minimise the possibility of such incidents occurring in the first place.

The correct approach to maintenance involves looking at all aspects of the equipment, not just those that might be thought of as the critical parts. The ACOP to regulation 5 suggests how this can be achieved through:

- routine maintenance;
- planned preventive maintenance.

It also suggests the kinds of measures that can be taken to reduce the risk of equipment failure and any risks to employees' safety that could result.

To help understand the distinction between the three terms, consider the example of a car.

(Note that, though a car can be work equipment and falls inside the scope of PUWER 1998, more specific road traffic legislation takes precedence when cars are used on public roads.)

The 'efficient state' of a car refers to its general safe condition, for example:

- having bodywork which is not corroded;
- no oil or water leaks;
- correct tyre pressures;
- whether essential tools are available, such as a wheel jack.

Checking whether a car is in 'efficient working order' means checking to ensure that everything designed for safety works as it is meant to. This includes:

- lights;
- horn;
- windscreen wipers;
- brakes;
- the car's stopping distance;
- steering.

To be 'in good repair' a car needs:

- regular servicing;
- repairs carried out at the right time and to an acceptable standard.

Like a car, work equipment needs to be regularly checked and maintained to do its job properly. When checks are carried out, priority must be given to:

- safety;
- operating efficiency and performance;
- the equipment's general condition.

Case study: A timber yard

During the course of an investigation into a machinery guarding accident, the investigators were concerned at the general level of wood dust in the main machine shop. Although not directly a contributory factor in the accident, the investigators considered that it arose from unsatisfactory attention to the condition of equipment in the timber yard. The investigation was therefore extended to this equipment.

The dust extraction system, designed to remove dust and small wood particles from all machines in the yard, was found to be under-maintained to a degree that it posed several health and safety problems to the yard's employees. Because of numerous leaks in the systems of ductwork, joints and in areas where control dampers had been removed, the system was not capable of pulling sufficient draught to withdraw wood dust and particles from machinery at its designated extraction points. Also, ducting valves designed to open and close automatically as individual machines started and stopped were found to be jammed and inoperable.

Finally, the investigators found that the maintenance of the system's main extraction fans had been neglected to the extent that they presented a potential hazard. Two fans had been provided, one of which was intended as a stand-by so that, in the event of maintenance work or repair on one fan, the other would operate to extract from the yard.

The maintenance practice, however, had been to use one fan as a source of spare parts for the other. All usable parts had been taken and recent, improvised repairs were obvious. It was evident that the fan bearings were not being lubricated and overheating was occurring.

The standard of maintenance of the dust extraction system was considered to be in breach of the Regulations. The timber yard was prosecuted for breaching regulations on guarding and maintenance of equipment to protect the health and safety of the employees.

Keeping maintenance logs for machinery up to date

While the regulation does not demand that every employer keeps maintenance logs, it does stipulate that any maintenance log that has been set up for machinery must be up to date. The maintenance log needs to give information that will help with future planning and form a record of what action has been carried out in the past. You may find it useful to look at a related topic. Regulation 22 (page 71) deals with carrying out maintenance work involving risk to people's health and safety.

Key terms	
Efficient state	The general safe condition of the equipment.
Efficient working order	Whether everything which might have a bearing on safety works as it should.
Good repair	Appropriate repairs and maintenance have been done when they should and to the correct standard.

Activity

List the benefits of maintenance logs. If you don't already have one, consider setting one up.

Feedback on page 92.

Self-assessment questions

1 Outline the difference between the three expressions:

- in an efficient state;
- in efficient working order;
- in good repair.

2 What is the purpose of taking a broad approach to maintenance?
3 Why does the regulation require that a maintenance log is kept up to date only for machinery rather than for all work equipment?

Answers on page 92.

Regulation 6 Inspection

Key points

This new regulation covers the extent and nature of inspection. It formalises the practice of systematic in-house checks on work equipment that already exists in many organisations.

The regulation focuses on:

- the different situations where inspection of work equipment is required;
- the purpose of the inspection in each case;
- who carries out the inspections;
- keeping records of inspection;
- work equipment not covered by regulation 6.

Regulation 6 (6) deals with PUWER regulations 31 to 35 which cover power presses. These regulations are not included here and are the subject of a separate Approved Code of Practice with guidance.[1]

Regulation 6 states:

(1) Every employer shall ensure that, where the safety of work equipment depends on the installation conditions, it is inspected –

(a) after installation and before being put into service for the first time; or
(b) after assembly at a new site or in a new location,

to ensure that it has been installed correctly and is safe to operate.

(2) Every employer shall ensure that work equipment exposed to conditions causing deterioration which is liable to result in dangerous situations is inspected –

(a) at suitable intervals; and
(b) each time that exceptional circumstances which are liable to jeopardise the safety of work equipment have occurred,

to ensure that health and safety conditions are maintained and that any deterioration can be detected and remedied in good time.

(3) Every employer shall ensure that the result of an inspection made under this regulation is recorded and kept until the next inspection under this regulation is recorded.

(4) Every employer shall ensure that no work equipment –

(a) leaves his undertaking; or
(b) if obtained from the undertaking of another person, is used in his undertaking unless it is accompanied by physical evidence that the last inspection required to be carried out under this regulation has been carried out.

(5) This regulation does not apply to –

(a) a power press to which regulations 32 to 35 apply;
(b) a guard or protection device for the tools of such power press;
(c) work equipment for lifting loads including persons;

(d) winding apparatus to which the Mines (Shafts and Winding) Regulations 1993 apply;
*(e) work equipment required to be inspected by regulations 31(4) or 32(2) of the Construction (Design and Management) Regulations 2007;**
(f) work equipment to which regulation 12 of the Work at Height Regulations 2005 applies.†

Under this regulation, when work equipment is first installed, AND when moved OR relocated, it must be inspected to ensure that it has been correctly installed and operates safely. Also, where it is possible that conditions could cause deterioration, the work equipment must be regularly inspected to ensure that safety is maintained. This means that:

- any damage must be picked up and put right in good time;
- if safety is evidently at risk at any time, another inspection must take place.

All inspections must be carried out by a competent person. Records of inspections must be made and kept for a set period.

When work equipment is used outside its owner's undertaking, then proof of inspection must accompany the equipment.

Certain types of work equipment are **not** covered by regulation 6 (see page 28).

An inspection **is** required by a competent person:

- when work equipment is first installed AND if it is relocated;
- when work equipment is installed for the first time to ensure that it has been installed correctly, the links or connections with other equipment, systems and services are securely in place and that it is safe to operate;
- if work equipment is moved or relocated. Once it is in its new situation, it must be inspected to ensure safe installation and operation; it must be treated as though it were being installed for the first time.

You'll find extensive guidance supporting this part of the regulation in the ACOP. It covers, for example:

- the role of the 'competent person';
- what levels of competence are required;
- the types of equipment to be inspected.

The ACOP states:

136 Where the risk assessment under regulation 3 of the Management of Health and Safety at Work Regulations 1992* has identified a significant risk to the operator or other workers from the installation or use of the work equipment, a suitable inspection should be carried out.

141 The extent of the inspection required will depend on the potential risks from the work equipment. Inspection should include, where appropriate, visual checks, functional checks and testing.

148 You should ensure that the persons who determine the nature of the inspections required and who carry out inspections are competent to do so.

149 The competent person should have the necessary knowledge and experience.

* Regulation 6, paragraph (5)(e) amended by Schedule 5 of the Construction (Design and Management) Regulations 2007.

† Regulation 6, paragraph (5) amended by regulation 17 of the Work at Height Regulations 2005.

* The Management of Health and Safety at Work Regulations 1992 (SI 1992/2051) have been superseded by the Management of Health and Safety at Work Regulations 1999 (SI 1999/3242).

Case study: Bakery

A bakery operator was badly scalded when a measuring vessel discharged hot vegetable oil into the wrong mixer equipment. The investigation that followed the accident revealed that uncoordinated testing and inspection meant that a dangerous situation remained unchecked.

The equipment involved in the accident included a new mixing/blending machine which was coupled into an existing, but relocated, measuring vessel. This vessel discharged hot oil to a number of mixing units via a system of automatic valves.

The enquiry into the accident examined the testing and inspection records produced by the contractor responsible for installing the new mixer. It also examined the inspection records of the relocated measuring vessel that was the responsibility of the bakery's maintenance section and inspected by the maintenance supervisor.

The records showed that each piece of equipment had been inspected separately and recorded as being suitable for normal operation. However, the interaction between the existing vessel's automatic discharge valve system and the new mixer had not been tested. It also established that the maintenance supervisor did not have the technical knowledge or training needed to act as a 'competent person' inspector of automated equipment systems.

Where conditions can cause deterioration

Where work equipment is used in conditions that are likely to cause deterioration and affect its safe operation, it must be inspected more regularly. Inspections must be done ahead of safety problems, to prevent them happening. The interval between inspections is vital in ensuring that they achieve what is intended. This means that intervals need to be carefully set according to:

- the severity of the conditions;
- the type of equipment;
- the risks involved.

In exceptional circumstances, on any occasion when it is evident that safety is at risk, inspection must take place. Although it aims primarily to ensure that the equipment is safe to use, the inspection should also provide information on how the dangerous situation has come about and help to prevent it happening again.

The ACOP helps with what 'suitable intervals' means and what 'exceptional circumstances' are. It also gives examples of equipment inspected.

The ACOP states:

155 Where work equipment is of a type where the safe operation is critically dependent on its conditions in use and deterioration would lead to a significant risk to the operator or other worker, you should arrange for suitable inspection to be carried out.

158 The frequency of inspections should be based on how quickly the work equipment or parts of it are likely to deteriorate and therefore give rise to a significant risk. This should take into account the type of equipment, how it is used and the conditions to which it is exposed.

Case study: Fairground

A potentially dangerous situation was averted when, during its pre-season painting, cracks were found in the steel structure of a seafront fairground's big dipper. The equipment was closed down and an inspection demanded by the local council was carried out on the structure to determine the extent of the cracking. Examination of the fairground's records showed that, although other items of equipment were inspected regularly, the support structure on the big dipper was not. A survey was carried out by specialists to locate and determine the severity of the damage to the structure. The damaged areas identified were replaced. A formal, annual inspection programme was set up for the structure. The inspections would be carried out by a firm of specialist surveyors who would provide a competent person inspection service to the fairground owners.

Records of inspection

Under this regulation, the inspection carried out must be recorded and the records are to be kept until the next inspection under this regulation is recorded. Guidance on recording includes:

- what should be recorded;
- how and where it should be recorded;
- the level of recording necessary.

Work equipment used outside the owner's undertaking

Under this regulation, if work equipment is used outside (ie away from) the employer's business, proof that the equipment has been inspected and is currently safe for use must go with the equipment. The ACOP explains that if the employer's business has a number of sites then the records do not have to go with the equipment to each site. It is sufficient that they are held at one site. For example, this could apply to:

- test equipment used by technicians to carry out surveys of the routes and condition of drains;
- medical equipment used in health screening programmes;
- chainsaws outside the hiring company.

The ACOP explains what's required to make it clear to users that the equipment has been inspected. It states:

165 For large items of equipment for which inspection is necessary, the physical evidence can be in the form of a copy of a record of the last inspection carried out. For smaller items of equipment, a tagging, colour coding or labelling system can be used. The purpose of the physical evidence is to enable a user to check if an inspection has been carried out and whether or not it is current, where required, and also to determine the

results of that inspection, by being able to link back the physical evidence to the records.

Equipment not covered by regulation 6

The regulation does not apply to:

- work equipment for lifting loads, including people;
- winding apparatus for mines;
- equipment inspected under regulations 31(4) or 32(2) of the Construction (Design and Management) Regulations 2007.

Equipment in these categories is subject to inspection under more specific regulations.

Power presses and parts of power presses are also excluded. They are dealt with in a separate Approved Code of Practice.[1]

Key terms
Six key terms are used in this regulation: ■ ***competent person;*** ■ ***conditions causing deterioration;*** ■ ***dangerous situations;*** ■ ***suitable intervals;*** ■ ***exceptional circumstances;*** ■ ***physical evidence.***

The guidance is very specific on their meaning and you will find it useful to look them up.

Activity

The regulation requires you to set an inspection interval for equipment in your organisation. Choose an item of equipment and explain how you will arrive at a suitable interval. You may need to take advice from a competent person.

Feedback on page 93.

Self-assessment questions

1 In what four situations does the regulation require inspection to be carried out on work equipment?
2 What is the purpose of inspection in each case?
3 Who is required to carry out an inspection?
4 Following an inspection, how long do inspection records have to be kept?
5 What does the regulation say about inspections for equipment used outside its owner's undertaking?

Answers on page 93.

Regulation 7 Specific risks

Where other regulations are about making work equipment safe, regulation 7 deals with restricting the use of equipment to those who are trained in the use of the equipment and in the specific risks involved.

The regulation focuses on:

- restricting the use of equipment to appropriate people;
- designating particular people to use and maintain it;
- training and instructing them in the safe use of the equipment.

Regulation 7 states:

(1) Where the use of work equipment is likely to involve a specific risk to health or safety, every employer shall ensure that –

(a) the use of that work equipment is restricted to those persons given the task of using it; and
(b) repairs, modifications, maintenance or servicing of that work equipment is restricted to those persons who have been specifically designated to perform operations of that description (whether or not also authorised to perform other operations).

(2) The employer shall ensure that the persons designated for the purposes of sub-paragraph (b) of paragraph (1) have received adequate training related to any operations in respect of which they have been so designated.

Regulation 7 looks at where specific risks are associated with certain kinds of work equipment – in other words, where the usual measures that would be taken to protect people from risk in using equipment are either not sufficient or not appropriate in these circumstances. Employers need to identify which of their equipment falls into this category and take steps to limit its use to a selected group of people.

Restricting the use of the equipment to certain people

Having identified equipment that involves specific risk, the employer must stipulate who is permitted to use and maintain it.

Designating the people who can use and maintain it

This includes people who operate the equipment to carry out their job, and also anyone involved in:

- repairing;
- modifying;
- maintaining; or
- servicing the equipment.

Providing training to designated people

Anyone whose job requires them to use the equipment, OR carry out repairs or modifications to equipment, OR to perform maintenance work or servicing operations must be properly trained to do so.

The ACOP states:

167 You should ensure that, wherever possible, risks are always controlled by (in the order given):

(a) eliminating the risks, or if that is not possible;
(b) taking 'hardware' (physical) measures to control the risks such as the provision of guards; but if the risks cannot be adequately controlled;
(c) taking appropriate 'software' measures to deal with the residual (remaining) risk, such as following safe systems of work and the provision of information, instruction and training.

Normal operation

168 Where the risks from the use of work equipment cannot be adequately controlled by hardware measures, such as guards or protection devices, during its normal operation, it is particularly important that only the persons whose task it is should be allowed to use such equipment. They should have received sufficient information, instruction and training to enable them to carry out the work safely.

Repairs, modifications etc

169 Where the risk from the use of work equipment cannot be adequately controlled by hardware measures such as guards or protection devices during repair, maintenance, or other similar work, only persons who have received sufficient information, instruction and training to enable them to carry out the work safely should do the work. They shall be the designated person for the purpose of this regulation.

Guidance supporting the regulation gives examples of situations where a safe system of work may be needed and what that safe system of work, and any related training, should cover.

Key terms	
Specific risk	Where a high risk still exists when precautions and normal protective measures have been taken.
Safe system of work	A written procedure which sets down a safe method and plan of working which must be followed in circumstances where it applies.

Activity

For equipment that carries 'specific risks' in your situation, what would you require user training to cover? List the topics you would include.

Feedback on page 93.

Self-assessment questions

1 What does regulation 7 say about restricting the use of work equipment?
2 Who should carry out repairs, modifications, maintenance or servicing?
3 What is the employer called upon to do before allowing any employee to carry out any of the operations listed in question 2?

Answers on page 93.

Regulation 8
Information and instructions

Key points
Under the Health and Safety at Work etc Act 1974, employers have a duty to provide their employees with information and instructions to safeguard their health and safety. Regulation 8 builds on this and sets down requirements on the information to be provided and who should receive it.

The regulation focuses on:

- the groups of people who should receive information and instruction;
- the form the information and instructions should take;
- the suitability of the information for the people who are to receive it.

Regulation 8 states:

(1) Every employer shall ensure that all persons who use work equipment have available to them adequate health and safety information and, where appropriate, written instructions pertaining to the use of the work equipment.

(2) Every employer shall ensure that any of his employees who supervises or manages the use of work equipment has available to him adequate health and safety information and, where appropriate, written instructions pertaining to the use of the work equipment.

(3) Without prejudice to the generality of paragraphs (1) or (2), the information and instructions required by either of those paragraphs shall include information and, where appropriate, written instructions on –

(a) the conditions in which and the methods by which the work equipment may be used;
(b) foreseeable abnormal situations and the action to be taken if such a situation were to occur; and
(c) any conclusions to be drawn from experience in using the work equipment.

(4) Information and instructions required by this regulation shall be readily comprehensible to those concerned.

Employers have a duty to ensure that employees have all the information at their disposal to enable them to use work equipment safely. This means that employees must be able to:

- access the information or instructions easily;
- understand it.

People for whom the employer must provide health and safety information

There are two groups:

- those using the work equipment;
- those supervising or managing the work equipment.

The regulation complements the general requirements of the Health and Safety at Work etc Act 1974 and the Management Regulations 1999. Through these, employers must make available to employees all the relevant information relating to their health and safety as well as written instructions on using work equipment. People managing or supervising other employees also need to receive information.

The amount of detail they are given varies depending on the kind of work involved, but employees should know what information is available to them, and where they can find it.

Consultation with employees

The Safety Representatives and Safety Committees Regulations 1977 and the Health and Safety (Consultation with Employees) Regulations 1996 (HSCER), require employers to consult safety representatives of recognised trade unions, or employees themselves if the company is not associated with a trade union, about:

- the information they need concerning other Regulations, including PUWER;
- risks to their health and safety; **and**
- preventive measures, eg use of a competent person to help comply with health and safety, planning health and safety training **and** the health and safety consequences of any new equipment or technology.

