

Health and safety in swimming pools



HSG179 (Fourth edition) Published 2018

This is the fourth edition of *Managing health and safety in swimming pools* (first published as *Safety in swimming pools*). The revision brings the guidance up to date with changes in health and safety law and new developments in relation to equipment and facilities.

This publication provides guidance for those who have any involvement with the operation and management of health and safety in swimming pools.

The fourth edition has been reissued with minor amendments to:

- reflect changes to British Standards
- clarify the competencies required by swimming teachers
- clarify requirements relating to PPE and work in confined spaces
- include information on small rafts and inflatable toys

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This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, 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.

Contents

Introduction	4
What the law requires	7
Managing for health and safety	9
Ensuring pool users' safety	17
Lifeguards	27
Pool equipment and features	31
Maintenance of plant and equipment	37
Swimming pool design	44
The pool water treatment system	48
Emergency procedures	54
Appendix 1 Further legislation	57
Further information	60

Introduction

- 1 This revised document updates the guidance on health and safety in swimming pools.
- 2 It complements the requirements of BS EN 15288–1 *Swimming pools Part 1: Safety requirements for design* and BS EN 15288–2 *Swimming pools Part 2: Safety requirements for operation*.
- 3 If you are a swimming pool operator this guidance is aimed at you, to help you comply with your duties under the Health and Safety at Work etc Act (the HSW Act) and the regulations made under it.
- 4 A visit to a swimming pool ought to be a safe and enjoyable experience. This guidance will help you to minimise risks to workers and pool users, without unduly restricting enjoyable and beneficial pool activities.
- 5 You are a pool operator if you are the designated person or organisation responsible for operating the pool.

How to use this guidance

- 6 This guidance provides practical advice on how to comply with the law relating to the management of health and safety in swimming pools. It covers both worker (www.hse.gov.uk/workers) and bather safety. Following the advice will help you prevent or reduce accidents and ill health.
- 7 The document gives management advice and technical information on health and safety in swimming pool design and pool water treatment. The information on swimming pool design and pool water treatment is only an introduction to these topics. For more in-depth technical information, you should refer to the specific industry guidance listed below:
 - The Pool Water Treatment Advisory Group (PWTAG) Code of Practice (www.pwtag.org);
 - The Swimming Pool Water Book (www.pwtag.org);
 - PWTAG Technical notes (www.pwtag.org);
 - The European Standard EN 13451 *Swimming pool equipment* (Parts 1–11);
 - Sport England *Design Guidance Note for Swimming Pools* (www.sportengland.org);
 - Sport England *Appendix 1: Pool Types and Technical Design Issues* (www.sportengland.org);

- Sport England *Appendix 2: Servicing the Building* (www.sportengland.org);
- Sport England *Appendix 3: Construction and specification considerations* (www.sportengland.org);
- Sport England *Appendix 4: Improvement and alterations to existing swimming pools* (www.sportengland.org);
- Sport England *Appendix 5: Further Information* (www.sportengland.org).

Pools covered by this guidance

8 This guidance applies to pools used by the public for water-related activities, as defined in BS EN 15288–2, as Type 1, 2 or 3. These include:

- communal pools;
- leisure pools;
- water parks;
- hotel pools;
- camping pools;
- club pools;
- paddling pools that are part of a larger pool or complex;
- therapeutic pools;
- pools in places of education;
- diving pools;
- military training pools;
- rescue training pools;
- counter-current training pools;
- scuba-diving pools.

9 The guidance may also apply in other non-conventional settings, such as to holiday lets in residential complexes. It has limited application to pools which consist of segregated areas of rivers, lakes or the sea.

10 Recommendations on safe design, working methods and supervision should be followed where they are relevant. In particular, pay attention to:

- signposting hazards;
- supervision of equipment;
- adequacy of written procedures, including emergency procedures;
- organisation and training of staff.

11 Specific recommendations on training etc, will have limited application in pools with unclear water and irregular natural bottoms.

12 The guidance does not apply to:

- private swimming pools in domestic premises while being used solely by the owner, family and guests;
- stand-alone children's paddling pools in public parks;
- stand-alone spa pools. The HSE publication *The control of legionella and other infectious agents in spa-pool systems* (www.hse.gov.uk/pubns/books/hsg282.htm) gives more information.

13 This guidance contains principles which, if followed, will help to promote a safer environment.

Separate advice on areas not covered in this guidance

14 You can get advice on the following areas not covered by this guide:

- **Child protection** is the responsibility of the government of each country in the UK (you can find information at www.nspcc.org.uk/preventing-abuse).
- **Access for disabled people** comes under the Equality Act. There is more information at www.gov.uk/guidance/equality-act-2010-guidance.
- **Water quality and hygiene** are not included in this guide, except where these issues may also be covered under the HSW Act. You can find information at www.gov.uk/check-drinking-water-quality and www.scottishwater.co.uk/business.
- **Advice on fire safety in the workplace** can be provided by your local fire authority.

Use of ‘must’ and ‘should’

15 In HSE guidance, ‘must’ is used only where there is an explicit legal requirement to take a certain action. ‘Should’ is used to indicate what to do to comply with the law – although dutyholders are free to take other action if that would result in compliance.