Those using work equipment, as well as employees who manage or supervise the use of work equipment, must be provided with information.

Make sure that you are aware of the requirements of HSCER and the Safety Representatives and Safety Committees Regulations 1977, and of the link to regulation 8 of PUWER.

Providing the information appropriately

Employers need to decide the best way of communicating the information to their employees; it will depend on the individual situation. Several factors must be considered:

- their employees' levels of skill;
- their training;
- their experience;
- how much supervision they have;
- how long and complicated the job is.

Written instructions

Manufacturers and suppliers have a duty to provide suitable information to accompany their equipment. This may be in the form of:

- instruction sheets or manuals;
- instruction panels on the equipment itself;
- warning notices;
- training manuals.

Employers need to check that the necessary information has been supplied with the equipment and that it finds its way to the people directly using the equipment. It's no good if the instruction manuals are filed away in a safe but inaccessible place. When the instructions deal with maintenance operations, these should be handed over to the maintenance staff.

Coverage of written information or instructions

They need to include when and how the equipment should be used so that people are not put at risk. Employees must be given examples of foreseeable problems and ways of dealing with them. After equipment has been used for a while, information builds up and provides a useful body of knowledge for other employees. This should be recorded and passed on to all appropriate members of the workforce.

Language of written information or instructions

This depends on the employer's individual circumstances and those of the employees. Before producing any information or instruction material, employers should ask themselves a number of questions to take account of the needs of their workforce, for instance:

- Does the language level need to be controlled to make the material accessible to all?
- Would illustrations and standard symbols help people understand the message better?
- Do any employees have special language difficulties or disabilities that make it difficult for them to understand what's written?
- Do a significant number of the employees have a language other than English as their first language? If so, should the information be produced in both languages?

Case study

A new bottling plant had just started up after being commissioned by the contractor, and equipment was purchased from another member state in the European Union. An operator, whose training on the equipment consisted of closely observing the commissioning technicians, was trapped when the equipment closed on her arm. The guard should have stayed open until she had the chance to pull her arm free.

Another operator, who was standing next to her, pressed the emergency stop button that should have opened the guard, but in this case, it failed to work. He ran to the supervisor's office where he knew the operating instruction manuals were kept, to discover that the supervisor was away ill that day and his office was locked. The only way to get at the information was to break the door down. Once inside it was found that the relevant instruction manuals were only in a foreign language, and the translations which had been ordered had not yet arrived. Engineers had to immobilise the equipment and dismantle the guard in order to free the operator. She suffered serious arm injuries and shock.

Key terms	
All persons	Anyone likely to use equipment, including those who have permission, but not necessarily employees of the organisation (eg contractors).
Foreseeable abnormal situations	Examples are: emergency and alarm conditions; interrupted cycle or sequence; breakdown; power failure.

Activity

Look around your workplace. Describe the location of operating/safety instructions for two or three items of equipment.

Feedback on page 93.

Self-assessment questions

1 In what form do information and instructions have to be provided for employees?
2 What two groups of people are highlighted for separate treatment under regulation 8?
3 What four elements have to be taken into account when providing information or instructions?

Answers on page 94.

Regulation 9 Training

Key points

Training and instruction are fundamental requirements under the Health and Safety at Work etc Act 1974 and many other specific regulations. Employers have a duty to provide those they are responsible for with general training on health and safety and, where particular requirements make it necessary, more specific training. Regulation 9 sets out the training requirements to ensure the safe use of work equipment.

The regulation focuses on:

- providing training to those who use work equipment;
- providing training to employees who manage or supervise the use of work equipment;
- the need for separate driver training.

Regulation 9 states:

(1) Every employer shall ensure that all persons who use work equipment have received adequate training for purposes of health and safety, including training in the methods which may be adopted when using the work equipment, any risks which such use may entail and precautions to be taken.

(2) Every employer shall ensure that any of his employees who supervises or manages the use of work equipment has received adequate training for purposes of health and safety, including training in the methods which may be adopted when using the work equipment, any risks which such use may entail and precautions to be taken.

The regulation explains the training provision for two distinct groups:

- anyone using work equipment;
- anyone supervising or managing the use of work equipment.

Training for anyone using work equipment

This does not just mean employees. It also includes people who are on the premises with the employer's permission or by invitation, such as:

- contractors;
- suppliers;
- representatives;
- service engineers;
- technicians.

If they need to use the employer's equipment, the employer must consider their safety and take steps to ensure that they are given appropriate training.

The guidance supporting regulation 9 looks at the different categories of employees and singles out several groups for special attention:

- young people – because of their relative immaturity and unfamiliarity with the working environment, they are especially vulnerable; they need training and supervision appropriate to their needs; induction training to establish good working habits is highlighted as being especially important;

- new employees.

The regulation does not lay down exactly what 'adequate training' consists of. However, employers must evaluate the training needs necessary to ensure that various levels of competence for safety and statements of competence should be developed. These can help to highlight where training is necessary to achieve competence to the required levels.

Training for anyone supervising or managing the use of work equipment

As with the training outlined earlier, training for those whose job involves managing or supervising the use of work equipment has to be:

- adequate to ensure competence;
- appropriate to the needs of the organisation.

Driver training

This may relate to either part of the regulation, since operators of self-propelled work equipment may not necessarily be employed by the organisation in which they are working.

The ACOP states:

194 You should ensure that self-propelled work equipment, including any attachments or towed equipment, is only driven by workers who have received appropriate training in the safe driving of such work equipment.

Guidance for this regulation also covers:

- previous PV, HGV driving experience and the training available;
- training of, and certification for, chainsaw operators (ie dangers from the chainsaw itself, the risks arising from using it, the precautions to control the dangers and the legal requirements).

Case study: Manufacturing in a rubber plant

To stop the operator of a two-roll mill (used for mixing tacky rubber) from gaining access to the nip between the two rolls, a safety trip bar had been fitted. Unfortunately, the standard of interlocking on the trip bar did not meet the agreed industry standards and an operator managed to override it so he could finish his work more quickly. While he was working on the rubber, his hand became trapped and he was pulled up and over the safety bar which, because he had defeated it, failed to work.

He was about to be pulled into the trapping hazard between the two rolls but managed to call out and attract the attention of a colleague who immediately pressed the emergency stop button.

The inquiry into the accident discovered that the employer had not given the employee adequate training in the safe use of the machine and the purpose of safety interlocks. Nor had any of the supervisors been given adequate training for ensuring the safe use of the machine.

Key terms	
Adequate training	Training that is appropriate and sufficient to deliver competence in the safe use of equipment.
Statement of competence	A statement based on job requirements giving the capabilities to perform a work role to an acceptable level or standard of performance.

Activity

Consider your situation and the people you need to protect. List the things you must take into account to make sure that training is adequate.

Feedback on page 94.

Self-assessment questions

1 What two groups of people require training?
2 What three areas should the training cover?
3 What does the regulation say about training people who operate self-propelled work equipment?

Answers on page 94.

Regulation 10 Conformity with Community requirements

NEW

Key Points

Regulation 10 sets down the employer's duties to provide work equipment that meets particular health and safety requirements. It applies to the entire chain of supply for work equipment that is provided for use after 1 January 1993.

The regulation focuses on:

- the need to comply with European Community Directives made under Article 100A of the Treaty of Rome, which places duties on the manufacturer and supplier of new work equipment;
- the age of work equipment affected.

Regulation 10 states:

(1) Every employer shall ensure that an item of work equipment conforms at all times with any essential requirements, other than requirements which, at the time of its being first supplied or put into service in any place in which these Regulations

apply, did not apply to work equipment of its type.

*(2) In this regulation "essential requirements", in relation to an item of work equipment, means requirements relating to the design and construction of work equipment of its type in any of the instruments listed in Schedule 1 (being instruments which give effect to Community directives concerning the safety of products).**

(3) This regulation applies to items of work equipment provided for use in the premises or undertaking of the employer for the first time after 3 December 1992.

Regulation 10 is about conforming to Community rules. The rules are covered by a number of existing regulations and are now being included within PUWER. So regulation 10 is about the rules that make equipment safe as it is designed, manufactured and provided for use. The regulation specifies the need to comply with the existing regulation, and thereby the Community requirements, for equipment of a certain age.

Article 100A Directives

Under Article 100A Directives, national controls and health and safety requirements have been replaced by EC requirements to achieve the free movement of goods in the single market. Examples relating to health and safety include:

- the Machinery Directive;
- the Personal Protective Equipment Directive;
- the Pressure Equipment Directive;
- the Simple Pressure Vessel Directive.

Suppliers have to ensure that their products comply with the legal requirements of the Directives. To signify compliance, many manufacturers attach the 'CE Marking' to their products.

This relates to equipment that was provided for use after 1 January 1993 because PUWER 1998 carries forward the duty that existed in the PUWER 1992 Regulations. However, guidance supporting regulation 10 explains:

- what is required for equipment which was provided before compliance with the product Directives was required;
- what to do to comply with the requirements;
- equipment which is not covered by product safety legislation.

Regulation 10

Employers using work equipment need to make sure that any new equipment has been made to the requirements of the relevant product Directive. You should:

- check that the equipment bears a CE Marking;
- have a copy of the EC *Declaration of Conformity*.

You may find it useful to read HSE's leaflet *Buying new machinery*.[3]

* Regulation 10, paragraphs (1) and (2) amended by regulation 7 of the Health and Safety (Miscellaneous Amendments) Regulations 2002.

Case study: Machine tools

An engineering group acquired a small specialist component company as part of its plan to diversify its product range. The specialist company had various machines, some of which were quite old. One had caused a severe accident when it failed to stop when its stop control button was pressed. A machine operator suffered a serious hand injury and the union took legal action on his behalf.

The engineering group's management planned to rely on the fact that the equipment at fault had not been properly maintained and checked by the previous owner, whom they deemed responsible in this case. Their legal advisers asked for evidence of the equipment records and evidence of the checks carried out by the group during and after the take-over. Equipment records were not produced and checks had not been carried out on the condition of equipment.

The managers were advised that their defence would be unlikely to succeed since the machine in question was within the age covered by the new Regulations. They could not demonstrate that they had carried out the appropriate work to ensure its safety, nor had they taken steps to establish the condition of the machine when they took possession. So they could not show that they had taken reasonable precautions.

Self-assessment questions

1 What date is given for equipment to conform to Schedule 1 of the Community directive?
31 Dec 1990 1 Jan 1993 5 Dec 1998 31 Dec 1992
2 What particular aspect of equipment is covered by Schedule 1?

Answers on page 94.

Regulation 11
Dangerous parts of machinery

Key points

The serious risks associated with dangerous parts of machinery are established in health and safety law. Regulation 11 sets out the measures which employers must take in order to protect employees from the hazards associated with machinery. It explains a hierarchy of measures that applies. The regulation focuses on:

- the measures to be taken;
- the purpose of the measures;
- the range of measures and the sequence in which they apply;
- how guards and protection devices will satisfy the regulation;
- the meaning of 'danger zone' and 'stock-bar'.

Regulation 11 states:

(1) Every employer shall ensure that measures are taken in accordance with paragraph (2) which are effective –

(a) to prevent access to any dangerous part of machinery or to any rotating stock-bar; or
(b) to stop the movement of any dangerous part of machinery or rotating stock-bar before any part of a person enters a danger zone.

(2) The measures required by paragraph (1) shall consist of –

(a) the provision of fixed guards enclosing every dangerous part or rotating stock-bar where and to the extent that it is practicable to do so, but where or to the extent that it is not, then
(b) the provision of other guards or protection devices where and to the extent that it is practicable to do so, but where or to the extent that it is not, then
(c) the provision of jigs, holders, push-sticks or similar protection appliances used in conjunction with the machinery where and to the extent that it is practicable to do so,

*and the provision of such information, instruction, training and supervision as is necessary.**

(3) All guards and protection devices provided under sub-paragraphs (a) or (b) of paragraph (2) shall –

(a) be suitable for the purpose for which they are provided;
(b) be of good construction, sound material and adequate strength;
(c) be maintained in an efficient state, in efficient working order and in good repair;
(d) not give rise to any increased risk to health or safety;
(e) not be easily bypassed or disabled;
(f) be situated at sufficient distance from the danger zone;
(g) not unduly restrict the view of the operating cycle of the machinery, where such a view is necessary;
(h) be so constructed or adapted that they allow operations necessary to fit or replace parts and for maintenance work, restricting access so that it is allowed only to the area where the work is to be carried out and, if possible, without having to dismantle the guard or protection device.

(4) All protection appliances provided under sub-paragraph (c) of paragraph (2) shall comply with sub-paragraphs (a) to (d) and (g) of paragraph (3).

(5) In this regulation –

"danger zone" means any zone in or around machinery in which a person is exposed to a risk to health or safety from contact with a dangerous part of machinery or a rotating stock-bar;

"stock-bar" means any part of a stock-bar which projects beyond the head-stock of a lathe.

* Regulation 11, paragraph (2) amended by regulation 7 of the Health and Safety (Miscellaneous Amendments) Regulations 2002.

The measures available to employers for protecting the workforce relate to:

- the nature of the measures (physical and any other);
- the hierarchy of measures;
- features and effectiveness of guards and protection devices;

- definition of the terms.

Nature of the measures to take

Employers have to ensure that measures are in place to prevent employees from being at risk from dangerous parts of machinery. Two measures are essential for avoiding risk and, depending on the situation, employers must implement at least one. They are:

- prevent access to the dangerous part; OR
- stop the dangerous part from moving before a person can come close to it.

Exactly what constitutes a 'dangerous part' of any machinery can be decided by carrying out a risk assessment. Briefly, if the hazard could present a reasonably foreseeable risk to a person, the part of the machinery generating that hazard is a 'dangerous part'.

The risk usually exists because the part of the machine is moving. The risk to be overcome is contact between part of the body, or clothing, and the dangerous part of the machine.

Regulation 11 does not deal with added hazards associated with machinery, such as heat and ejected particles. Look at regulation 12 (page 32) for information on these.

Hierarchy of measures

This is about ensuring that risks are assessed methodically. The second part of the regulation (paragraph 2) uses a hierarchy with specific measures arranged in three levels. They must be applied in sequence according to each situation.

They are:

1 provide fixed guards;
2 provide other guards or protection devices;
3 provide protection appliances (jigs, holders, push sticks).

Having identified the hazard, employers have to consider each level of the hierarchy from 1 to 3 in turn. They have to provide measures at that first level if practicable. If not practicable, and **only** then, they can consider measures from the next level, and so on until all practicable measures are taken to reduce risk.

It's likely that a combination of all measures will be needed to overcome the risk and ensure compliance with the regulation.

Deciding which measures will be most effective depends on:

- the type of work being carried out;
- evaluation of the risks;
- the technical features of possible safeguarding.

Many machines present more than one hazard. Employers need to take this into account when assessing the risks.

Employers are also expected to provide any information, instruction, training and supervision as required.

Effectiveness of guards, protection devices and protection appliances

Guards and protection devices

Guards or protection devices should meet a number of standards that are largely common sense and are detailed in relevant national and international standards (look at paragraph 3 of the regulation where the eight separate requirements (a to h) relating to the design and condition of the guards or protection devices are spelled out). They must be:

- well constructed;
- made of sound materials;
- strong enough to do the job they are meant to do.

It is essential they are properly maintained. Accidents continue to happen where employers have neglected to look after guards as vital parts of equipment.

Appliances like jigs, holders or push-sticks also have to be adequate for the job they do. The same factors apply as for guards and protection devices: they should all allow the people using them to do their jobs without getting too close to the danger zone and they must not block the user's view of the machinery.

Guidance supporting the regulation covers risk assessment and how it relates to guarding dangerous machinery.

Defining the terms used in the regulation

The terms 'danger zone' and 'stock-bar' are defined in each case which applies. See Key terms below.

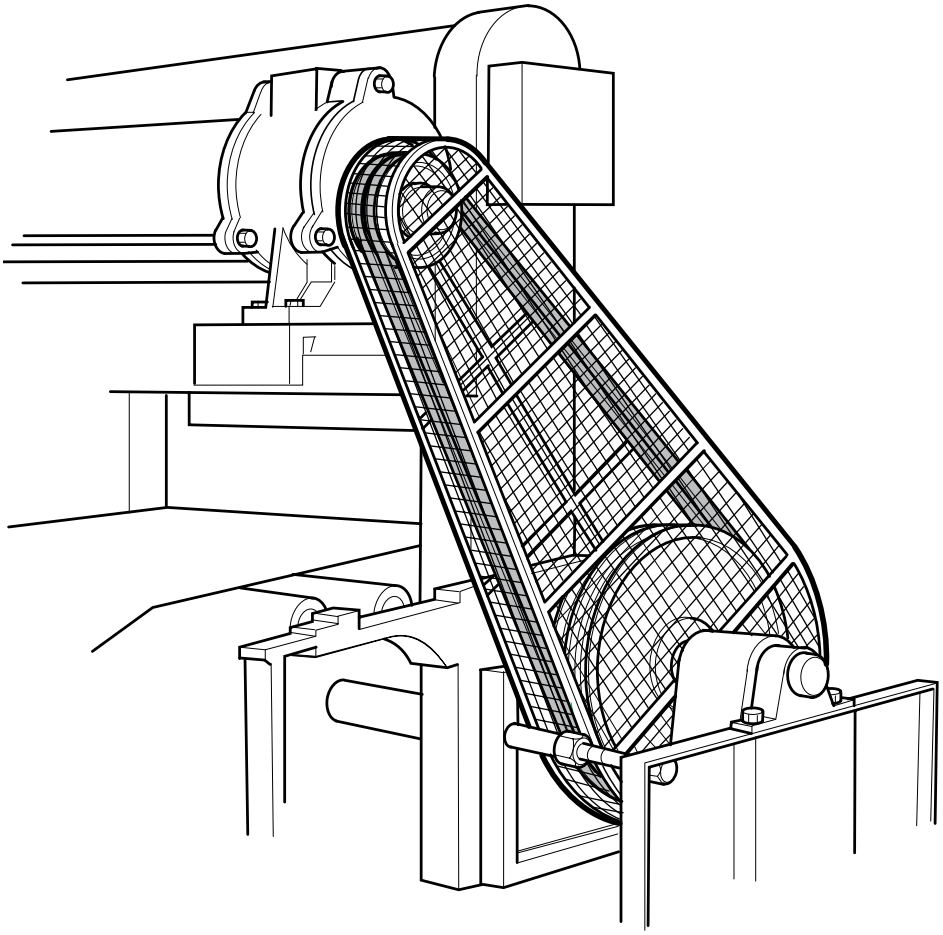
Case study: Textiles mill

As part of his job, a dyestuffs mill operator had to clean down the machinery between colour changes. The process involved reducing the filter cake product to a fine powder via nibbling and milling machinery. Between the nibbler and the mill was a rotary valve and a hopper on which there was an access hatch secured by two over-centre catches, but the hopper itself was not interlocked. While the operator was feeling down inside the hopper for any possible contaminating material, his hand came into contact with the vanes of the rotary valve. He lost all his fingers.