Meaning of ‘reasonably practicable’

16 When you see the term ‘so far as is reasonably practicable’ in this guidance it means balancing the level of risk against the measures needed to control the real risk in terms of money, time or trouble. However, you do not need to take action if it would be grossly disproportionate to the level of risk.

Enforcement of health and safety law

17 Under the Health and Safety (Enforcing Authorities) Regulations, the local authority is the enforcing authority for all pools unless it is the owner and/or occupier with control of the activities or equipment. HSE is the enforcing authority in pools operated by local authorities, in educational establishments and at Ministry of Defence premises.

What the law requires

18 Every pool operator is responsible for the health and safety of employees, pool users and other people on the premises. The HSW Act, the Management of Health and Safety at Work Regulations and others place general obligations on pool operators. The following are the key pieces of legislation that all pool operators should be aware of.

19 Appendix 1 includes a list of other legislation, which while not exhaustive, highlights pieces of legislation that may apply depending on the nature of your business.

Health and Safety at Work Act

20 The HSW Act places duties on employers, employees and self-employed people. It protects not only people at work, including those undertaking voluntary work, but also the general public who may be affected by work activities. The general requirements under the HSW Act are that equipment and plant are safe, the workplace is safe, there are safe systems of work and there is the provision of information, instruction, training and supervision needed to ensure that safety.

21 Employees must do all that is reasonably practicable to take care of their own health and safety and that of others, including those undertaking voluntary work, who may be affected by their acts or omissions at work and they must co-operate with their employers in complying with statutory health and safety obligations.

Management of Health and Safety at Work Regulations

22 As a pool operator, under the Management of Health and Safety at Work Regulations (MHSWR), you must carry out an assessment of the risks which may affect employees, and others, as a result of the work activity. These requirements also take into account members of the public using the pools. You must then take appropriate action to eliminate or reduce those risks as far as is reasonably practicable. See www.hse.gov.uk/pubns/books/hsg65.htm

Control of Substances Hazardous to Health Regulations (COSHH)

23 As a pool operator, you must carry out an assessment under COSHH to protect your workforce and visitors against health risks from hazardous substances used at work. Having assessed the risks decide what precautions are necessary to prevent or control exposure. Then monitor the procedures and make sure that the control measures are used and maintained.

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations

24 Employers, the self-employed and people in control of premises where work is carried out, including pool operators, have duties under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). You must report certain work-related accidents and cases of ill health to the appropriate health and safety enforcing authority. For further details about reporting accidents, ill health or dangerous occurrences see www.hse.gov.uk/riddor/.

Managing for health and safety

Risk assessment

25 This section deals with managing risks specific to swimming pools. Risk assessment is central to the effective management of health and safety. It is the duty of pool operators to ensure risks are adequately identified, assessed and controlled to prevent harm to employees and those affected by the work activity. See www.hse.gov.uk/risk for more general information about risk.

26 If you have five or more employees, you must record your assessment but, even if you have fewer than five, it makes sense to write down what steps you have taken to identify the risks.

Competence in health and safety

27 Competence can be described as the combination of training, skills, experience and knowledge that a person has and their ability to apply them to perform a task safely. Other factors, such as attitude and physical ability, can also affect someone's competence. As an employer, you should take account of the competence of relevant employees when you are conducting your risk assessments. This will help you decide what level of information, instruction, training and supervision you should provide. You can find out more about competence and competent persons at www.hse.gov.uk/competence.

Pool safe operating procedures

28 Pool safe operating procedures (PSOPs) are commonly used in the swimming pool industry as part of management arrangements. You can base your PSOPs on the information from your risk assessment.

29 A PSOP consists of the Normal Operating Plan (NOP) and the Emergency Action Plan (EAP) for the pool, changing facilities and associated plant and equipment. The NOP sets out the way a pool operates on a daily basis, including details of the layout, equipment, manner of use, user group characteristics etc. The EAP gives specific instructions on the action to be taken, by all staff, if there is an emergency. There is more general information on emergency procedures in paragraphs 273–283.

30 Your staff, at every level, should understand what these plans are for, what is in them and what part they have to play, as individuals, in their implementation. You should regularly check their:

- knowledge and understanding of the content;
- competence in applying the plans;

as part of your routine staff training.

31 Where a pool is hired by organisations, such as swimming clubs, make sure they understand the relevant sections of the PSOP. Not all the sections of the NOP and the EAP will be relevant but hirers should be completely familiar with the sections that apply to them. It is particularly important that they are aware of the arrangements for dealing with emergencies.

32 Procedures should also be in place for ensuring that any contractors working on site are aware of the parts of the NOP and EAP which may affect their work or which their work may affect, for instance policy and procedures for working at height (www.hse.gov.uk/work-at-height) or in confined spaces (www.hse.gov.uk/confinedspace).

33 A suggested structure for PSOPs is in BS EN 15288–2:2008.

Swimming pool management arrangements

34 There are various swimming pool management arrangements. For example, a pool can be:

- privately owned and operated by the same company;
- privately owned and operated by a leisure management company;
- local authority owned and operated;
- local authority owned and operated by a leisure management company;
- local authority owned and operated by a leisure trust (charity);
- leisure trust owned and operated.

35 If you operate a pool on behalf of the owner, discuss and agree the extent of your responsibilities, when you set out the contract. For example the arrangements for the maintenance of the fabric of the building or for electrical or extraction systems may lie with the owner, while the operator may be responsible for day-to-day operational issues, such as water treatment and bather supervision. There may also be areas of shared responsibility, so co-operation between dutyholders and between workers and employers is important to ensure safety.

36 Make sure that all parties are clear about what they need to do and where to go for help with areas outside their area of responsibility.

Emergency action plan

37 The EAP should provide details on how to respond effectively to accidents and other emergencies. Plans should be in proportion to the level of risk and the potential extent and severity of the incident.

38 Your plan should detail what to do if there is a more serious emergency requiring evacuation of the premises and a response from the emergency services, for example a release of chlorine gas.

39 Most pool EAPs should address the same basic requirements, to:

- get people away from immediate danger;
- handle casualties;
- deal with the non-injured;
- summon, direct and help the emergency services;
- protect property.

40 Make sure that all workers, no matter what their normal role, understand and are competent in what to do in an emergency, for example the location of exits, emergency equipment, how to raise the alarm and who will give them instructions. Bear in mind that pool users may require protection from the weather (cold/sun) if evacuated outdoors. You should test your emergency plan as often as is necessary to ensure competence is maintained.

Alarms

41 Pool halls may have a number of alarms for different types of emergencies, for example fire, plant failure, help etc. Each alarm should be distinctive and it may help in buildings with a public address system to have recorded messages alerting staff to a particular type of emergency. A visual beacon may be useful in some circumstances, if for example pool users are likely to be hearing impaired and there is no other way to alert them.

42 All alarms should be tested according to the manufacturer's instructions and PSOP. Consider keeping a record of equipment and alarm checks.

First aid

43 You must ensure the safety of non-employees who may be affected by your business activities. The Health and Safety (First-Aid) Regulations (the first-aid regulations) require you to provide adequate and appropriate equipment, facilities and staff to ensure that employees receive immediate attention if they are injured or taken ill at work.

44 The first-aid regulations do not require you to make first-aid provision for non-employees, such as pool users and visitors, however HSE recommends that you include them in your first-aid needs assessment and make provision for them as part of your overall duty of care towards them.

What should a first-aid needs assessment include?

45 At a swimming pool, the first-aid needs assessment should include consideration of the pool design (for example features, visibility) and the nature of activities. It is recommended that you also take into account pool user characteristics, age, ability etc.

46 As a minimum, you must have:

- a suitably stocked first-aid box;
- an appointed person to take charge of first-aid arrangements;
- information for all employees giving details of first-aid arrangements.

47 The findings of your first-aid needs assessment will influence what you include in your first-aid box (there is more information at www.hse.gov.uk/firstaid). BS 8599-1:2011 may help you to determine suitable contents for your first-aid box.

48 First aid should be carried out by competent staff. The training undertaken by pool lifeguards will generally cover or surpass that required under the first-aid regulations where the lifeguard attends regular ongoing training and competency assessment.

49 First-aid staff and their equipment should be located so they can reach an incident quickly and easily.

50 First-aid equipment should be of a type which, as far as possible, does not pose any additional risk to the injured person.

51 The first-aid provisions should include equipment for dealing with the consequences of direct contact with pool water treatment chemicals. For more information on first aid after direct contact with chemicals, see paragraphs 280–282.

52 Due to the nature of activities carried out in swimming pools, your needs assessment may identify that your first-aiders need additional training in, for example, treatment of drowning or use of a spine board and defibrillator (there is more information at www.resus.org.uk). There is more information on rescue at www.rlss.org.uk/hsg179.

Reporting accidents and incidents

53 Employers and people in control of work premises have duties under RIDDOR to report certain work-related injuries, cases of ill health and dangerous occurrences, to HSE or a local authority. For more information, go to www.hse.gov.uk/riddor.

Pool access for disabled people

54 Consult current or potential disabled users and/or organisations on the most appropriate aids to help access.

55 Hoists are one way of helping wheelchair users to get into the pool. You should carefully consider the location of the hoists to ensure they are of maximum benefit, and do not represent an obstruction to the free movement of pool users and staff.

56 You must make sure:

- staff are fully trained and competent in the use of the equipment;
- the capabilities of the individual are taken into consideration;
- the equipment is inspected and, if necessary, tested periodically by a competent person to ensure that the hoist can continue to safely lift loads up to its marked safe working load.

If slings are used instead of a seat or stretcher, 'dog-clips' are used to prevent the sling floating free in the water.

57 In most cases, moving and handling equipment such as hoists, when used by people at work, are subject to thorough examination under the Lifting Operations and Lifting Equipment Regulations (see www.hse.gov.uk/work-equipment-machinery).

Safety information and signs

58 Safety signs should be considered as a part of your package of risk control measures. They can be used to warn the public where:

- there are any sudden changes in depth and it is necessary to clearly mark the depth of water, especially at shallow and deep ends;
- it is necessary to show areas where it is unsafe to swim, or to dive (and indicating any sudden changes in depth which could pose a hazard);
- there are slippery surfaces;
- it is necessary to provide instructions on the safe use of the pool and its equipment.