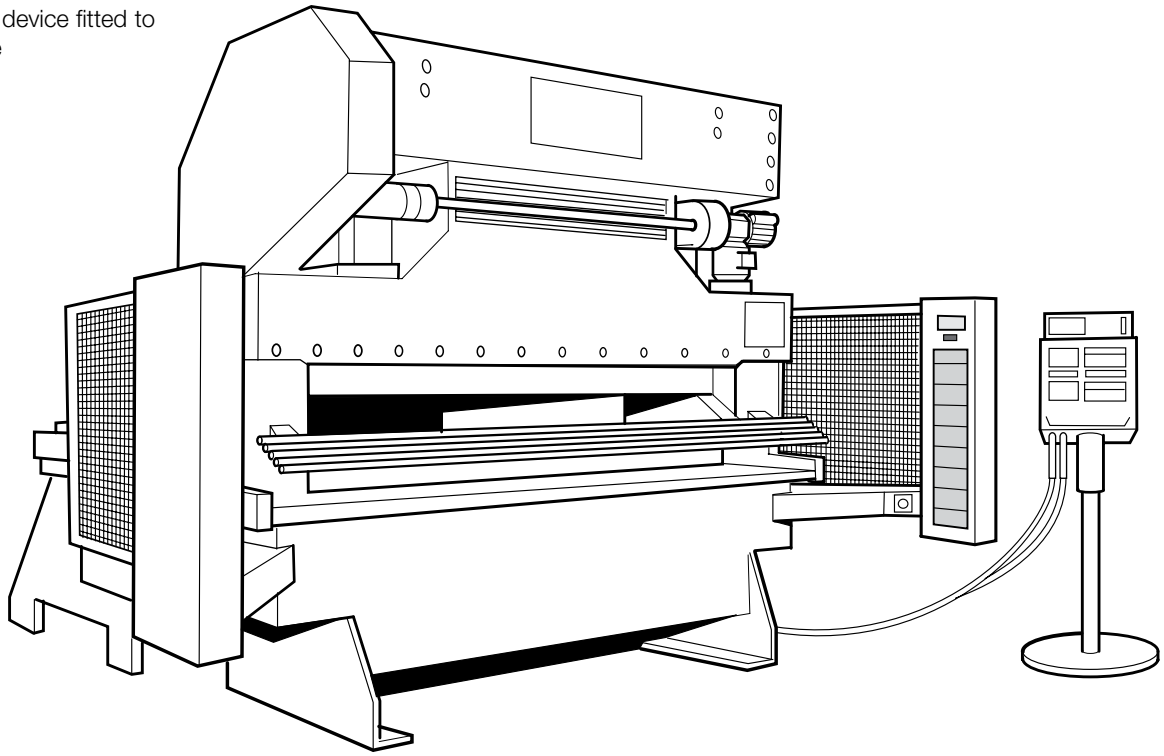
It was later discovered that the employer had been aware that there was no interlock and had ordered the necessary part. Unfortunately it had been out of stock at the manufacturers and although the employer assumed he had solved the problem, nothing had actually been done. The cleaning operation between products had not been analysed for risk and an effective and safe method or appliance for cleaning residual material from the rotary valve had not been considered.

Appliances for protecting users of machinery

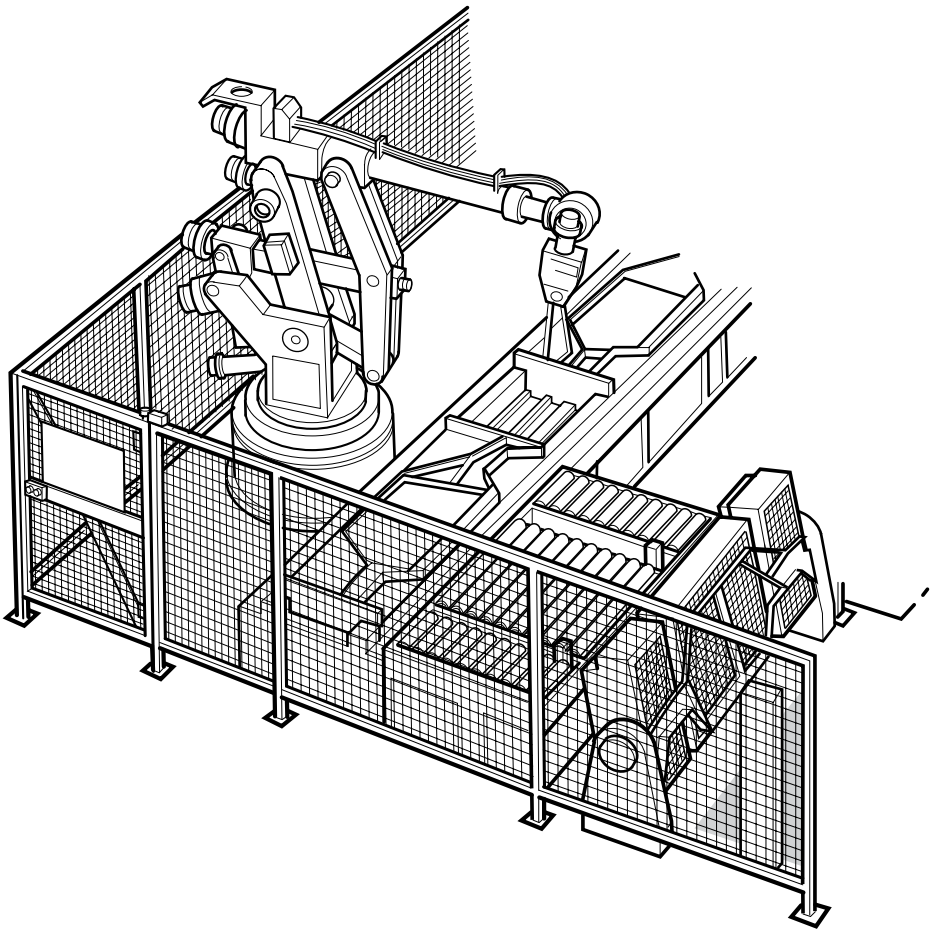
Fixed enclosing guard



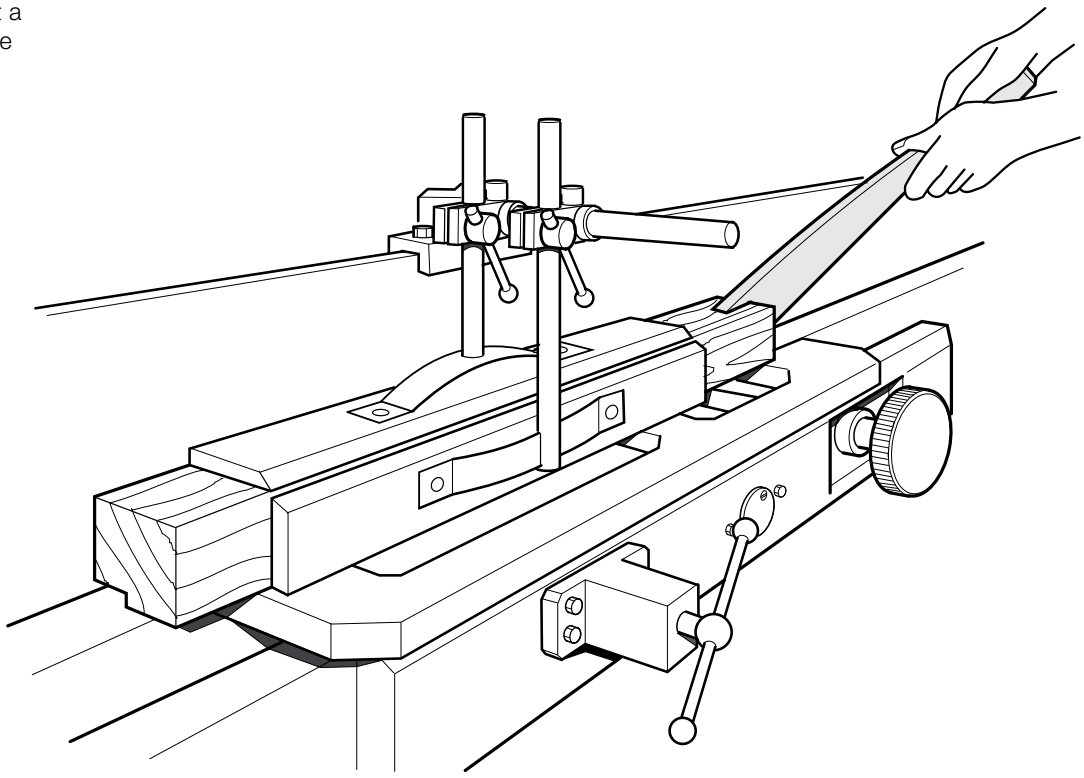
Photoelectric device fitted to a press brake



Perimeter fence guard with fixed panels and interlocking access door



A push stick in use at a woodworking machine



Key terms	
Guard	Physical barrier preventing people gaining access to a danger zone.
Protection device	Stops the movement of the dangerous part before contact is made.
Protection appliance	Used to hold or manipulate work material enabling operators to use machinery while staying clear of the danger zone.
Danger zone	Any zone in or around machinery in which a person is exposed to a risk to health or safety from contact with dangerous parts of machinery or a rotating stock-bar.
Stock-bar	Any part of a stock-bar which projects beyond the head-stock of a lathe.

Activity

For all machinery that comes under this regulation in your organisation, use the regulation as a checklist. State whether or not you satisfy its requirements and, where not, explain what needs to be done.

Feedback on page 95.

Self-assessment questions

1 What physical measures are employers required to take to protect employees from the risks posed by dangerous parts of machinery?
2 List the hierarchy of measures that applies to reduce the risk posed by dangerous parts of machinery.
3 What is meant by a ‘danger zone’ in the regulation?
4 In the properties that guards and protective devices must have to be effective, two apply to maintenance. Which are they?

Answers on page 95.

Regulation 12 Protection against specified hazards

Key points

Regulation 12 covers measures which employers are required to take in order to prevent, control or minimise the effects of specified hazards. The type and nature of the measures taken must be based on the assessed risks in each case. The regulation focuses on:

- explaining that employers must either prevent or control the risk from the specified hazards;
- outlining what the specified hazards are;
- defining the meaning of 'adequate' in terms of the degree of control of the risks involved;
- explaining where there are exceptions to the regulation because even more specific regulations take priority.

Regulation 12 states:

(1) Every employer shall take measures to ensure that the exposure of a person using work equipment to any risk to his health or safety from any hazard specified in paragraph (3) is either prevented, or, where that is not reasonably practicable, adequately controlled.

(2) The measures required by paragraph (1) shall –

(a) be measures other than the provision of personal protective equipment or of information, instruction, training and supervision, so far as is reasonably practicable; and
(b) include, where appropriate, measures to minimise the effects of the hazard as well as to reduce the likelihood of the hazard occurring.

(3) The hazards referred to in paragraph (1) are –

(a) any article or substance falling or being ejected from work equipment;
(b) rupture or disintegration of parts of work equipment;
(c) work equipment catching fire or overheating;
(d) the unintended or premature discharge of any article or of any gas, dust, liquid, vapour or other substance which, in each case, is produced, used or stored in the work equipment;
(e) the unintended or premature explosion of the work equipment or any article or substance produced, used or stored in it.

(4) For the purposes of this regulation "adequately" means adequately having regard only to the nature of the hazard and the nature and degree of exposure to the risk.

(5) This regulation shall not apply where any of the following Regulations apply in respect of any risk to a person's health or safety for which such Regulations require measures to be taken to prevent or control such risk, namely –

(a) *the Ionising Radiations Regulations 1985;**
(b) *the Control of Asbestos Regulations 2006;*†
(c) *the Control of Substances Hazardous to Health Regulations 1994;**
(d) *the Control of Noise at Work Regulations 2005;***
(e) *the Construction (Head Protection) Regulations 1989;*
(f) *the Control of Lead at Work Regulations 1998.**
(g) *the Control of Vibration at Work Regulations 2005.*††

Other regulations deal in general with preventing or controlling risk of injury from using equipment by means of protective clothing, information, training and supervision. Regulation 12 is concerned with specific hazards and measures which are over and above the general measures mentioned in other regulations.

The employer's responsibility

Ideally, preventive measures should be considered at the outset and built into the design of the equipment. But manufacturers can't control either how and where equipment is used, or what materials may be used by the equipment. It's up to employers to ensure that the equipment is suitable for use with the range and type of material which the equipment is likely to encounter.

Deciding on the measures to take

The precise measures which employers must take are not laid out in the regulation. That's left up to the employer and individual circumstances, although the measures must be 'adequate' according to the meaning of the term. Employers need to assess the risks in each case and consider:

- the likelihood of such hazards occurring;
- the consequent danger if they do occur.

They must then decide on the measures to take.

Measures to control the risk

There will always be circumstances where it is not possible to prevent risk. Where this is the case, employers must look to controlling or reducing the risk, for example by:

- monitoring solvent concentrations at evaporating ovens to detect the build-up of explosive atmospheres;
- using inert gas systems to control and suppress dust explosions.

But employers must also consider measures to lessen the effects if a dangerous incident should occur, for example fitting pressure relief panels and appropriate containment measures.

Hazards specified in the regulation

Any article or substance falling or being ejected from work equipment
Examples could be:

- a loose board falling from scaffolding;
- molten metal spilling from a ladle.

* These regulations have been replaced by the Ionising Radiations Regulations 1999, the Control of Substances Hazardous to Health Regulations 2002 (as amended) and the Control of Lead at Work Regulations 2002 respectively.

† Paragraph (5)(b) substituted by SI 2006/2739, regulation 36(2), Schedule 5.

** Paragraph (5)(d) substituted by SI 2005/1643, regulation 15.

†† Paragraph (5)(g) inserted by SI 2005/1093, regulation 13.

Rupture or disintegration of parts of work equipment
Material in the equipment could be thrown out unexpectedly:

- swarf ejected from a machine tool;
- parts of the equipment could break off and be thrown out;
- part of the equipment could come apart, for example the collapse of scaffolding.

Work equipment catching fire or overheating
This could be the result of:

- friction;
- an electric motor burning out;
- ignition by welding torch;
- a thermostat failing;
- a cooling system failure.

Unintended or premature discharge of an article or gas, dust, liquid, vapour or other substance
This may relate to a substance produced, used or stored in the work equipment and could include:

- fuel or oil leakage;
- the escape of steam.

Unintended or premature explosion of the work equipment or an article or substance produced, used or stored in it
For example:

- the failure of a pressure-relief device;
- an unexpected blockage or sealing off of pipework;
- an unplanned ignition of a flammable gas.

You need to be aware of the guidance supporting the regulation. As well as providing many useful examples of specified hazards, it highlights the special case of abrasive wheels and explains the relationship between regulation 12 and other legislation, for example the Control of Substances Hazardous to Health Regulations 2002 (COSHH).

Finally, you need to be aware of the Regulations listed in paragraph 5. These Regulations specify requirements to deal with the operation of the machinery and the control of the risks which the Regulations are designed to reduce, eg the emission of asbestos fibres.

Case study: Agriculture

Two employees in a poultry farm were seriously hurt by roof fragments that fell when a dust explosion shattered the roof of a farm building.

The explosion occurred in a storage hopper for poultry feed. The hopper had been designed with relief panels in its roof which were found, on investigation, to be incorrectly sized to provide safe relief. The original plan had been to site the hopper in the open, next to some poultry sheds, but there had been local environmental objections to the plan. It was amended to enclose the hopper in a light-clad building structure.

At the time of the explosion, a scaffold had been erected by an electrical contractor to repair and replace the lighting inside the hopper enclosure. The scaffold platform had been positioned over the hopper roof, leaving a gap of only a few inches between it and the relief panels. The explosion raised the scaffold platform boards through the roof of the enclosure, scattering large fragments of cladding over a wide area of the farm.

The accident investigation concluded that the scheme in which the original hopper was enclosed inside the building structure was potentially unsafe and breached safety regulations. It recommended that the hopper design should be revised and changed to position relief panels on the hopper sides and that ducts should be provided to contain and direct explosive materials safely outside the building.

Key terms	
Specified hazard	One of the six hazards outlined in regulation 12(3).
Adequate control	Control that has regard only to the nature of the hazard and the nature and degree of exposure to the risk.

Activity

Regulation 12 does **not** apply where other, more specific Regulations (eg Control of Asbestos Regulations 2006) take priority. In your situation, are you affected by any of these Regulations? Identify three items of work equipment that are subject to regulation 12.

Feedback on page 95.