59 Where provided, pool operators should:

- maintain safety signs;
- ensure that signs are located in appropriate positions and unobstructed, for example by equipment or plant;
- explain the signs to their employees, and tell them what they should do when they see a safety sign, particularly in relation to bathers;
- maintain the depth of water in accordance with the information displayed.

Information, instruction and training

60 Everyone who works for you needs to know how to work safely and without risks to health. You must provide clear instructions, information and adequate training for your employees (see www.hse.gov.uk/simple-health-safety/provide.htm).

New workers

61 Workers are at particular risk of injury in the first six months of a job, when they are more likely to be unaware of risks. Follow these six steps to protect new workers:

- assess the new starter's capabilities;
- plan and provide an induction;
- make sure control measures to protect them against risks are up to date and being properly used and maintained;
- provide relevant information, instruction and training;
- provide effective supervision;
- check workers have understood the information, instruction and training they need to work safely.

62 More information can be found at www.hse.gov.uk/diversity/new-to-the-job.htm.

Young workers

63 A young person is anyone under 18 and a child is anyone who has not yet reached the official minimum school leaving age which may be just before, on, or just after their 16th birthday.

64 Employers are responsible for ensuring a young person is not exposed to risk due to lack of experience, being unaware of existing or potential risks or a lack of maturity.

65 More information on young people at work can be found at www.hse.gov.uk/youngpeople.

Control of admissions

66 Think about the maximum number of people who can safely be admitted to the pool or pool area. You should implement an effective method of controlling and recording the numbers of pool users. There are various ways to do this, such as coloured band systems, locker tokens/keys, access kiosks, pre-booked admissions and turnstiles. Warning signs, particularly on outdoor pools, are normally used as an additional control measure.

67 It may be possible to control admissions at the point of entry to the pool facility, rather than to the water itself. Allowance can be made in

setting a maximum figure for the proportion of users likely to be out of the water at any one time.

68 According to BS EN 15288 the typical starting point for determining occupancy ratio is 3 m² of water per pool user. But this is only a guide. Consider the design and surface area of the pool. Pools with a large beach area may be able to tolerate higher occupancy rates. You should also take account of the capacity of the pool water treatment system, pool activities and equipment when determining maximum occupancy figures. Make allowance for any large influxes of users into the water, particularly when associated with operating equipment, such as wave machines, inflatables and play floats.

Child admissions

69 You should consider the number of young children (under the age of 8 years) allowed into the pool under the supervision of a responsible person aged 16 or over. While adult:child ratios are an essential consideration for safeguarding children, occupational health and safety law does not prescribe what this ratio should be. So consider this during the risk assessment process for the pool. The appropriate ratio should be determined by assessing the risks.

70 Lifeguards should note that some adults may need to be reminded of their responsibility to supervise the children in their care. More information is available at www.cimspa.co.uk/guidance.

Preventing unauthorised access

71 Take effective measures to prevent unauthorised access to a pool intended to be out of use (for example after closing time or while under repair). Plant rooms, chemical stores and other restricted areas should be secured against unauthorised access.

72 For open air pools, consider putting up security walls or fences and/or installing intruder lighting and/or alarms. Motion sensitive lighting, security cameras and/or alarms can also be effective as a deterrent or as a way of ensuring you are alerted to an intruder or casualty.

Information for pool users

73 Any pool will be safer if swimmers are aware of potential hazards, and act responsibly. As far as reasonably practicable, the hazards should be brought to swimmers' attention as soon as possible. This can be achieved in a variety of ways, such as:

- notices and signs displayed at reception, in changing areas and on the poolside;
- information on websites;
- a leaflet handed to swimmers as they arrive, and to those in charge of organised groups (including school parties);

- references in contracts with club organisers, schools, etc, hiring the pool;
- including it in membership documents;
- oral reminders, where necessary, by lifeguards.

74 Lifeguards are in the front line of pool-user education and can help prevent accidents; therefore good communication skills are essential. Lifeguards can educate pool users about the hazards and risks associated with a particular pool or activity, and about water safety generally.

75 Information for pool users is particularly important if constant poolside supervision is not in place.

Ensuring pool users' safety

76 The measures required to ensure pool users' safety must be determined by your site-specific risk assessment. Your risk assessment must include not only the physical hazards but those hazards relating to swimmers and swimming-related activities. When you assess the need for supervision you should consider:

- local circumstances;
- the pool structure and equipment;
- the way the pool is used and the characteristics of those who may use it.

77 Pool operators should have an appreciation of the main hazards and risks to users. The following issues have been factors in past deaths or serious injuries:

- inadequate, inappropriate or no supervision;
- absence of, or inadequate response by, lifeguards in an emergency;
- glare;
- failure to identify casualties because of unclear pool water, or obstructions in the line of vision;
- unauthorised access to pools intended to be out of use;
- prior health problems (for example heart trouble, impaired hearing or sight, epilepsy);
- consuming alcohol or food before swimming;
- youth and inexperience (half of those who drown are under the age of 15);
- weak or non-swimmers straying out of their depth;
- diving into an insufficient depth of water (leading to concussion, or injury to head or spine);
- unruly behaviour and misuse of equipment.

78 Careful recording and consideration of any incidents or near-misses at the pool will help to ensure that safety arrangements remain relevant. The NOP should draw attention to any particular risk factors and provide information on the control measures to use.

Poolside supervision

79 Constant poolside supervision (watching the water) by lifeguards provides the best assurance of pool users' safety. Where the site-specific risk assessment has shown that constant poolside supervision is not reasonably practicable, robust, alternative measures must be implemented to ensure the safety of pool users.

80 It is the responsibility of the pool operator to ensure that there are enough lifeguards and that they are competent, effectively organised and diligent in their duties. This should be addressed in the risk assessment and also includes assessing whether hirers of pools have made effective and safe arrangements for supervision.

What level of supervision is required?

81 You must have robust systems to ensure the safety of pool users. These should focus on:

- preventing pool users getting into difficulty by intervening early and promoting responsible behaviour;
- identifying pool users in difficulty;
- procedures to effectively perform a rescue.

82 A risk assessment must be undertaken to determine the level of supervision required. Consider the following when carrying out your risk assessment:

- the nature of the pool (public, school, hotel, holiday park etc);
- pool design (for example layout, access from changing rooms);
- pool water area;
- pool depth;
- abrupt changes in depth;
- pool and pool hall features (for example glare, reflections, blind spots);
- the demographic and ability of pool users, if known;
- occupancy levels;
- nature of activities in the pool (children's play session, club swimming, swimming lesson);
- pool features posing additional risk, for example features creating turbulent water, use of inflatable equipment, flumes, diving boards etc;
- if/where diving is permitted;
- the practicability of enforcing house rules for safe behaviour;
- access/admission arrangements, for example unrestricted access to hotel residents, child admission ratios.

Supervision of disabled people

83 Consider if there are any additional supervision requirements for pool users who are disabled.

Lifeguard numbers

84 If your risk assessment has indicated that it is reasonably practicable to provide lifeguards, you should decide how many you need. The number of lifeguards required will depend on their ability to see someone getting into difficulties and being able to respond in a timely manner. This will be influenced by how you intend to deploy them, for example, patrolling the poolside, static in high chairs or in an observation tower. A Lifeguard Zone Visibility Test (LZVT) (see www.rlss.org.uk/hsg179) can be used to help you determine the number of lifeguards.

85 The LZVT (sometimes called the LZT) is a practical exercise designed to highlight any areas of the pool surface or pool basin floor where a casualty cannot be seen from any particular lifeguard position, especially those furthest away and closest to the lifeguard position.

86 The LZVT will allow you to confirm that:

- your lifeguard numbers are correct;
- positions are correct and give 100% visibility of the pool;
- positions cover the full volume of pool water and designate observation zones for each lifeguard position.

87 Using zones is crucial to ensure that:

- each lifeguard knows and understands which area of the pool they are responsible for;
- lifeguard supervision areas do not unnecessarily overlap;
- lifeguards can scan across the zone in 10 seconds and are positioned no more than 20 seconds from the furthest point if rescue or other intervention is required. This is called the 10:20 rule.

88 Training guidance published by the main lifeguard training bodies has more detail about supervision techniques, scanning the pool and the 10:20 rule.

89 Given the wide range of pool facilities and the ways that pools are used, it is impossible to make specific recommendations on lifeguard numbers. When doing your risk assessment, you will need to consider what is required (this will be determined in the risk assessment) and take account of all relevant local circumstances at any particular time. The general arrangements decided upon should be set out in the NOP.

Based on a lifeguard zone and the ability to apply the 10:20 rule as a starting point, the table below sets out the indicative numbers of lifeguards. The table describes a range of conventional rectangular pools, when used for swimming sessions and water activities which are not programmed. It does not include consideration of factors such as the use of diving boards or any other special equipment, which would potentially increase the numbers indicated. It is not a legal requirement, nor should it be used in isolation, but you may find it useful when considering your own poolside supervision needs.

Approximate pool size: m	Area: m ²	Number of lifeguards indicated by LZVT	Number of lifeguards indicated by LZVT for busy conditions
20.0 x 8.5	170	1	2
25.0 x 8.5	212	1	2
25.0 x 10.0	250	1	2
25.0 x 12.5	312	2	2
33.3 x 12.5	416	2	3
50.0 x 20.0	1000	4	6

Notes

- 1 Where only one lifeguard is on duty at the poolside there should be adequate means, such as an assistance alarm, for summoning support rapidly to the pool area. This is essential where a single lifeguard is involved in an in-water rescue. The remaining swimmers are no longer supervised until backup lifeguards/staff arrive and the recovery of a casualty from the water often requires at least two people.
 - 2 The figures in the fourth column refer to whenever loading approaches pool maximum capacity.
 - 3 For irregularly shaped pools, including many leisure pools, the figures in the second column of the table, related to the water area, may be a useful starting point.
 - 4 In 50-metre pools where the width is 16 m or more, visibility through the water becomes a problem. In determining the number of lifeguards and their positioning, the LZVT will help you check visibility.
 - 5 Programmed activities are those with a formal structure, ie disciplined, supervised or controlled and continuously monitored from the poolside.
- 90 When you start to consider more complex freeform designs or add features such as a waterslide along the poolside, there can be a significant impact on the deployment of lifeguards. With leisure pools, the LZVT basic principles apply in terms of lifeguard numbers, positions and deployment.