Self-assessment questions

1 Under regulation 12, what must the measures achieve that employers are called on to take?
2 What does 'adequately control' mean in terms of the risks that are the subject of this regulation?
3 What are the specified hazards that have to be prevented or controlled?

Answers on page 95.

Regulation 13
High or very low temperatures

Key points
Many items of equipment have exposed surfaces, or contain or use hot or very cold substances. Regulation 13 deals with the risks from these and requires measures to be taken to ensure that people using work equipment are not burned, scalded or seared.

The regulation does not cover related risk such as radiant heat or glare. The regulation focuses on:

- using engineering measures for protection in equipment;
- using other measures for protection.

Regulation 13 states:

Every employer shall ensure that work equipment, parts of work equipment and any article or substance produced, used or stored in work equipment which, in each case, is at a high or very low temperature shall have protection where appropriate so as to prevent injury to any person by burn, scald or sear.

Accessible surfaces of work equipment represent a risk of:

- burn when very hot – a gas cooker, for example;
- other injury such as frostbite when handling equipment in a cold store.

Some equipment is hot because of the process being carried out. People may have to work close to the equipment to do their job. Hot or very cold surfaces may be touched intentionally, for example when using a handle, or unintentionally when someone brushes against the equipment.

As with many of the other regulations, the measures taken depend on the circumstances in each case. It is up to employers to decide what is appropriate in their situation.

Reducing risk by engineering methods

From contact with hot surfaces
There are several different measures:

- reducing surface temperature;
- insulation;
- shielding;
- barricading;
- guarding.

From contact with hot process materials
The risks include splashing, spilling and direct contact. The measures to take include:

- limiting the maximum temperature;
- providing doors, lids or covers and deflection systems for hot liquids.

Reducing risk by other methods

While the regulation says that engineering protective measures should be taken in preference to others, it recognises that this is not always possible. Some equipment or devices, such as cooker hot plates, have to be hot and accessible. In these cases, alternative measures include providing:

- personal protective equipment;
- training;
- warning signs and signals;
- supervision;
- operating instructions;
- instructions for use.

Case study: Hospital catering

A sudden and significant rise in the number of reported incidents of hand and arm burns in the kitchens of a local hospital prompted council inspectors to check for the cause. The burns were reported by employees of the catering contractor appointed by the hospital. They were happening as employees loaded and unloaded two bread ovens.

The ovens had recently been adapted as part of a rationalisation of the kitchen equipment to increase their capacity. Additional shelving had been fitted and as a result the space between the shelves for loading and emptying the ovens had been reduced. Protective gloves were available for loading and emptying the ovens but employees found them awkward and bulky to wear, and the contractor did not enforce the wearing of them.

As the catering company could not return the ovens to their original state, the bread was subcontracted to a local bakery.

Activity

Look at your organisation's safety records for the number of accidents involving burns. Check the number of cases in which the cause could be removed by engineering measures.

Feedback on page 96.

Self-assessment questions

1 What kind of preferred preventive measures should be taken to prevent injury from hot or very cold work equipment?
2 List the measures that can be used to reduce the risk from contact with hot surfaces.
3 What else can employers do to protect people from risk if engineering protective measures are not possible?

Answers on page 96.

Regulation 14 Controls for starting or making a significant change in operating conditions

Key points

This regulation addresses the risks to health and safety created by the starting or uncontrolled operation of work equipment.

There must be one or more controls for starting work equipment. Equipment should never start or change its operating conditions unintentionally, apart from automatic equipment. Changes in operating conditions must occur deliberately by the action of specific controls. The regulation focuses on:

- controlling starting and re-starting;
- controlling the change of operating conditions;
- ensuring that operating conditions cannot change accidentally.

Re-starting or changing operating conditions as a result of the normal operating cycle of an automatic device is not covered by this regulation.

Regulation 14 states:

(1) Every employer shall ensure that, where appropriate, work equipment is provided with one or more controls for the purposes of –

(a) starting the work equipment (including re-starting after a stoppage for any reason); or
(b) controlling any change in the speed, pressure or other operating conditions of the work equipment where such conditions after the change result in risk to health and safety which is greater than or of a different nature from such risks before the change.

(2) Subject to paragraph (3), every employer shall ensure that, where a control is required by paragraph (1), it shall not be possible to perform any operation mentioned in sub-paragraph (a) or (b) of that paragraph except by a deliberate action on such control.

(3) Paragraph (1) shall not apply to re-starting or changing operating conditions as a result of the normal operating cycle of an automatic device.

The purpose of this regulation is to ensure that no-one is caught unaware by any changes in the operating conditions or modes of the equipment in use. The regulation highlights the importance of controls to start or make a significant change in the operating conditions of work equipment in cases where the change is likely to create a risk to health and safety.

Starting and restarting work equipment

It should never be possible for equipment to be started accidentally, so one or more controls must be provided. The equipment doesn't necessarily have to start up the moment the control is operated – certain conditions may have to be met before this happens. Re-starting equipment is considered in just the same

way, whether the stop happened deliberately or because a protection device was activated.

Equipment must never be able to start up again simply because, for instance:

- a protection device such as an interlock has been reset; or
- a person has moved out of range of a sensing device.

The start control must be activated first.

Changing the operating conditions of the equipment in use

Operating conditions include:

- speed;
- pressure;
- temperature;
- power.

The regulation says that it should only be possible to change any of these by means of a control, unless the change does not increase the risk to health and safety. In the case of multifunctional equipment or machinery, it is vital that:

- a function is changed only by the conscious and positive action of the operator;
- other functions cannot start up unintentionally.

Design and positioning of controls

Any controls provided should be designed and positioned so that, as far as possible, they cannot be operated accidentally. The guidance supporting regulation 14 gives details on specific controls.

The exception of automatic machinery

The final part of the regulation covers automatic or programmed machinery, where it is recognised that it is not appropriate to require separate controls for changing operating conditions when these changes are part of the normal operating cycle. There is extensive guidance on this part of the regulation.

Case study: Forestry

An employee of a national conservation organisation suffered serious injury when she was crushed by a dumper truck which went out of control after instantaneously re-starting. The truck had been left in gear by the driver on a steeply inclined forest road. The truck driver had just dismounted from the vehicle and had not removed the ignition key.

An investigation by inspectors into the accident revealed that excessive vibration of the ignition switch had caused the truck to re-start by itself while the key was in place. The excessive vibration that carried on after the engine had been switched off had been noticed by the driver on many previous occasions, but he had never reported it. The vehicle had not been serviced in the previous 12 months and nobody had dealt with the defective ignition switch contact.

Key terms	
Starting	Beginning operation of the equipment.
Re-starting	Starting the equipment again after a deliberate or unintentional stoppage.
Significant change	Change sufficient to increase the risk to health and safety.
Operating conditions	Aspects of the state or mode of operation of equipment.
Deliberate action	Consciously and intentionally taking action to change the operating state or function of equipment.

Activity

Check your records for occasions in your organisation when equipment self-started or changed its operating state on its own. If no such occasions have been reported, list the equipment or machinery to which this could apply on your site.

Feedback on page 96.

Self-assessment questions

1 What are the three main requirements in regulation 14 for which one or more controls have to be provided?
2 What is significant about the changes in operating conditions?
3 What is the purpose of the controls under regulation 14 and what must be avoided?
4 What is the exception to the regulation?

Answers on page 96.

Regulation 15 Stop controls

Key points

This regulation deals with controls for ensuring that work equipment in operation under normal conditions can be stopped without risk to health and safety. It acknowledges that stopping work equipment may involve a number of co-ordinated operations that must be brought under control to avoid risk to health and safety. The regulation focuses on ensuring that:

- stop controls are provided and are accessible;
- a proper stopping sequence is followed;
- sources of energy can be switched off once the equipment has stopped.

Regulation 15 states:

(1) Every employer shall ensure that, where appropriate, work equipment is provided with one or more readily accessible controls the operation of which will bring the work equipment to a safe condition in a safe manner.

(2) Any control required by paragraph (1) shall bring the work equipment to a complete stop where necessary for reasons of health and safety.

(3) Any control required by paragraph (1) shall, if necessary for reasons of health and safety, switch off all sources of energy after stopping the functioning of the work equipment.

(4) Any control required by paragraph (1) shall operate in priority to any control which starts or changes the operating conditions of the work equipment.

The first requirement of the regulation is that, where appropriate, work equipment shall have one or more accessible controls to stop it safely. The controls must bring work equipment to a complete stop and then switch off all sources of energy. They must operate in a sequence that gives priority to the stopping process over starting or changing the equipment's operating conditions.

You need to be aware of the guidance to regulation 15. It emphasises the range of stopping operations that have to be controlled. Topics include:

- the purpose of emergency stops;
- examples of risk reduction measures in different circumstances;
- where emergency stop controls should be provided (based on the risk assessment);
- types of emergency stop controls.

Case study: Building cleaning and maintenance

An operative of a high-pressure water jetting company suffered serious leg laceration when a water jetting lance he was using failed to shut off safely. The man was engaged in jet cleaning a building.

At the end of a period of jetting, he released the jetting lance's trigger, which should have tripped the pump supplying jetting water at very high pressure. The pump trip in turn should have opened a dump valve that relieved the pressure of the water in the hose connecting the pump to the lance. On this occasion the valve, activated electrically by the motor trip, failed to open. The lance discharged a jet of residual high-pressure water on to the operator's legs when he accidentally touched the lance trigger as he lowered it to the ground.

The company that supplied the jetting system was fined. The jetting system controls were subsequently modified to incorporate a safe shutdown control sequence. This prevented water at a high pressure being trapped in the jetting hose between the stopped pump and lance.

Key terms	
Stop control	Control that brings work equipment to a safe condition in a safe manner; control that brings work equipment to a complete stop.
Source of energy	The means by which equipment gets motive power or heat (or cold).
Operate in priority	The stop control should take priority over any operating or start control.

Activity

Check the results of inspections or tests in your organisation that prove the efficient working of stop controls where there is a risk to health and safety. Note down any areas where action is required, and list the action points.

Feedback on page 97.

Self-assessment questions

1 What is the purpose of the controls required under regulation 15?
2 What are the three functions of these controls?
3 What are the qualifications expressed in regulation 15 in relation to its application?

Answers on page 97.

Regulation 16
Emergency stop controls

Key points

This regulation applies where appropriate after the particular circumstances of the equipment have been considered. You may be called on to show that your assessment of risk to health and safety makes it clear that emergency stop controls are necessary. The regulation focuses on:

- the number of emergency stop controls;
- the accessibility of these controls;
- interaction with other controls in other regulations;
- circumstances where emergency stop controls are not necessary;
- the priority given to emergency stop controls.

Regulation 16 states:

(1) Every employer shall ensure that, where appropriate, work equipment is provided with one or more readily accessible emergency stop controls unless it is not necessary by reason of the nature of the hazards and the time taken for the work equipment to come to a complete stop as a result of the action of any control provided by virtue of regulation 15(1).

(2) Any control required by paragraph (1) shall operate in priority to any control required by regulation 15(1).

Sufficient, readily accessible emergency stop controls must be provided if necessary for safety, bearing in mind:

- the hazards of the equipment in use;
- the action of other controls.

Where emergency stop controls are provided they must operate in priority of, or they must over-ride, any other stop control.

You need to be aware of the guidance for regulation 16. It explains several key considerations which apply to emergency stop controls, including:

- where emergency stop controls must be provided in addition to, and not be used as substitutes for, other controls or safeguards;
- locating emergency stop controls in and around equipment;
- the single purpose of these controls;
- the need to avoid hazards caused by the operation of emergency stop controls;
- common types of emergency stop controls.

If you want further information, the features of emergency stops are identified in European, international and national standards.

Case study: Chemical industry

A small chemical business situated close to a major road was responsible for a multiple car pile-up when heating oil gushed from their factory and covered the road.

Investigation into the cause found that the emergency stop control in the heating system's boiler was to blame. The system had recently been commissioned and the operating staff were still under training. On the shift in question the system's main circulating pump tripped and the stand-by pump could not be started. Correctly, in these circumstances, the emergency stop control was activated to close the boiler down. This involved the automatic closing of several isolation valves. The rapid closing of these valves created a pressure surge in the system which lifted the main relief valve, sending hot vaporising heating oil into the atmosphere.

The findings of the investigation included modification to the valves to reduce their closing speed in an emergency, and the addition of a large dump vessel to contain the contents of the heating system in the event of the system's relief valves lifting. The emergency stop control system was not changed.

Key terms	
Emergency stop	Rapid response to dangerous, unforeseen event to close down the operation of equipment.
Time to come to a complete stop	Applies to the action of other controls and the time they take to affect and stop equipment.

Activity

You need to be able to assess whether emergency stop controls are necessary for equipment in your workplace. Check your records to see whether they provide information about events calling for emergency stop controls. Note down your views about whether a further risk assessment is required to determine the need for such controls and, if necessary, take action.

Feedback on page 97.

Self-assessment questions

1 Name the specific type of control covered by regulation 16. What is the key requirement?
2 What are the only reasons for not providing this type of control for work equipment?
3 What does regulation 16 say about the operation of this control?

Answers on page 97.

Regulation 17 Controls

Key points

Note the terms 'where necessary', 'where appropriate' and 'reasonably practicable', which are used throughout this regulation. This indicates that employers have the discretion to decide the measures they need to take to comply with the regulation, based on an assessment of risk. The regulation focuses on:

- ensuring that controls are clearly identifiable;
- locating controls so that neither the control operator nor any other people near the equipment are at risk;
- the use, in particular circumstances, of warnings to signal the use of equipment controls, as required by regulation 24 (see page 56);
- giving advance warning to people exposed to risk;
- giving people exposed to risk the means of avoiding it.

Regulation 17 states:

(1) Every employer shall ensure that all controls for work equipment are clearly visible and identifiable, including by appropriate marking where necessary.

(2) Except where necessary, the employer shall ensure that no control for work equipment is in a position where any person operating the control is exposed to a risk to his health or safety.

(3) Every employer shall ensure where appropriate –

(a) that, so far as is reasonably practicable, the operator of any control is able to ensure from the position of that control that no person is in a place where he would be exposed to any risk to his health or safety as a result of the operation of that control, but where or to the extent that it is not reasonably practicable;
(b) that, so far as is reasonably practicable, systems of work are effective to ensure that, when work equipment is about to start, no person is in a place where he would be exposed to a risk to his health or safety as a result of the work equipment starting, but where neither of these is reasonably practicable;
(c) that an audible, visible or other suitable warning is given by virtue of regulation 24 whenever work equipment is about to start.

(4) Every employer shall take appropriate measures to ensure that any person who is in a place where he would be exposed to a risk to his health or safety as a result of the starting or stopping of work equipment has sufficient time and suitable means to avoid that risk.

All controls have to be visible, and clearly and easily identifiable. This includes any marking needed to show:

- where the control is;
- what it does.

The control must be positioned so that it does not put its operator, or anyone who may be nearby, at risk from the action of the equipment starting or in operation. Safe systems of work should be implemented where this cannot be guaranteed. People could be at risk from equipment starting up. The safe system should indicate the places in relation to the equipment which must be cleared of people.

Finally, warnings and warning devices must be used if other measures are insufficient or inappropriate.

Clear identification of controls

It must be possible to identify what each control does and which equipment it operates. There are several well-established ways of doing this:

- by the design and shape of the control;
- by labelling or marking;
- by the layout of controls on a panel or console (grouping controls according to their function).

It is unlikely that any control will be adequately identifiable without some sort of marking.

The safe location of controls

Controls should not be placed where anyone operating them might be at risk from the action of the equipment being controlled. In some circumstances special temporary controls are used, close to the equipment where access is potentially dangerous, for example during maintenance or the functional testing of equipment. In these special circumstances, the method of working needs a system of work.

From the place where the controls are situated, the operator should be able to see whether anyone could be at risk from the equipment in operation.

Using warnings

Warnings are at the next level of precautionary measures. According to regulation 24 (see page 56), warnings used in appropriate circumstances will:

- serve to alert anyone who could be at risk from the operation of controls;
- serve to start or change the operation of equipment;
- explain the precautions to take.

Warning in advance and the means to avoid risk

The final safeguards deal with measures to allow people who may be at some distance from the controls time to get clear of any danger and the means to do this. They include notices and directions to safe areas.

You need to be aware of the guidance supporting regulation 17. It is specific and is given on each part of the regulation, including:

- where controls should be placed;
- ways of identifying controls;
- relevant national and international standards;
- special measures where exposure to risk is unavoidable;
- the special requirements for some maintenance operations;
- dealing with people remote from the point of control;
- the use of ‘permissive controls’ and combinations of warnings;
- giving advance warning and time to get clear.

Case study: Petrochemical industry

A maintenance fitter on a North Sea oil rig was injured when a pump he was working on started unexpectedly. The pump was one of a pair on the same pumping duty, and they were given the designations Water Injection Pumps A and B. A safe system of work – a permit to work system – was in operation to control the safe hand-over of equipment for maintenance.

The controls for the water injection unit were operated from a central control room on the rig, located some distance from the pump. At the time of the accident, the control room had recently been extended and existing control panels modified to make room for more control instruments. The controls for injection pumps A and B had been relocated as part of this work and new identity labels were on order but had not yet been fitted to the control panels. As a temporary measure, the pump control position had been marked A and B by hand in black marker pen. The permit to work had been correctly completed and the corresponding pump power supply isolated and locked-off.

During the investigation, it was discovered that the control markings on the panel had been reversed. Starting pump A, according to the control panel identity, in fact started pump B.

The accident prompted a review and reallocation of responsibility for control identification within the engineering function of the company.

Key terms	
Controls for work equipment	Devices which initiate or change the operation and action of work equipment.
Systems of work	Written procedures setting down safe methods of working.

Activity

Pick three items of work equipment in your site. In each case, check and record whether its controls satisfy the requirements of regulation 17.

Feedback on page 97.