91 Conduct a LZVT first to establish the fields of view and the likely minimum level of observation. Consider then the required number of lifeguards in a real-life situation. As an example, a leisure pool may have moving water areas that have vegetation and corners obscuring the view for the lifeguards. Consider how best to observe and supervise swimmers in these areas. You may also consider increasing the number of staff and/or using technology to help existing lifeguards.

92 Fewer lifeguards may be required in non-swimming areas. BS EN 15288 defines areas with a water depth ≤ 1.35 m as non-swimmer areas, whereas areas with a water depth > 1.35 m are swimmer areas. Conversely, large areas of deep water or the use of features such as wave sessions in a leisure pool may require additional supervision. Small children can drown in very shallow water so it is important to consider who is going to use the pool when making your decision.

Duty spells and structuring of duties

93 Effective pool supervision requires a high level of vigilance. Duty spells for lifeguards should be controlled to ensure they do not lose concentration or become fatigued. There are no specific legal limitations but the Royal Life Saving Society UK (RLSS) (www.rlss.org.uk) recommends that you spend no longer than 60 minutes at the poolside, except in exceptional circumstances such as when providing support for lifeguards during an emergency or due to a sudden and unexpected increase in swimmer loading.

94 Regular rotation between lifeguard positions may also assist the lifeguard to remain alert. When structuring rotation patterns, where possible, try to ensure that the warmer positions are the last ones before a lifeguard is given a break away from the pool. RLSS UK advises that the time on poolside, under any conditions, should not exceed 90 minutes. In addition, your rotation should consider other duties which may require the lifeguard to be away from their supervisory tasks.

95 Extra checks may be required if the changing area is particularly busy or there is a large number of unsupervised children, though this duty should be undertaken by other staff if lifeguard resources cannot accommodate this.

96 Where part-time or casual staff are employed or volunteers are used who may have other employment, or where full-time staff are known to have other employment, operators should satisfy themselves that the other employment does not interfere with the efficient performance of lifeguard duties, for example tiredness which may affect vigilance.

97 Specify the maximum period of uninterrupted pool supervision, the length of the working day, and programmed breaks from duty in the PSOP. The Royal Life Saving Society UK produces guidelines (see www.rlss.org.uk/hsg179) on this subject, which may be useful.

98 Think about features of pool design affecting vision, hearing or concentration when you decide on the length of duty spells, such as:

- inappropriate illumination;
- pool occupancy;
- problems of glare and reflection;
- inadequate ventilation system;
- poor acoustics;
- extreme temperatures or excessively high humidity, or hot sun in open pools, solar gain;
- water turbulence, crowded conditions and excessive noise which tend to increase risk;
- wave machines/flumes, features and other equipment;
- activities taking place in the pool;
- distractions from poolside activities, for example radios, ball games and similar activities.

99 Ensure that lifeguards are able to carry out their duties with a minimum of distractions. Having the appropriate number of lifeguards will help ensure this is possible. The following can easily divert attention from their supervision duties:

- cleaning;
- fetching equipment from stores;
- carrying out pool water tests;
- talking to colleagues and/or swimmers;
- using an electronic device such as a smartphone, smartwatch or other device.

100 Pool operators may need to vary the arrangements for supervision from time to time, according to current use, for example public or teaching/coaching sessions, pool parties etc, and this will be reflected in the NOP.

101 See paragraphs 126–150 for more information about lifeguards.

Safeguarding coaching/teaching sessions

102 Suitably competent teachers and coaches may take responsibility, both for supervision and teaching/coaching of their class/squad.

103 The number of pupils in a swimming lesson class should be determined by your risk assessment, with additional consideration given to the:

- swimming ability of the pupils and how they respond to the teacher in a class environment;
- age of the pupils and their physical attributes in relation to the swimming pool configuration;
- temperature of the pool water and its effect on the young, older and disabled people.

104 There is no optimum or maximum ratio but these factors will have an impact on the numbers in the class. Teachers and coaches may take responsibility, both for supervision and teaching/coaching of their class/squad. See www.swimming.org/swimengland/worker-health-and-safety.

Specialised activities

Canoeing and sub-aqua

105 Competencies to supervise canoeing and sub-aqua require specialised skills and additional knowledge, not normally within the scope of lifeguard training. The number of users should be controlled to ensure competent rescue cover. The British Sub-Aqua Club (www.bsac.com) provides guidance on risk assessment, including the provision of rescue cover. The British Canoe Union (bculifeguards.org.uk) also provides information on appropriate lifeguard training.

Social events

106 Social events, such as pool parties, where high noise and excitement will be generated, may require additional supervision. The risk assessment should take this into account and be reflected in the length of duty spells of the lifeguards.

107 Eating and drinking before swimming can increase the risk of vomiting and/or choking so it is recommended that you organise events so swimming takes place first.

Responsibilities for the pool users' safety when the pool is hired out

108 Agree in advance with the pool hirer who will provide the necessary supervision cover, and the number and competencies of any lifeguards. Your hire agreement will detail the standard of pool supervision.

109 Where agreement is reached that the hirer will provide supervision, you are responsible for ensuring that the agreed level of supervision by competent persons is provided.

110 Where the hirer shares use of the pool with the general public, you retain primary responsibility for the safety of pool users.

111 You should put measures in place to ensure that the conditions of the hire agreement are being met (through random checks, for example).

Precautions where constant poolside supervision is not provided

112 Where your risk assessment determines that a pool does not require constant poolside supervision, you must implement effective control measures to reduce the risk to pool users as far as reasonably practicable. These can include a combination of measures such as:

- providing poolside supervision in specified circumstances and/or at specified times;
- signs in the pool area showing the depth of the water;
- poolside checks at agreed intervals;
- suitable rescue equipment (poles, throw bags, buoyancy aids) available by the poolside;
- emergency contact arrangements, for example an alarm to summon help;
- signs at the entrance, in the changing rooms and in the pool area indicating that the pool is not staffed and drawing attention to simple rules of use and safety;
- control and monitoring of the number of people allowed to use the pool at any one time;
- the use of technology and drowning detection systems;
- control of lone swimmers;
- avoiding steep gradients that may take pool users unawares.

113 When the pool is in use, there must be a safe system of work to identify a person in difficulty and ensure that a rescue can be performed. For example, in the absence of lifeguards there should be designated 'on-call' competent staff, to respond immediately to deal with any emergency. They should be suitably trained and capable of reaching the poolside in time to perform a rescue and provide emergency first aid if the alarm is raised.

114 At the outset, you should test your arrangements for identifying someone in difficulty and the effectiveness of your emergency response. Rescue procedures should be tested periodically using an unannounced, realistic drill to ensure that the theory works in practice.

115 If CCTV is used to monitor pool use, it should be arranged to see all parts of the pool hall. Ensure that you have effective arrangements for monitoring the CCTV feeds, with robust procedures to help pool users in difficulty and perform a rescue if required. The person monitoring the CCTV should be able to identify pool users in difficulty as well as anyone behaving irresponsibly.

Using technology to aid observation

116 There are a wide range of devices and systems that are available to help lifeguards observing a pool. Equipment extends from convex mirrors that increase the field of view where there are small obstructions to active computerised detection that will identify a body on the pool basin floor.

117 While these technologies have their limitations, they have helped lifeguards identify potential drowning accidents they had not observed.

118 These systems are not intended to reduce observation and monitoring by lifeguards, unless a suitable and sufficient risk assessment demonstrates that you can maintain at least the same level of risk control that would be provided by a lifeguard. Where your risk assessment has already determined that you do not need constant poolside supervision, some technologies can provide additional reassurance. It is important to, remember that while these devices can be useful, they cannot communicate with swimmers; intervene to prevent inappropriate behaviour or perform a rescue. This means that arrangements to respond to an incident will always be necessary. ISO 20380:2017 provides more information.

Drowning detection systems

119 Drowning detection systems use cameras and computer software to detect a swimmer who may be in difficulty. They can comprise of over and/or underwater cameras linked to a computer, which analyses the information in real time to identify a casualty and sounds an alarm. When considering the installation of such a system, make sure you know what it is capable of. Do not assume that it can detect all possible drowning accidents unless the manufacturer is able to guarantee this. Ask the manufacturer or your supplier about any limitations, because not all systems are the same, for example some cannot detect a person floating on or just under the surface of the water.

120 A procedure should be established by the operator to ensure that all alarms generated by the system are responded to promptly. Where computerised drowning detection systems are installed, staff must be trained in their use. Training should take account of the manufacturer's instructions as well as the PSOP. Operators should make sure the equipment is tested and maintained in accordance with the manufacturer's instructions.

Poolside CCTV to help poolside supervision

121 These systems differ from computerised drowning detection systems, as they do not raise the alarm automatically. CCTV systems may be provided as an additional method of helping the lifeguard's ability to supervise by providing cameras linked to a monitor at the lifeguard position. The NOP should outline the frequency and duration that the lifeguard should scan their monitor for any swimmers in difficulty. Crucially, lifeguards should still be able to reach any part of the pool quickly enough to rescue someone.

122 Where poolside CCTV systems are installed, staff must be trained in their use. Operators should ensure the equipment is tested and maintained in accordance with the manufacturer's work instructions.

Poolside mirrors

123 Using mirrors may provide operators with an additional method of helping lifeguards observe hard-to-see areas of the pool. Where poolside mirrors are used, they should be checked regularly to ensure they have not moved from their intended area of observation and are not obscured, damaged or covered. Operators should train lifeguards in their use and ensure that the use of the mirror is included in the scanning regime. Examples of their use is to help in observing areas such as spa pools and lazy river rides where bends and features such as vegetation can cause visibility problems.

Motion sensors

124 Pool motion sensors will sound an alarm to alert you when someone or something disturbs the surface of the pool. These are often valuable in smaller pools or where a pool is closed, but there is the possibility of unauthorized entry. While not a life-saving or observation device, they do give you some time to react if someone uses your pool illegally or falls in.

User-worn drowning detection systems

125 User-worn drowning detection systems may comprise of a sensor, worn on the wrist and linked to a receiver and alarm system. These can be programmed for depth and/or inactivity and will cause an alarm alert if activated. Operators should ensure that they have effective arrangements for monitoring alarms, with procedures to help pool users in difficulty and perform a rescue if required. Operators should ensure that any electronic equipment under their control is inspected and maintained according to the manufacturer's instructions, and staff are competent to use it.