Self-assessment questions

1 What are the key features of control devices for work equipment required by regulation 17?
2 In relation to the position of controls, what is the vital consideration for those who operate them?
3 From the position of the control, what must its operator be capable of ensuring?
4 What measures must be taken to protect those exposed to risk from the starting or stopping of work equipment?

Answers on page 97.

Regulation 18 Control systems

Key points

The phrase 'shall not be safe unless' is used in paragraph 2 of regulation 18. It indicates that, in all circumstances, a control system will be considered safe ONLY if it satisfies the requirements stated. Employers need to be sure that it does. The regulation focuses on:

- taking realistic and practical allowances into account when choosing or specifying control systems;
- not increasing risk when the control system is operating, either directly or indirectly, by impeding the operation of other safety measures;
- not increasing risk if a control system fails or loses its power supply.

Regulation 18 states:

(1) Every employer shall ensure, so far as is reasonably practicable, that all control systems of work equipment –

(a) are safe; and
*(b) are chosen making due allowance for the failures, faults and constraints to be expected in the planned circumstances of use.**

(2) Without prejudice to the generality of paragraph (1), a control system shall not be safe unless –

(a) its operation does not create any increased risk to health or safety;
(b) it ensures, so far as is reasonably practicable, that any fault in or damage to any part of the control system or the loss of supply of any source of energy used by the work equipment cannot result in additional or increased risk to health or safety;
(c) it does not impede the operation of any control required by regulation 15 or 16.

When choosing and specifying control systems, employers have to take into account what is likely to happen in their situation. This includes faults, failures and practical difficulties. To be safe, control systems must NOT:

- create any increased risk when operating normally;
- create additional risk when a part or a component fails;
- give rise to additional risk if the power supply is lost;
- impede operation of other stop or emergency stop controls.

Practical and realistic allowances

At the earliest opportunity, employers must take into account as many of the likely (or even unlikely) considerations that could apply when specifying and selecting control systems for work equipment.

The regulation refers to the 'planned circumstances of use'. This means that the conditions and the demands which the equipment's control system is expected to deal with, must be planned for and worked out so that they can be used as the basis of choosing a control system.

Not introducing additional or increased risk

Additional risk could apply when the control system introduces new dangers because of its nature or operation, for example where sensing instruments within the control system use radioactive materials or where lasers are used.

When the components of a control system fail, a fail-safe condition should apply. This must be proven effective by testing before the equipment is put into operation. This regime should also apply to failure of the equipment's source of energy.

Other stop controls

Control systems must not operate in conflict with other stop controls. That is, the stop controls of regulation 15 and the emergency stop controls of regulation 16 must operate separately from, and not be impeded by, the controls which are the subject of this regulation.

Guidance supporting the regulation:

- defines a control system (a system or device which responds to input signals and generates an output signal which causes the equipment to operate in a particular manner);
- explains what is meant by 'input signals' and gives examples of different types;
- describes what a 'fail-safe' condition is;
- advises that the greater the risk, the more the control system must resist the effects of failure;
- refers to the relevant European, international and national standards.

Case study: Leisure centre

A sudden and alarming increase at the local hospital in the number of cases of eye and throat irritation, mainly in children, raised staff suspicion that the local swimming pool's level of chlorine was dangerously high. Local authority inspectors closed the pool while they carried out their investigation to find the cause and resolve the problem.

The chlorine level in the pool was controlled by equipment that automatically sampled the water and carried out a chemical analysis. It then added chlorine according to permitted levels that were set into the equipment. It was found that the device which carried out the chemical analysis – a probe which was in constant contact with the pool's water – was coated in residues from the pool.

This meant that the system was not able to add the correct level of chlorine. In fact, uncontrolled amounts of chlorine were being pumped into the pool.

The pool was kept closed until new equipment with up-to-date analytical instruments and an automatic 'management system' was installed, to ensure minimal failure to danger.

Key terms	
Control system	A combination of instruments and devices designed to change the operating state of equipment within predetermined limits.
Planned circumstances	The intended operating environment.
Additional/increased risk	A situation more dangerous than before the event in question.

Activity

Have you heard people in your organisation say – or do you suspect they may think – things like these?

- 'It's not the machine, it's the control system that's the problem.'
- 'I don't know what that control's for. We never need to use it.'
- 'We couldn't get the equipment to work with this control system so we had it switched off.'
- 'It's just a "black box" as far as I'm concerned.'

(a) When should control systems be attended to?
(b) What steps could be taken to improve employees' attitudes, skills and knowledge of control systems?

Feedback on page 98.

Self-assessment questions

1 Regulation 18 requires that all work equipment control systems are safe. What needs to be taken into account when they are being chosen?
2 What are the four criteria that will be applied under this regulation to decide if a control system is safe?
3 What other PUWER regulations have an impact on regulation 18?

Answers on page 98.

Regulation 19
Isolation from sources of energy

Key points

Regulation 19 requires that equipment must be capable of being isolated from 'all its sources of energy'. The most common are power, heat and pressure but there are others – it depends on the particular equipment. Make sure that your risk assessment covers them all. The regulation focuses on:

- suitable means of isolation;
- their identification and accessibility;
- measures to ensure safe reconnection.

Regulation 19 states:

(1) Every employer shall ensure that where appropriate work equipment is provided with suitable means to isolate it from all its sources of energy.

(2) Without prejudice to the generality of paragraph (1), the means mentioned in that paragraph shall not be suitable unless they are clearly identifiable and readily accessible.

(3) Every employer shall take appropriate measures to ensure that re-connection of any energy source to work equipment does not expose any person using the work equipment to any risk to his health or safety.

Where appropriate, work equipment must be provided with suitable means of isolating it from its sources of energy. This is needed to make equipment safe for maintenance and other circumstances. To be appropriate, the means provided must be easily identified and readily accessible.

To ensure the safe return of equipment to its normal operating state, the re-connection of its energy sources must not introduce any risk to those who use it.

Suitable means of isolation

The means of isolating the equipment must be appropriate to the nature of the work equipment and the technology used in supplying its energy. Other considerations include ensuring that:

- the means of isolation are constructed to recognised standards where possible;
- they are sufficiently robust and capable of withstanding the same operating conditions as the equipment, for example blanking plates or flanges to isolate steam.

Clearly identifiable and readily accessible methods

Methods that conform to recognised standards must be used. They include identification tabs and labels.

Ensuring that equipment can be reconnected safely

The risk caused by inadvertent operation is the key consideration. Risk assessment needs to take into account all normal and foreseeable circumstances. Employers must ensure that people are not put at risk when the energy source is reconnected from unexpected movement or other hazards. Guards and other protection devices must function properly before operation begins.

Guidance for regulation 19 includes explanations of:

- the meaning of 'isolation';
- when it is appropriate to provide means of isolation;
- the different forms of energy source used in work equipment;
- precautions needed to ensure that no-one is put at risk.

Case study: Injection moulding

A technician employed by an injection moulding company had her hand crushed during maintenance work on a moulding machine.

The maintenance work was in response to a breakdown and so was unplanned. Several components had to be replaced. The machine had been fully prepared for the work involved and had been isolated from its energy sources for electrical power, compressed air and electrical heating. The last maintenance operation involved checking the rotating alignment of the machine's die plate which needed the electrical power to a main drive to be reconnected temporarily while the machine was open and its guards withdrawn. The main drive circuit was identified, locks removed and its power supply reconnected. At this point, a guard became energised and closed on to the technician's hand.

An investigation into the accident established that the guard was interlocked with the main drive and so operated accordingly, to close when power was re-established. Although a safe system of work was in operation it had not taken into account the unusual circumstances of the breakdown and the one-off repairs which were necessary. The system was revised.

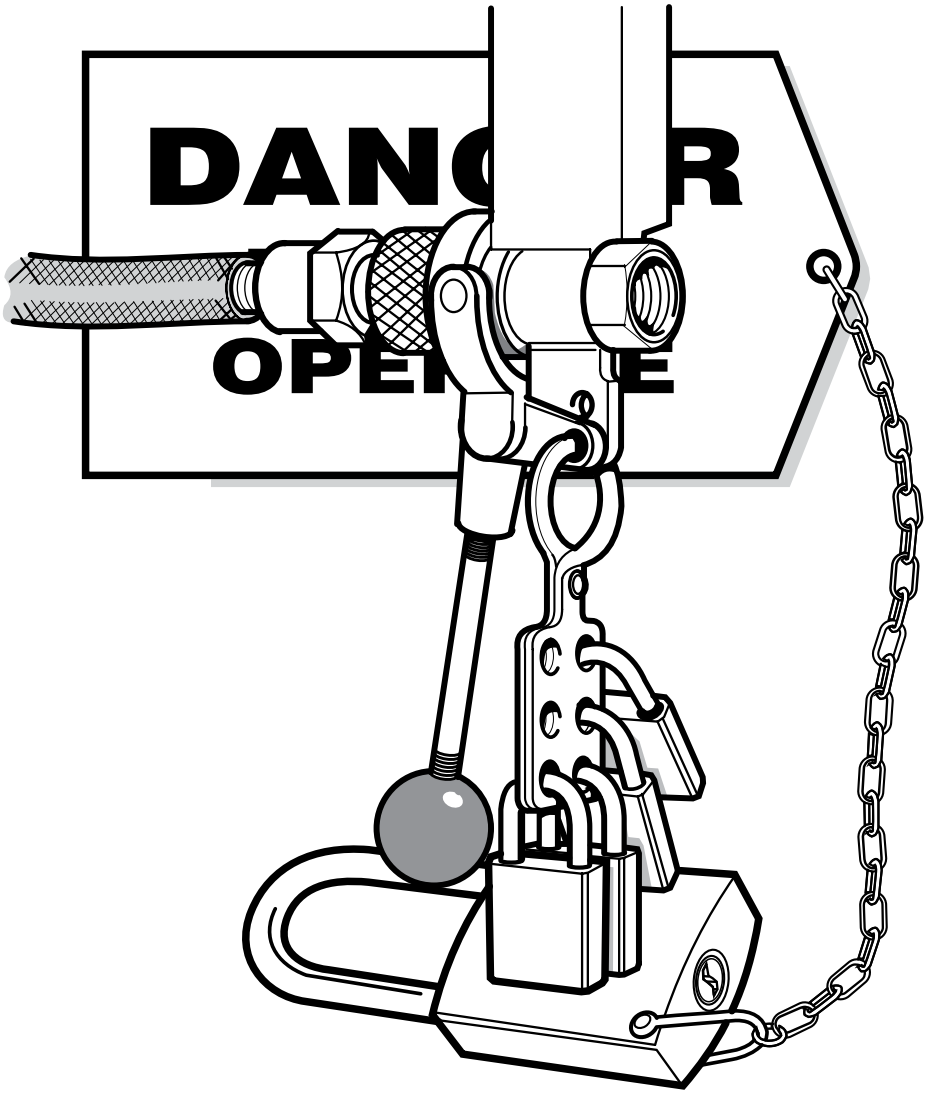
Key terms	
Isolate	To separate by physical means.
Reconnection	Reinstating the normal means of providing energy.

Activity

List the measures you use in your organisation to isolate equipment.

Feedback on page 98.

Multi-padlockable hasp for locking off isolating valve



Self-assessment questions

1 What is the main requirement of regulation 19?
2 What two attributes are required by the regulation in paragraph (1) for something to be 'suitable'?
3 The regulation refers to a particular operation as having risk associated with it. What is it?

Answers on page 98.

Regulation 20 Stability

Key points

Many kinds of equipment could topple over, overturn or collapse unless they are securely fixed. Regulation 20 explains how equipment must be stabilised, clamped, tied or fastened to make it safe. The regulation focuses on:

- stabilising fixed work equipment; and
- mobile work equipment.

Regulation 20 states:

Every employer shall ensure that work equipment or any part of work equipment is stabilised by clamping or otherwise where necessary for purposes of health or safety.

Whatever work equipment, or part of equipment, is moving, the forces that the movement sets up need to be kept in check. This applies to equipment whether it goes round (eg a concrete mixer, laboratory centrifuge or a circular saw), up and down, or side to side (eg a sewing machine or knitting machine). The device must be prevented from changing its position or becoming unstable, which would mean that it was out of control and a risk to people's health and safety.

Fixed work equipment

Bolting or fastening equipment down is usually the best way of guaranteeing that it does not move or rock when it is being used. Some equipment, such as woodworking machines, should be bolted to the floor. Other equipment can be tied to supporting structures or platforms. If the item of equipment is inherently unstable, such as scaffolding for example, additional measures are needed to make it stable. In this case, the added possibility of adverse weather conditions having an effect on the scaffolding should be considered, and ties and sheeting used. Ladders must be placed at the right angle and either secured or footed.

Mobile work equipment

Mobile work equipment is a special category and is dealt with in detail in regulations 25 to 30 (pages 58–67). Briefly, guidance for regulation 20 points to work equipment, such as tractors, that may require counterbalance weights to balance loads at either the front or the rear. Mobile cranes are also fitted with devices to increase their stability. Particular circumstances will dictate the extra measures to be taken, for example choosing the right kind of lift truck for the ground condition it will be travelling over. Finally, equipment such as mobile cranes or access platforms can be made more stable when they are moving by fitting outriggers or similar devices.

Case study: Launderette

A toddler was badly scalded when pipes behind a washing machine in a launderette burst and hot water sprayed across the premises. The machine that the child had been playing next to was the last in a row of five, and for several days before the accident, the machine had been vibrating more than usual and making additional noise. On this occasion, at the start of the spinning cycle, the machine pulled away from the wall, cracking the hot water supply piping and causing the accident.

Local authority inspectors discovered that leaking water and spilled detergent had caused the floor under the machines to break up, which meant that some, including the machine in question, were no longer level and were consequently unstable. None of the machines had been serviced within the last 12 months. All appeared to have damaged pipework and faulty pipework connections that would need to be replaced immediately to avoid further risk to health and safety.

Key terms	
Stable	Fixed and steady in use.

Activity

It is also important to consider the stability of 'temporary' equipment. Describe the provisions made for it in your organisation.

Feedback on page 99.

Self-assessment questions

1 Why is it important for fixed work equipment to be clamped?
2 What methods can be used for stabilising fixed work equipment?

Answers on page 99.

Regulation 21 Lighting

Key points

Regulation 21 sets out what employers must do to ensure that any place where people use work equipment is suitably and sufficiently lit. The regulation focuses on:

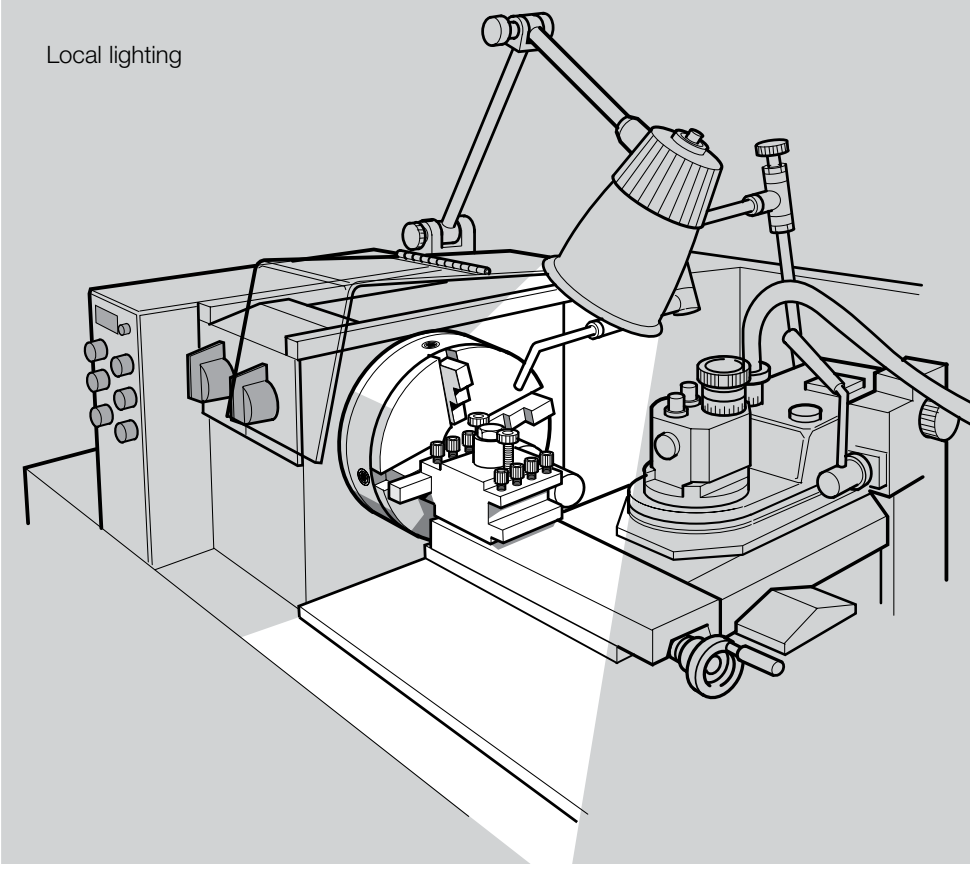
- where and when local lighting should be provided; and
- when additional lighting may be required.

Regulation 21 states:

Every employer shall ensure that suitable and sufficient lighting, which takes account of the operations to be carried out, is provided at any place where a person uses work equipment.

Regulation 21 says that lighting must be suitable AND sufficient. You must take both these requirements on board. Wherever work equipment is used, the type and level of lighting must ensure that people are not at risk.

Local lighting could be necessary to ensure safety where a dangerous process is carried out, for example on wood- or metal-cutting equipment. It may also be necessary for ensuring that measurements are carried out precisely, for example in laboratories.



Case study: Mail order clothing warehouse

A mail order clothing company operating in new, custom-built premises, found that staff absence due to sickness was affecting their order response times. Staff in the order preparation and despatch areas had frequently complained of headaches and other problems caused by the poor general lighting in their area of the factory. This was refuted by the employer who claimed that all lighting levels had been tested when the new factory was handed over and were found to be suitable in all areas.

Inspectors recommended that another assessment of lighting should be done. Two of its findings resulted in changes to the type and level of lighting provided. First, since the factory opened, a new system of package labelling had been introduced which needed local lighting to check labels accurately before parcels were despatched. General lighting alone was not adequate. Second, the level of general lighting had been set following a survey carried out in daylight in the middle of the year. It had not made allowance for seasonal differences in daylight levels or in differences in daylight levels at various times of the day.

Following the report, general lighting levels were increased and local lighting was put in where necessary.

Key terms	
Suitable/sufficient lighting	Lighting which is appropriate to the task being carried out and of such a kind that people's health and safety is considered and ensured.

Activity

Examine the lighting in your organisation. Find out how the lighting levels were arrived at. Do they still suit the type of work and the way employees are working? Have there been changes in the workplace since the lighting system was installed? Note your conclusions about whether the lighting is suitable and sufficient.

Feedback on page 99.

Self-assessment questions

1 What are the two requirements of regulation 21?
2 What does guidance on the regulation cover?

Answers on page 99.

Regulation 22 Maintenance operations

Key points

Regulation 5 (page 14) deals with general requirements for maintaining equipment in a suitable condition. Regulation 22 considers what must be done to ensure that maintenance is carried out safely. Many accidents happen during maintenance work, often because basic precautions to reduce the risks have not been taken.

The regulation focuses on minimising the risk to employees' health and safety while they are carrying out maintenance operations.

Regulation 22 states:

Every employer shall take appropriate measures to ensure that work equipment is so constructed or adapted that, so far as is reasonably practicable, maintenance operations which involve a risk to health or safety can be carried out while the work equipment is shut down, or in other cases –

(a) maintenance operations can be carried out without exposing the person carrying them out to a risk to his health or safety; or
(b) appropriate measures can be taken for the protection of any person carrying out maintenance operations which involve a risk to his health or safety.

The regulation examines the need for equipment to be constructed or adapted in a way that takes account of the risks associated with maintenance work, including those during routine and planned preventive maintenance. In complying with the regulation, employers help to ensure that when they do carry out maintenance work, it is done safely and without risk to health.

There are three parts to this regulation; according to your situation, you need to comply with at least one. They are:

- maintenance operations while the equipment is shut down;
- measures to ensure safe maintenance while equipment is capable of moving;
- protecting employees who carry out maintenance operations.

Maintenance operations while the equipment is shut down

If the maintenance work involves a risk to employees' health or safety, the best solution is to have the equipment designed, built or adapted so that it can be shut down or made inactive before the work is done. But in some instances, for example where equipment is part of a larger system like a production line, this may not be possible.

Look at regulation 19 (page 47) which covers the safe isolation of sources of energy.

Measures to ensure safe maintenance while equipment is capable of moving

Measures could include:

- temporary guards and barriers;
- controls that limit or slow down movement;
- remote measurement or alignment instruments.

The guidance advises when to consider adding extra features to protect employees so that maintenance can take place safely. These include adjustment points that can be reached without opening guards, and lubrication points that can be accessed safely even when the equipment is moving.

Protecting employees who carry out maintenance operations

This arises when it is not possible either to shut down the equipment or to provide other measures to eliminate risk. Protection of employees can be achieved by providing:

- barriers;
- safe means of access;
- protective clothing and equipment, for example, goggles.

Case study: Manufacturing

As part of a product change routine, a fitter at a newly commissioned plant that made paving slabs was adjusting a conveyor belt at a position which was under a grab. The grab operator could not see the fitter or the conveyor when he operated the controls that made the grab descend. No safe system of work for routine belt adjustment had been set up and the fitter was fatally injured when his head was trapped by the grab.

Following the accident, fixed guarding around the plant was completed and photoelectric safety devices were installed. Legal proceedings were taken and the company was fined.

Key terms	
Maintenance operations	All activities concerned with maintenance of equipment including examination, inspection, testing, adjustments, repairs, replacement, lubrication and modification.
Shut down	Equipment stopped and isolated from all its sources of energy.

Activity

Review the safety records kept by your organisation. How many incidents have occurred during maintenance operations? Describe how one or two might have been avoided.

Feedback on page 99.

Self-assessment questions

1 What requirements under regulation 22 should be considered to make maintenance operations safe?
2 What condition should equipment be in before maintenance operations are carried out?
3 Give five examples of measures that could be taken to minimise the risk of injury during maintenance operations.

Answers on page 100.

Regulation 23 Markings

Key points

If equipment is dangerous or has dangerous parts that project, it should be marked so that employees are not put at risk.

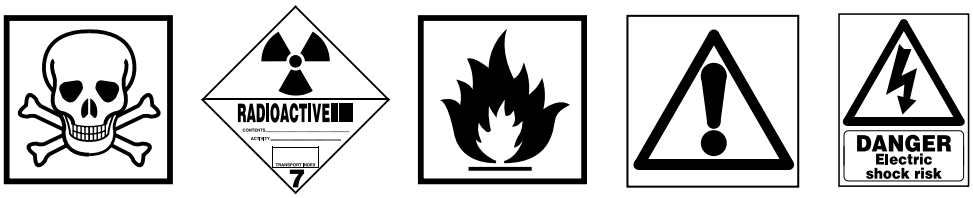
Regulation 23 states:

Every employer shall ensure that work equipment is marked in a clearly visible manner with any marking appropriate for reasons of health and safety.

Equipment must be clearly marked to show where there is a risk to health and safety. Markings in some situations must be specific and these are covered by other Regulations. In other situations, they are more general, for example, 'Mind your head'.

Marking can be done in several ways:

- using words, letters, numbers, colours, shapes and symbols to draw attention to the risk;



- painting parts of equipment that protrude into a working space in such a way that they are easily seen;
- using a combination of high-visibility paint, and signs and symbols. Note that any signs used have to comply with the Health and Safety (Safety Signs and Signals) Regulations 1996.

Case study: Ceramics pottery

The owner of a small pottery business, which she ran with one assistant, installed a larger kiln to keep pace with an increase in orders. It was not new, but a very good model, manufactured in Norway. Inside the kiln, rows of shelves had to be stacked by hand with pots for firing.
The potter was in the kiln changing a batch of pots at the end of the day's work, for overnight firing. She had almost finished when the door closed behind her, trapping her inside. The door's locking mechanism was designed so that during changing or emptying, when someone was inside the kiln, the door catch was held open by pressing a button on the lock. The safety instructions for this were given on a panel on the kiln door. The correct sequence for opening – holding the lock open, closing and locking – was clearly laid out, but in Norwegian.

The kiln had a safety feature which meant that anyone trapped inside could raise the alarm signal – a red light on the kiln's operating console. The potter raised the alarm. However, other controls in the console had red indicator lights showing that the kiln was in operation.

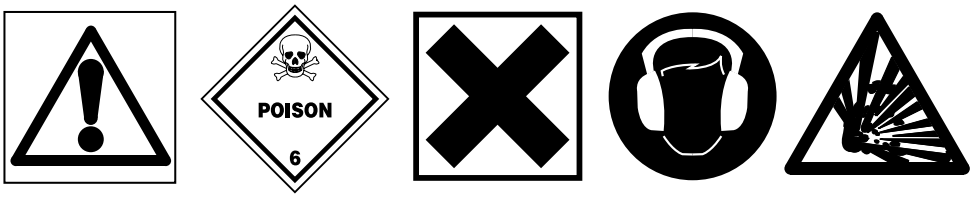
As he was leaving for the day, the assistant noticed that the red light on the console was on, and assumed the kiln was firing. He thought his employer must have finished and left before him but as soon as he got outside and saw that her car was still there, he realised something was wrong. He went back inside and on checking the kiln discovered the potter and released her.

A new instruction panel, in English, was produced straight away and put on the kiln door. A klaxon was fitted above the kiln door to replace the red alarm light.

This incident shows how markings and warnings often go together and highlights what can happen when they are inadequate to deal with the particular situation.

Key terms	
Marking	Visual means of signalling areas of potential danger, by means of paint or signs.

Activity



Name and explain each sign. If relevant, describe how they are used in your organisation.

Feedback on page 100.

Self-assessment questions

1 What is the particular safety issue addressed by regulation 23?
2 What does regulation 23 require in these safety measures?

Answers on page 100.

Regulation 24 Warnings

Key points

Regulation 24 states that warnings are not appropriate unless they are unmistakable in signalling danger.

The regulation focuses on ensuring that warnings are:

- clear;
- easy to understand;
- unmistakable.

Regulation 24 states:

(1) Every employer shall ensure that work equipment incorporates any warnings or warning devices which are appropriate for reasons of health and safety.

(2) Without prejudice to the generality of paragraph (1), warnings given by warning devices on work equipment shall not be appropriate unless they are unambiguous, easily perceived and easily understood.

It is often necessary to use warnings and warning devices after other hardware measures have been taken, and where a risk to health and safety still exists. If you've already worked through regulation 23 (page 54) you will know that some markings may also serve as warnings.

Appropriate warning signs or instructions

Warning devices

These may be visible or audible, for example:

- flashing lights on equipment in prominent places;
- lights on control panels which can signal that something has broken down, developed a fault, or continues to be a hazard (eg a hot-plate);
- reversing alarms on construction or refuse vehicles which warn of movement.

Visual warnings have limitations: they are only effective if people are regularly looking in a particular direction. Flashing or coloured lights may be noticed more readily.

Audible warnings may not be suitable if the working environment is noisy or if any employees are wearing ear protection, or have a hearing impairment. It must be possible for employees to distinguish at once between:

- different audible warnings;
- warnings and any other unrelated signals operating at the same time.

Guidance for regulation 24 gives examples of markings, the kind of warnings required and information on when their use is appropriate.

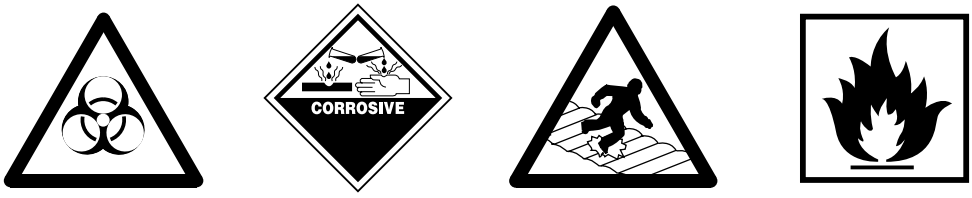
Case study: Cement factory

A conveyor belt under some stone hoppers in a factory was being adjusted by an experienced fitter. All fitters in the company had been issued with ear protectors to combat noise levels in the factory of 96 dB.

The driver of a dumptruck, which was equipped with an audible reverse warning light, walked past the conveyor belt on his way to his vehicle. He did not see the fitter who was crouched under the conveyor belt at the time. He climbed into the cab, checked that there was no one behind the vehicle and reversed. At that moment, the fitter stepped out from under the hoppers with his back to the dumptruck to watch the tracking of the conveyor belt. He was knocked to the ground, sustaining serious injuries to his head and back. He had not heard the dumptruck's reversing device because of his ear protectors and the driver had not seen him in the normal reversing mirrors.

Key terms	
Warning device	Device attached to work equipment; can be visual (lights) or audible (horn).

Activity



Name and explain each sign. If relevant, describe how they are used in your organisation.

Feedback on page 100.

Self-assessment questions

1 What is the employer's duty under regulation 24?
2 What is meant by the term 'appropriate' in relation to warnings?
3 What are the two main characteristics of warnings?

Answers on page 100.

Regulation 25
Employees carried on mobile work equipment

NEW

Key points
This regulation is about ensuring the safety of people carried by mobile equipment.

Regulation 25 states:

Every employer shall ensure that no employee is carried on mobile work equipment unless –

(a) it is suitable for carrying persons; and
(b) it incorporates features for reducing to as low as is reasonably practicable risks to their safety, including risks from wheels or tracks.

The regulation focuses on the employer's duty to make mobile equipment safe for everyone being carried by it – both drivers AND other workers, including passengers. In particular, it deals with safety provisions in the equipment.

Making mobile equipment safe

This usually involves providing additional equipment or adapting it in some way, for example by:

- fitting locks to doors;
- providing extra safety belts or extra guarding;
- providing safety warning notices.

The ACOP states:

324 You should ensure that risks to the operator and other workers due to the mobile work equipment travelling are controlled. Workers should be protected against falling out of the equipment and from unexpected movement.

Speed adjustment

333 If work needs to be carried out during the journey, speeds should be adjusted where necessary.

Guards and barriers

335 You should ensure that guards and/or barriers fitted to mobile work equipment, which are designed to prevent contact with wheels and tracks, are suitable and effective.

Supporting guidance explains:

- what kinds of vehicle are involved;
- the risks which employers need to make provision for;
- when passengers should and should not be carried; work equipment that is not specifically designed for carrying people may, under exceptional circumstances, be used for this purpose.

Make sure that you know:

- how to ensure that mobile equipment is made suitable for carrying people;
- the requirements for seating;
- when cabs, operators' stations and work platforms should be used, and how they should be designed and constructed;
- whether it is necessary to provide falling object protective structures (FOPS) or restraining systems (eg full-body seat belts, lap belts or purpose-designed systems).

Case study: Agriculture

An eight-year-old boy, one of three children being carried in a tractor cab, fell out of the open back window. He was fatally crushed.

The accident happened because the tractor was not designed to carry passengers. The passenger was not seated securely and he fell out of the back window. The driver was unable to stop the tractor in time and the child was crushed under the roller.

Passengers should never be carried in tractor cabs unless the cabs are specifically designed for this and appropriate and secure seating is provided.

Activity

Survey all mobile work equipment in your workplace to assess whether it is 'fitted' for safety. If not, describe the steps needed to ensure that it is. Then take action!

Feedback on page 100.

Self-assessment questions

1 What type of equipment does regulation 25 apply to?
2 As well as risks in general, what particular risks are identified in the regulation?
3 What are employers expected to do to comply with regulation 25?

Answers on page 101.

Regulation 26 Rolling over of mobile work equipment

NEW

Key points

This regulation applies to employers who use mobile equipment where the risk of roll-over exists. Employers should be aware of the risks involved in using their equipment and make provision to minimise the risk of mobile equipment rolling over. They need to ensure that riders are protected if it does occur. The regulation focuses on:

- devices which should be provided to reduce the risk of equipment rolling over;
- how to protect those being carried, if rolling over does occur;
- where the regulation does not apply.

Regulation 26 states:

(1) Every employer shall ensure that where there is a risk to an employee riding on mobile work equipment from its rolling over, it is minimised by –

(a) stabilising the equipment;
(b) a structure which ensures that the work equipment does no more than fall on its side;
(c) a structure giving sufficient clearance to anyone being carried if it overturns further than that; or
(d) a device giving comparable protection.

(2) Where there is a risk of anyone being carried by mobile work equipment being crushed by its rolling over, the employer shall ensure that it has a suitable restraining system for him.

(3) This regulation shall not apply to a fork-lift truck having a structure described in sub-paragraph (b) or (c) of paragraph (1).

(4) Compliance with this regulation is not required where –

(a) it would increase the overall risk to safety;
(b) it would not be reasonably practicable to operate the mobile work equipment in consequence; or
(c) in relation to an item of work equipment provided for use in the undertaking or establishment before 5 December 1998 it would not be reasonably practicable.

To make mobile equipment safe from rolling over and to protect people being carried by it if it does roll over, the regulation sets two requirements:

- to include features in the equipment's design to make it structurally safe, for example its shape and rigidity;
- for the equipment to have other measures that will hold those being carried securely.

Note: the regulation does not apply to fork-lift trucks with a structure described in 26(1)(b) or (c).

The ACOP states:

Roll-over protective structures (ROPS)

347 You should fit suitable roll-over protective structures to mobile work equipment where necessary to minimise the risks to workers carried, should roll-over occur.

Restraining systems

352 You should provide restraining systems on mobile work equipment, where appropriate, if they can be fitted to the equipment, to prevent workers being carried from being crushed between any part of the work equipment and the ground, should roll-over occur.

Tractors

356 If a tractor is fitted with a ROP rather than a cab, a restraining system will be needed.

Making the equipment safe against rolling over

A range of measures are required, each designed to prevent equipment from becoming completely overturned – that is, 180° or more from normal. All measures should be present where the risk of rolling over exists. They need to ensure that:

- the equipment is inherently stable;
- it is designed so that it would, in the event, fall on its side;
- if for any reason it overturns more than this, it is capable of safely enclosing those being carried.

Protecting people being carried if rolling over occurs

During the rolling over and in the rolled-over position, protection for those being carried must restrain them AND hold them secure.

The risk being addressed here is the likelihood of being thrown out of the equipment and crushed by it as it overturns.

You need to be aware of the guidance supporting the regulation, which includes:

- the type of equipment the regulation applies to;
- what kind of roll-over protection should be provided, and when;
- when adaptation is required;
- where adaptation may not be necessary.

Key terms	
Rolling over	Overturning to the extent of 90° or more from the normal position.
Structure	Part of the equipment's fabrication which, by its design, is intended to stop rolling over or enclose those carried.
Restraining system	For example, seat belts to prevent those carried being thrown from equipment.

Activity

Page 62 includes an activity that covers both regulations 26 and 27.

Self-assessment questions

1 How should employers ensure that when employees are using mobile equipment the risk to them from the equipment rolling over has been minimised?
2 What danger are people in when mobile equipment rolls over? What are the corresponding protective measures?
3 What does ROPS mean?
4 What equipment is excluded from regulation 26?

Answers on page 101.

Regulation 27 Overturning of fork-lift trucks

NEW

Key points
This regulation deals with the fork-lift trucks referred to in regulation 26 and with minimising the risk of them overturning.

Regulation 27 states:

Every employer shall ensure that a fork-lift truck to which regulation 26(3) refers and which carries an employee is adapted or equipped to reduce to as low as is reasonably practicable the risk to safety from its overturning.

The regulation focuses on measures that are taken for the safety of its riders in the event of the fork-lift truck overturning.

The ACOP states:

360 For fork-lift trucks fitted with either a mast or a roll-over protective structure, you should provide restraining systems where appropriate, if such systems can be fitted to the equipment, to prevent workers being

carried from being crushed between any part of the truck and the ground, should it overturn.

The guidance on regulation 27 includes:

- the need to minimise the risk of overturning where possible;
- types of fork-lift truck requiring measures to reduce risks from overturning, eg counterbalanced, centre control and high-lift trucks that have a sit-down, non-elevating operator position;
- when seat belts should be worn;
- the types of accident which this regulation will help prevent;
- when modifications are not necessary.

Case study: Overturning

A fork-lift truck was being driven at speed with the load in a raised position when the driver steered the truck around a tight corner. The truck overturned, threw the driver out of his seat and trapped him between the structure and the ground. The driver later died of his injuries.

Drivers need to be contained within the roll-over protective structure by using the seat restraining system provided. If they come out of the seat or are thrown out of the cab they risk being crushed by the vehicle as it rolls over.

Key terms	
Overturning	When the overturn is 180° or more.
Adapted or equipped	When engineering modifications are made or additional provisions are fixed to the truck.

Activity

If you use mobile equipment in your workplace, make sure that you know the risk of it overturning or rolling over. Make a note of the last time a risk assessment was carried out, state your views on whether a further risk assessment is required to comply with regulation 27, and briefly justify your views.

Feedback on page 101.

Self-assessment questions

1 Which mobile equipment does regulation 27 cover?
2 What is the condition giving rise to the safety risk being regulated here?
3 How is the risk to be minimised?

Answers on page 101.

Regulation 28 Self-propelled work equipment

Key points

Regulation 28 identifies seven specific areas of risk in self-propelled work equipment of which you need to be aware. Generally, the issues arise because the equipment is moving and being operated by a driver. The regulation is mainly about 'hardware' features that need to be part of, or fitted to, self-propelled work equipment to be safe under PUWER.

The regulation considers a number of known safety issues and the need to minimise the risk of injury.

Regulation 28 states:

Every employer shall ensure that, where self-propelled work equipment may, while in motion, involve risk to the safety of persons –

(a) it has facilities for preventing its being started by an unauthorised person;
(b) it has appropriate facilities for minimising the consequences of a collision where there is more than one item of rail-mounted work equipment in motion at the same time;
(c) it has a device for braking and stopping;
(d) where safety constraints so require, emergency facilities operated by readily accessible controls or automatic systems are available for braking and stopping the work equipment in the event of failure of the main facility;
(e) where the driver's direct field of vision is inadequate to ensure safety, there are adequate devices for improving his vision so far as is reasonably practicable;
(f) if provided for use at night or in dark places–
(i) it is equipped with lighting appropriate to the work to be carried out; and
(ii) is otherwise sufficiently safe for such use;
(g) if it, or anything carried or towed by it, constitutes a fire hazard and is liable to endanger employees, it carries appropriate fire-fighting equipment, unless such equipment is kept sufficiently close to it.

The seven areas of risk of self-propelled work equipment can be grouped into three categories:

- operating the equipment safely;
- improving visibility;
- preventing fire.

Operating the equipment safely

Authorised and competent

Anyone who is not authorised, and not competent, to operate or drive the equipment must be prevented from starting it up.

This means, for example, having:

- key switches; or
- immobilisers; and
- a system for authorising drivers.

Remember, 'authorised' doesn't just mean being familiar with the equipment or what it does. It means being formally approved to drive it. It's a bit like having a driving licence and usually involves training and preparation – and a test!

Minimising the effects of a collision between equipment which operates on and shares a common rail system or network

This could include:

- fitting buffers;
- fitting bumper bars;
- ensuring that equipment is capable of being seen and heard clearly by other users of the track or rail.

Lights and horns may need to be considered to avoid collision in some situations.

Ensuring that the equipment can brake and stop

This might seem obvious, but it needs to be checked. It is not enough to have brakes – they need to be checked regularly and must work efficiently.

Ensuring, where needed, that there are back-up braking and stopping devices

The main point to note is that back-up devices must be completely independent of the main braking system.

Case study: Building site

During the construction of a supermarket extension, one of the construction workers was driving a dumper truck to the construction site. He noticed that there was a problem with the truck's brakes, which were stiff to operate and hardly responded when he pressed the brake pedal. He managed to stop the truck and set off to find his supervisor to report the problem, without realising that he had actually pulled up just outside the supermarket's maintenance area.

The driver of an electrical parts delivery van, on his daily delivery to the store, saw that his route to the maintenance area was blocked by the dumper truck. He noticed that the keys had been left in the truck's ignition and, as he was in a hurry, decided to move the truck himself. He started the truck and by mistake put it into reverse. Unable to stop, the truck careered out of control and crashed into the wall of the building. The van driver received a serious back injury. Luckily, in this case, the truck and wall were the only other things to be damaged.

Improving visibility

Ensuring that the driver's field of vision is enhanced

For each work situation, check that drivers can see in front of them and behind when their equipment is loaded normally. If there are blind spots, eliminate them by positioning mirrors at appropriate points on the equipment.

Other steps may be needed to maximise visibility. For example, where drivers have to negotiate blind bends between racks in a warehouse, mirrors may have to be fitted to facing walls.

Ensuring that equipment can be used safely in dark and poorly lit situations

Because the equipment is mobile, there are times when it could be operated in poorly lit areas of the workplace. Lights may not be needed if the equipment is operating in the main location (eg the production area), but are essential in the storage compound.

Case study: Food processing

A new food processing plant needed to discharge its liquid and slurry waste into tankers for disposal. Its method was to pump the waste material to discharge points on an overhead gantry. This meant that tanker drivers had to reverse their vehicles accurately below the discharge points in the tanker bay. For the safety of their own operators, who were responsible for filling the tankers, and for the benefit of the tanker drivers, the plant owners stipulated that tankers used for this job must have enlarged rear-view cabin windows. This will give the driver a clear rear view of the gantry points.

Preventing fire

Employers must ensure that fire extinguishers are readily available in case of fire in the equipment or in material carried by it.

The ACOP states:

The carriage of appropriate fire-fighting equipment

374 Where escape from self-propelled work equipment in the event of a fire could not be achieved easily, you should ensure that fire-fighting appliances are carried on that equipment.

Key terms	
Self-propelled work equipment	Work equipment propelled by its own motor or mechanism, powered by energy either generated on the equipment itself, or from a remote source.
Unauthorised person	A person not formally permitted by the employer to operate the equipment.
Braking and stopping device	Mechanisms within the equipment that ensure that it can be brought safely to, and remain securely at, rest.
Automatic (braking and stopping) system	A system within the equipment which operates automatically and independently, in the event of failure of the brake and stopping device, to perform the functions of braking and stopping.
Direct field of vision	The areas in front, behind and around, which must be clearly visible to the driver in all circumstances to ensure safe manoeuvring.
Dark	A level of ambient illumination which is not sufficient for safe operation of equipment.
Fire-fighting appliance	A portable pressurised spray device containing a fire-extinguishing fluid or powder.

Activity

List the types of equipment in your organisation which you think come under regulation 28. Make a note of any changes needed to ensure that the equipment complies.

Feedback on page 102.

Self-assessment questions

1 What are the key characteristics of the equipment covered by the regulation?
2 List the seven specific areas of risk.
3 What are the main kinds of changes that are called for in this regulation?

Answers on page 102.

Regulation 29 Remote-controlled self-propelled work equipment

NEW

Key points

This regulation deals with a special and relatively recent type of self-propelled equipment that is driverless and relies on external signals transmitted electronically for its guidance and control.

Regulation 29 states:

Every employer shall ensure that where remote-controlled self-propelled work equipment involves risk to safety while in motion –

(a) it stops automatically once it leaves its control range; and
(b) where the risk is of crushing or impact it incorporates features to guard against such risk unless other appropriate devices are able to do so.

The regulation focuses on minimising the risk to people who could be present within, or close to, the operating range of this equipment by:

- ensuring that it is controlled to stop automatically if it goes beyond its operating range;
- introducing measures to reduce the risk of contact and crushing.

The guidance in the ACOP states:

378 As part of your risk assessment you need to consider risks, due to the movement of the equipment, to the person controlling it and also to anyone else who may be in the vicinity. You may need to consider alarms or flashing lights so that other people in the area are aware of its movement, or presence, sensing or contact devices which will protect people from the risks associated with the equipment, ie if people may come close to or contact it.

The guidance also covers:

- a definition of remote-controlled self-propelled work equipment;
- the need for every part of the equipment to come to a safe stop.

Key terms	
Control range	The area within which the equipment is limited to operate.

Activity

If remote-controlled self-propelled mobile work equipment is operated in your workplace, it's likely that you are familiar with relatively complex systems of technology. This regulation, though, is concerned with the 'risk to the safety of persons' which means that both the technology and those who could be at risk need to be considered in your safety provisions. Consider your arrangements to

see whether you are meeting both requirements. Explain your findings briefly.

Feedback on page 102.

Self-assessment questions

1 What is the state of remote-controlled self-propelled work equipment that involves risk which is covered by regulation 29?
2 What must be ensured when equipment leaves its control range?
3 What is the particular danger to people referred to in regulation 29(b)?
4 What safety provisions must be in place where risk of the danger in question 3 exists?

Answers on page 102.

Regulation 30 Drive shafts

Key points

This regulation applies to mobile work equipment that operates in combination with functional accessories or with trailers and provides them with a source of power by way of a mechanical drive extension. It deals with protecting employees from the risk posed by seizure of the drive unit between mobile equipment and its accessories.

Regulation 30 states:

(1) Where the seizure of the drive shaft between mobile work equipment and its accessories or anything towed is likely to involve a risk to safety every employer shall –

(a) ensure that the equipment has a means of preventing such seizure; or
(b) where such seizure cannot be avoided, take every possible measure to avoid an adverse effect on the safety of an employee.

(2) Every employer shall ensure that –

(a) where mobile work equipment has a shaft for the transmission of energy between it and other mobile work equipment; and
(b) the shaft could become soiled or damaged by contact with the ground while uncoupled;

the work equipment has a system for safeguarding the shaft.

The regulation focuses on:

- the provisions needed to prevent or protect those at risk from the circumstances and the consequences of seizure of the mechanical drive;
- the means of preventing contact between the mechanical drive extension (or shaft) and the ground.

It requires that, where seizure of the extended drive between the main equipment and its accessories is likely, it is prevented. If seizure cannot be avoided, measures must be taken to ensure that employees are not put at risk as a result.

In circumstances where the drive shaft might come into contact with the ground, this regulation requires that the equipment has a means of preventing this from happening.

Guidance on the regulation explains:

- what a drive shaft is;
- 'appropriate measures' to prevent unexpected seizure;
- methods to prevent damage to power take-off or drive shafts;
- how the equipment should be supported when not in use

Key terms	
Seizure	Unintended, sudden and complete jamming.
Drive unit	The mechanical device which produces power.
Drive or take-off shaft	The part of the drive unit which transmits the power and connects with the accessory.
Adverse effects	Injury from being struck by bursting or exploded equipment fragments, which could be very hot.

Activity

Seizure of drive shafts is potentially serious and can lead to high-risk incidents. List the sorts of things you should include in a scheme of measures to prevent it.

Feedback on page 103.

Self-assessment questions

1 What is the dangerous condition in drive shafts addressed by regulation 30?
2 Where this condition is likely, what must employers ensure?
3 With regard to power take-off or drive shafts, what does the regulation say must be prevented?
4 Why must it (the answer to question 3) be prevented?

Answers on page 103.

Feedback and answers

Regulations 1–3: Self-assessment questions

1 The Provision and Use of Work Equipment Regulations 1998.
2 5 December 1998.
3 New, existing and second-hand or leased equipment.
4 Applies to use of work equipment.
5 To avoid any ambiguity of meaning within the Regulations.
6 The definitions are:

- *the 1974 Act* – refers to the Health and Safety at Work etc Act 1974;
- *employer* – used broadly to include several groups: self-employed people and the equipment they use at work, people in charge of work equipment, anyone using, supervising or managing how work equipment is used, as well as the way the work equipment itself is used in a work context;
- *essential requirements* – the requirements in regulation 10(1), ie health and safety requirements relating to the design or construction of work equipment in any of the instruments which give effect to Community directives concerning the safety of products;
- *inspection* – has the meaning it bears in PUWER regulation 6, including testing where appropriate;
- *power press* – power-driven equipment that includes a flywheel and a clutch (used for working cold metal by using tools or for die proving);
- *thorough examination* – a detailed examination by a competent person including testing the nature and extent of which are appropriate for the thorough examination;
- *use* – all activities centred around work equipment, from starting, stopping, programming, setting, transporting, repairing, modifying, maintaining and servicing through to cleaning;
- *work equipment* – any machinery, appliance, apparatus, tool or installation used in a work situation.

7 Includes self-employed people, people in charge of work equipment; anyone using, supervising or managing how work equipment is used.
8 Great Britain; offshore installations on the Continental Shelf.
9 Employers; self-employed; and those in control of work equipment.

Regulation 4: Activity

You could have listed:

In the equipment's location:

- space occupied by the equipment;
- space occupied by materials necessary for the equipment, eg product, raw materials, fuel;
- access needed to operate and maintain it, including removing large sections or parts of it;
- other equipment next to it or nearby;
- lighting, ventilation.

The equipment itself:

- its size, shape, weight;
- its construction (hard, sharp);
- its complexity (eg large number of controls?; operated by electric power or compressed air?; generation of fumes?; energy sources?);
- whether it has exposed, moving parts;
- whether it is mobile or transportable;
- whether it generates heat.

The people involved – are any special skills needed:

- to operate it;
- to maintain it.

Regulation 4: Self-assessment questions

1 Construction OR adaptation of work equipment to make it suitable; risks to the health and safety of employees; work equipment only to be used for operations for which it is suitable; definition of 'suitable'.
2 Employers have to assess the risks in the working environment that exist in their business and ensure that in using their choice of work equipment it does not pose any added risk to their employees.
3 That it should only be used where there is sufficient air of good quality available to ensure health and safety.
4 'Suitable' means that the employer has to foresee any likely problems that might affect the health and safety of operators and others while the equipment is being used.

Regulation 5: Activity

You could have listed:

- provision of a record of what has happened;
- to have a plan for carrying out checks, ahead of problems;
- to be able to track critical conditions, for example, power consumption or bearing temperatures;
- ability to flag the need for particular jobs to be carried out in future;
- provision of a complete record of events for the purpose of any statutory inspections required;
- ability to demonstrate that you operate within the requirements of health and safety legislation;
- management control over essential maintenance.

Regulation 5: Self-assessment questions

1 'Efficient state' refers to the general safe condition of the equipment; 'efficient working order' relates to whether everything which contributes to safety works as it should; 'in good repair' means making sure that repairs and maintenance are done at the right time and to the correct standard.
2 To anticipate and prevent problems which could increase the risk to people's health and safety.
3 Because machines are generally more complex than other equipment and normally present a greater risk to health and safety.

Regulation 6: Activity

Your explanation may include:

- looking at maintenance history records to pick up any trends or regular problems on similar equipment;
- looking at equipment suppliers' manuals to pick up their recommendations;
- linking inspections with existing preventive maintenance routines.

Regulation 6: Self-assessment questions

1 When installed and put into routine operation for the first time; where relocated; where deterioration in use could occur; when safety is evidently at risk as a result of exceptional circumstances.
2 To ensure equipment is installed and is safe to operate; to anticipate safety problems and take remedial action in good time; to establish cause and take remedial action.
3 A competent person.
4 Until the next inspection.
5 Evidence of the last inspection must accompany the equipment when used outside the employer's business or business sites.

Regulation 7: Activity

You could have listed any or all of the following operations and activities:

- normal running, monitoring conditions;
- starting and stopping in normal operation;
- stopping in an emergency;
- preparations necessary for maintenance;
- routine maintenance;
- repairs and replacement of key parts;
- adjustments;
- checking after maintenance and before starting;
- procedures to be followed;
- safe systems of work;
- safety equipment and personal protective equipment.

Regulation 7: Self-assessment questions

1 It should be restricted to people given the task of using it.
2 Only people who have been designated to carry out these operations.
3 To ensure that the employees have received adequate training on carrying out any of these operations.

Regulation 8: Activity

Having located information, and using your accumulated operating experience, can you guarantee that the information is up to date with all changes and adaptations made to the equipment?

Regulation 8: Self-assessment questions

1 Either verbally or in writing – whatever is most appropriate to the employees' needs and the risks associated with the work and equipment.
2 Employees using work equipment; anyone supervising or managing work equipment.
3 Conditions and methods of using the work equipment: foreseeable abnormal circumstances; conclusions drawn from using the work equipment; making them comprehensible.

Regulation 9: Activity

You could have noted the following:

When people are using work equipment or managing its use, are they:

- closely supervised?
- unsupervised?
- working alone or within a work group?
- working in different locations and surroundings?
- working in remote or hazardous locations?

Do they:

- wear protective clothing?
- use special tools or other devices?
- need to demonstrate a high level of physical fitness?

Can competence be proved:

- by demonstration and observation?
- by written testing?

Regulation 9: Self-assessment questions

1 People using work equipment; employees who supervise or manage the use of work equipment.
2 Methods to be adopted when using work equipment; any risks entailed; precautions to be taken.
3 The employer shall ensure that mobile work equipment, including attachments or towed equipment is only driven by workers who have received appropriate training.

Regulation 10: Activity

1 1 January 1993.
2 Its safety as designed, constructed and provided for use.

Regulation 11: Activity

It's likely that you have taken a combination of the measures required. In arranging the regulation's requirements in order of priority – in the hierarchy of measures – you need to consider carefully and systematically how each particular risk is most effectively eliminated or reduced. Only when all that is reasonably practicable has been done at the higher level may measures at a lower level be considered.

Regulation 11: Self-assessment questions

1 Prevent access to dangerous parts; stop dangerous parts from moving before a person can get close to them.
2 Fixed enclosing guards; other guards or protection devices; protection appliances like jigs, push sticks, holders, etc; information, instruction, training and supervision.
3 Any zone in or around machinery in which a person is exposed to a risk to health or safety from contact with a dangerous part of machinery or a rotating stock-bar.
4 11(3)(c) – (They shall) be maintained in an efficient state, in efficient working order and in good repair; 11(3)(h) – (They shall) be so constructed or adapted that they allow operations necessary to fit or replace parts and for maintenance work, restricting access so that it is allowed only to the area where the work is to be carried out and, if possible, without having to dismantle the guard or protection device.

Regulation 12: Activity

It's likely that the review of your equipment may have revealed gaps in the measures required to control specified hazards. To expose more fully all areas of risk, you'll need to carry out a proper risk assessment. An approach could be to break the equipment down into its different functions and analyse each function for risk involved, for example:

- available physical guarding systems;
- systems to supply energy to the equipment;
- systems to handle or convey materials to the equipment, etc.

Regulation 12: Self-assessment questions

1 They must prevent or adequately control the risk.
2 'Adequate' means with regard only to the nature of the hazard and degree of exposure to risk.
3 (a) any article or substance falling or being ejected from work equipment;
(b) rupture or disintegration of parts of work equipment;
(c) work equipment catching fire or overheating;
(d) the unintended or premature discharge of any article or of any gas, dust, liquid, vapour or other substance which, in each case, is produced, used or stored in the work equipment;
(e) the unintended or premature explosion of the equipment or any article or substance produced, used or stored in it.

Regulation 13: Activity

This table is provided for interest. It shows the nature of injuries – including burns – to employees as a proportion of all non-fatal major injuries from 1987/88 to 1995/96 as reported to enforcing authorities. The data exclude:

- reports made to HSE's Quarries Inspectorate;
- reports to HSE's Railway, Mines and Explosives Inspectorate;
- injuries in the offshore oil and gas industry.

	1987/88	**1988/89**	**1989/90**	**1990/91**	**1991/92**	**1992/93**	**1993/94**	**1994/95**	**1995/96**
fractures	70%	72%	72%	75%	75%	74%	76%	74%	76%
amputations	10%	10%	9%	7%	7%	6%	6%	6%	6%
burns	5%	4%	5%	5%	5%	5%	4%	4%	4%
total injuries	**147 430**	**18 619**	**19 239**	**18 925**	**16 739**	**16 230**	**16 137**	**16 604**	**16 136**

Nature of injuries to employees: from Health and safety statistics 1996/74 (see Further information, page 75).

Regulation 13: Self-assessment questions

1 Engineering measures.
2 Reducing surface temperature; insulation; shielding; barricading; guarding.
3 Provide: personal protective equipment, training, warning signs and signals, supervision, operating instructions and instructions for use.

Regulation 14: Activity

If reports of these events appear only in your accident records, it would be worthwhile implementing a reporting system which records such events whether or not an accident is caused. These are potentially very dangerous circumstances and should be given a high priority. They are the kinds of event that must be investigated and brought under effective control.

Regulation 14: Self-assessment questions

1 (a) starting work equipment; (b) re-starting work equipment; (c) controlling changes in operating conditions.
2 Regulation 14 deals with the increased risk which is created by changes in operating conditions.
3 To ensure that people are not caught unaware by the changes in operating conditions or mode of operation of equipment and the controls cannot be operated accidentally.
4 Machinery which operates automatically, for example any machines controlled by electronic programming.

Regulation 15: Activity

Regulation 15 requires you to have identified where it is appropriate, for reasons of health and safety in the equipment you use, to have stop controls which minimise risk. If your recorded information is up to date and reliable, you are in the best position to show that you comply with this regulation.

Regulation 15: Self-assessment questions

1 To bring the work equipment to a safe condition in a safe manner.
2 To bring equipment to a complete stop; to then switch off all sources of energy; to operate in priority to start controls or controls which change operating conditions.
3 That controls are provided where appropriate and necessary for reasons of health and safety.

Regulation 16: Activity

If your records are already complete, up to date and used to review your current requirements for safety controls – well done! If you don't keep records, or they are not specific enough for those purposes, plan to address this issue. A risk assessment could be the place to start.

Regulation 16: Self-assessment questions

1 Emergency stop control; it must be readily accessible.
2 It is not necessary because of the nature of the hazards present and the time taken for the work equipment to come to a complete stop as a result of the action of any control provided under regulation 15(1).
3 The emergency stop control must operate in priority of any other stop control.

Regulation 17: Activity

Are you satisfied that you meet the requirements? Are you certain that your arrangements for identifying controls are up to date with any changes that have been made to equipment?

Regulation 17: Self-assessment questions

1 They must be clearly visible, identifiable and include appropriate marking where necessary.
2 They must not be exposed to risk to their health and safety.
3 That nobody is in a place where they would be exposed to any risk from the operation of that control.
4 They must be given sufficient time to get clear and the means to avoid that risk.

Regulation 18: Activity

Do these sound familiar? Control systems are so important. They deal with complex and often dangerous operations. Make sure that the systems are given proper attention:

- during the equipment's design and specification;
- when equipment is being tested before going into operation;
- regularly, while in operation;
- when faults occur;
- when there is any evidence of risk to health and safety.

Carry out a staff training-needs analysis involving everyone who needs to know about the control systems in your undertaking. Find out staff's existing knowledge, skills and behaviour relating to the systems. Then design, deliver and evaluate a training programme to meet the needs identified.

Regulation 18: Self-assessment questions

1 That due allowance is made for the failures, faults and constraints to be expected in the planned circumstances of the equipment's use.
2 Its operation does not create any increased risk; failure of any of its parts must not result in additional risk; the loss of its supply of energy must not result in additional risk; it does not impede the operation of any of the equipment's stop or emergency stop controls.
3 Regulations 15 and 16.

Regulation 19: Activity

You could have listed the physical or 'hardware' measures, for example:

- padlocks for locking off switches;
- hasps of different kinds for locking off valves;
- blanking plates or flanges for piping connections;
- warning notices.

Remember – even though isolating equipment is well established as a critical safety operation, you'll need to use other measures too. These include training, information and a safe system of work.

Regulation 19: Self-assessment questions

1 Where appropriate, the provision of suitable means to isolate work equipment from all its sources of energy.
2 The means of isolation have to be clearly identifiable and readily accessible.
3 Reconnecting any energy sources to work equipment.

Regulation 20: Activity

For temporary equipment, you may have included scaffolding and ladders. Both of these are vulnerable to the conditions and circumstances of their location – especially if they are used out of doors. Great care needs to be taken with stability in windy conditions.

Regulation 20: Self-assessment questions

1 To prevent it from becoming unstable and posing a danger to people's health and safety.
2 Bolting to the ground; fastening down; tying or fastening to supports or platforms.

Regulation 21: Activity

Since lighting often causes problems for employees, it is important to consider it carefully. Look at the recognised standards for suitable levels of lighting. Make sure that you are familiar with the techniques available to you for measuring lighting levels and checking that the lighting is appropriate for the tasks being performed.

Regulation 21: Self-assessment questions

1 Lighting must be suitable and sufficient for the tasks being performed.
2 It covers where and when local lighting on work equipment should be provided and when additional lighting may be required.

Regulation 22: Activity

Your records should make it clear which incidents or accidents can be attributed to maintenance, and which ones occur during other operations. If they don't, consider reorganising your records so that the distinction is clear.

Assess whether anything needs to be done to improve the safety of your maintenance operations in general.

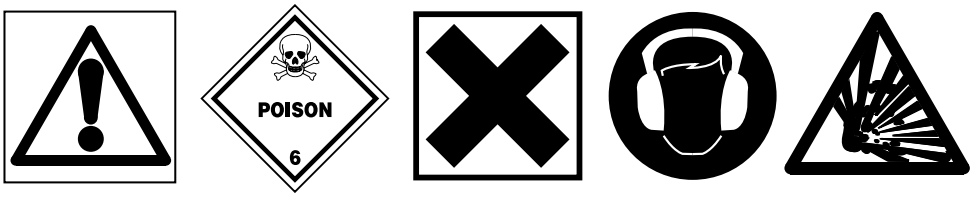
Your description of how one accident could have been avoided may include:

- shutting equipment down;
- carrying out isolations;
- improving the safety of equipment which moves by using guards, barriers, remote measurement;
- improving access;
- making more or better PPE available and ensuring it is used.

Regulation 22: Self-assessment questions

1 Can the equipment be shut down? Can the equipment be provided with additional safety measures? Can employees be protected?
2 Shut down or made inactive.
3 Temporary guards; barriers; controls to limit movement; controls to limit speed; protective clothing.

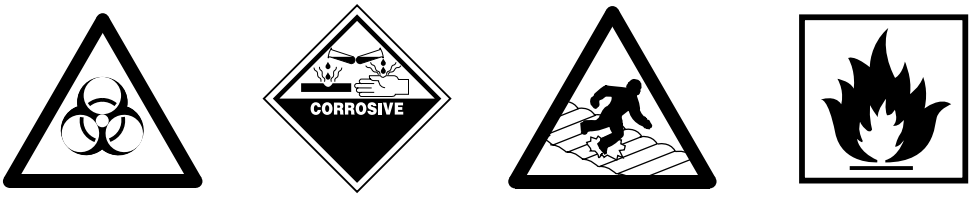
Regulation 23: Activity



Regulation 23: Self-assessment questions

1 That work equipment is marked appropriately for reasons of health and safety.
2 That markings are clear and visible.

Regulation 24: Activity



Regulation 24: Self-assessment questions

1 To ensure that work equipment incorporates any warnings or warning devices appropriate for reasons of health and safety.
2 Warnings will not be appropriate unless they are unambiguous, easily perceived and easily understood.
3 That they are perceived by being audible and/or visual.

Regulation 25: Activity

If you think that the mobile equipment in your organisation is fitted for safety because you are not aware of any accidents having happened to people being carried in the equipment, you could be under a misapprehension. Lack of accidents does not mean that risks do not exist. Regulation 25 states that you need to take steps to identify where risks exist and then fit whatever measures are appropriate to minimise those risks to employees' safety. Make a start by getting the views, opinions and ideas of people who regularly use the equipment in different conditions.

Regulation 25: Self-assessment questions

1 Mobile work equipment.
2 Risk from the equipment's wheels or tracks.
3 Make the equipment safe for those being carried by providing measures which reduce risk in the particular circumstances in which they work.

Regulation 26: Self-assessment questions

1 By incorporating into the equipment, when the risk of rolling over exists:

- stabilising equipment;
- a structural feature which prevents rolling over beyond 90°;
- where overturning beyond 180° is possible, a structural feature which encloses the occupants, to prevent crushing;
- a device giving comparable protection.

2 People are in danger of being thrown out and crushed by the overturning equipment. A restraining system is required to hold them secure within the equipment.
3 'Roll-over Protective Structure'.
4 Fork-lift trucks.

Regulation 27: Activity

It's probable that the newer your equipment, the more likely it is that it will be equipped to recent standards and be satisfactory. However, it would be worthwhile to look again at older equipment to check that it is provided with the measures required by the regulation.

Regulation 27: Self-assessment questions

1 Fork-lift trucks which have:

- a structure which limits overturning to 90°; or
- a structure which contains those carried if overturning beyond 90°.

2 Overturning.
3 By modifying the truck or providing additional safety measures according to the risk present in particular circumstances.

Regulation 28: Activity

You could take several different approaches. Here is a suggestion. Think of the main functions in your organisation and then list the types of mobile equipment within it, for example:

Construction	On-site transport – rough terrain vehicles – earth movers, dumpers, diggers
	Smooth terrain vehicles – dumper trucks, trailers, pick-up trucks
Manufacturing	Materials supply – tankers, container lorries, dumper trucks, wagons
Farming	Land-use vehicles – tractors, combine harvesters.

Regulation 28: Self-assessment questions

1 That the equipment is moving and being operated by a driver. Certain specified features need to be part of or fitted to the equipment for it to be safe.
2 They are:

- start-up by an unauthorised person;
- collision between items of rail mounted work equipment;
- lack of a properly functioning braking and stopping system;
- lack of an independent braking and stopping system;
- obstruction of the driver's view;
- inadequate lighting;
- fire on the equipment or on an appliance towed by it.

3 This regulation is mainly concerned with ensuring that equipment is adapted or modified to include additional safety provisions. These usually involve changes to the equipment hardware.

Regulation 29: Activity

If you have looked at your arrangements, answer these two questions:

- Do you monitor equipment operation more closely at critical times, for example after modifications or maintenance work, or when a change in the facilities is introduced?
- Do you check that, for example, people new to the workplace or unfamiliar with it know about remote-controlled equipment?

If you answered 'no' or 'sometimes' to either question, plan ways to improve your systems so that you can always answer 'yes'.

Regulation 29: Self-assessment questions

1 While it is in motion.
2 That it stops automatically.
3 Crushing or other impact.
4 Facilities to guard against crushing or impact; appropriate devices to control the risk of impact.

Regulation 30: Activity

Check that you have all these on your list:

1 When selecting equipment, check equipment specifications for those which have anti-seizure features included in their design.
2 Ensure that maintenance of equipment drive shafts is planned to eliminate problems which could result in seizure, before it occurs.
3 Implement a routine of regular checking during operation to identify damage or signs that seizure is likely, such as overheating, excessive noise, oil leaks.

Regulation 30: Self-assessment questions

1 Seizure.
2 Ensure that equipment has a means of preventing it; when it cannot be avoided, take every possible measure to avoid its adverse effects on employees.
3 Contact with the ground.
4 Because of damage which could affect the proper, safe functioning of the unit and how securely it is connected to accessories.

Further information

References

1 *Safe use of power presses. Provision and Use of Work Equipment Regulations 1998 as applied to power presses. Approved Code of Practice and guidance* L112 HSE Books 1998 ISBN 978 0 7176 1627 5

2 *Five steps to risk assessment* Leaflet INDG163(rev2) HSE Books 2006 (single copy free or priced packs of 10 ISBN 978 0 7176 6189 3) www.hse.gov.uk/pubns/indg163.pdf

3 *Buying new machinery: A short guide to the law and some information on what to do for anyone buying new machinery for use at work* Leaflet INDG271 HSE Books 1998 (single copy free or priced packs of 15 ISBN 978 0 7176 1559 9) www.hse.gov.uk/pubns/indg271.htm

4 *Health and safety statistics 1996/7* HSE Books (see www.hse.gov.uk/statistics for latest information)

Further reading

Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance L22 (Second edition) HSE Books 1998 ISBN 978 0 7176 1626 8

Safe use of lifting equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved Code of Practice and guidance L113 HSE Books 1998 ISBN 978 0 7176 1628 2

Safe use of woodworking machinery. Provision and Use of Work Equipment Regulations 1998 as applied to woodworking machinery. Approved Code of Practice and guidance L114 HSE Books 1998 ISBN 978 0 7176 1630 5

Managing health and safety: Five steps to success Leaflet INDG275 HSE Books 1998 (single copy free or priced packs of 10 ISBN 978 0 7176 2170 5) www.hse.gov.uk/pubns/indg275.pdf

Workplace transport safety: An employers' guide HSG136 (Second edition) HSE Books 2005 ISBN 978 0 7176 6154 1

COSHH a brief guide to the Regulations: What you need to know about the Control of Substances Hazardous to Health Regulations 2002 (COSHH) Leaflet INDG136(rev3) HSE Books 2005 www.hse.gov.uk/pubns/indg136.pdf

Safe work in confined spaces Leaflet INDG258 HSE Books 1997 (single copy free or priced packs of 20 ISBN 978 0 7176 1442 4) www.hse.gov.uk/pubns/indg258.pdf

Control of substances hazardous to health (Fifth edition). The Control of Substances Hazardous to Health Regulations 2002 (as amended). Approved Code of Practice and guidance L5 (Fifth edition) HSE Books 2005 ISBN 978 0 7176 2981 7

A guide to the Health and Safety (Consultation with Employees) Regulations 1996. Guidance on Regulations L95 HSE Books 1996 ISBN 978 0 7176 1234 5

Lighting at work HSG38 (Second edition) HSE Books 1997
ISBN 978 0 7176 1232 1

Application of electro-sensitive protective equipment using light curtains and light beam devices to machinery SG180 HSE Books 1999 ISBN 978 0 7176 1550 6

Essentials of health and safety at work (Fourth edition) HSE Books 2006
ISBN 978 0 7176 6179 4

Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21
(Second edition) HSE Books 2000 ISBN 978 0 7176 2488 1

Workplace health, safety and welfare. Workplace (Health, Safety and Welfare) Regulations 1992. Approved Code of Practice L24 HSE Books 1992
ISBN 978 0 7176 0413 5

A step by step guide to COSHH assessment HSG97 (Second edition) HSE Books 2004 ISBN 978 0 7176 2785 1

EH40/2005 Workplace exposure limits: Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations 2002 (as amended) Environmental Hygiene Guidance Note EH40 HSE Books 2005
ISBN 978 0 7176 2977 0

Rider-operated lift trucks. Operator training. Approved Code of Practice and guidance L117 HSE Books 1999 ISBN 978 0 7176 2455 3

Industrial robot safety: Your guide to the safeguarding of industrial robots HSG43
(Second edition) HSE Books 2000 ISBN 978 0 7176 1310 6

The Supply of Machinery (Safety) Regulations 1992 SI 1992/3073
The Stationery Office ISBN 978 0 11 025719 8

The Supply of Machinery (Safety) (Amendment) Regulations 1994 SI 1994/2063
The Stationery Office ISBN 978 0 11 045063 6

The Electrical Equipment (Safety) Regulations 1994 SI 1994/3260
The Stationery Office ISBN 978 0 11 043917 4

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