Lifeguards

126 A lifeguard can be:

- an employee;
- a contractor;
- a volunteer.

127 Ensure that lifeguards are:

- sufficient in number;
- adequately trained and competent to carry out their assigned tasks;
- effectively organised;
- supervised to ensure they are diligent.

128 The main duties of the lifeguard are to:

- anticipate problems, intervene early to prevent accidents;
- intervene to prevent unsafe behaviour;
- keep a close watch over the pool to identify pool users in difficulty and take appropriate action;
- communicate effectively with pool users, and colleagues;
- carry out a rescue;
- give immediate first aid to any casualty;
- perform cardiopulmonary resuscitation (CPR);
- follow procedures and respond in the event of an emergency evacuation;
- raise the alarm if further assistance is required.

129 To perform the duties set out above, lifeguards should:

- be physically fit and able to perform the role;
- be alert;
- be self-disciplined;
- be strong, able and confident swimmers;
- be trained and have successfully completed a course of training in the techniques and practices of supervision, rescue and first aid in accordance with a syllabus by or equivalent to a national qualifications awarding body;
- have undergone a programme of induction before undertaking their duties, and as specified by the pool operator;
- participate in a programme of regular ongoing training.

Specific skills

Resuscitation of casualties

130 The ability to administer cardiopulmonary resuscitation (CPR) is an essential skill required by a lifeguard where any casualty is assessed to be not breathing normally.

Extended life support

131 Pool operators should be aware, and apply as appropriate, approved methods of extended life support, including the skills of automated external defibrillation (AED) and oxygen insufflation (where appropriate). Information on the safe use of oxygen in the workplace can be found at www.hse.gov.uk/pubns/indg459.pdf.

132 The provision of an automated external defibrillator (AED) is now commonplace in many pools and where these devices can be deployed in a resuscitation emergency, staff should be trained to use the equipment and integrate its use into their EAP.

Safe management of spinal injuries

133 The number of in-water emergencies where a spinal cord injury is suspected is very small, but the potential for this type of injury should not be ignored.

134 When such an injury is suspected, it is essential that the methods used in rescuing the casualty, recovering them from the pool and administering any subsequent CPR and first aid can be done without further compromising the casualty's condition.

135 You should make sure any training and qualification programme used as part of the competency assessment includes an awareness of spinal injuries. This is so that lifeguards can ensure, during a rescue and subsequent recovery, that there is an absolute minimum of movement of the casualty's spine when:

- they are moved through the water, onto the poolside;
- ensuring a clear airway as part of both primary and secondary casualty assessment.

136 The consequences of a spinal injury can be devastating and life-changing for those affected. Within the context of swimming pools such injuries are most often associated with diving or falling/being pushed into the water. Where your risk assessment identifies that there is a risk of a spinal injury, you should ensure that a suitable aquatic pool extraction board is available to support the whole of the casualty's body and prevent flexion of the spine when they are removed from the water. Where they are provided, lifeguards should be trained, individually and as a team, in their use. They should practise their techniques as often as necessary to maintain competence. When

selecting an aquatic pool extraction board, information can be obtained from a recognised pool lifeguard training provider.

Competencies

137 Lifeguards must be competent to carry out the full range of duties they are assigned to.

138 Competence can be described as a combination of training, skills, experience and knowledge that a person has and their ability to apply them to perform a task safely. Other factors, such as attitude and physical ability, can also affect someone's competence.

139 Duties should be suitably restricted and supervised until competencies have been acquired.

140 Lifeguard competencies have two elements:

- core or foundation knowledge and skills;
- site-specific knowledge and skills.

141 Training can be provided in-house and/or by attendance at courses. Site-specific training should ensure a full understanding of the PSOP and facilities and how they should be used.

142 Possessing an up-to-date qualification in lifeguarding/poolside supervision, recognised by a national qualifications awarding body, is the best way to demonstrate an acceptable level of competence.

143 There are organisations which can provide information on suitable lifeguard training (see www.rlss.org.uk and www.sta.co.uk).

144 It is recommended that you maintain records of training sessions which include:

- the names of those involved;
- the date;
- what they did, including use of equipment;
- the duration of the training sessions.

145 All lifeguards will benefit from suitable refresher training (see www.rlss.org.uk/hsg179), to ensure they retain these skills. Frequency of refresher training is not defined because it varies depending on how often lifeguards practise and/or use their skills and any changes to their work environment or to current industry standards. Changes in the health or physical fitness of individual lifeguards may also indicate that refresher training is required, especially if they have been off duty for a significant period of time. A review of an incident may also indicate a need for refresher training.

Core knowledge and skills

146 Training should be delivered and assessed by competent persons and include both knowledge and practical skills in:

- fitness training, with swimming ability acquired before starting a course;
- role and responsibilities of the lifeguard;
- water safety and accident prevention;
- early intervention, casualty recognition, principles of rescue and manual handling of a casualty;
- principles of PSOP;
- pool observation and supervision skills;
- scanning. This is the skill required to supervise a particular zone using a sweeping action. The internationally recognised practice known as the 10:20 system requires lifeguards to be able to scan their supervision zone in 10 seconds and to be close enough to get to an incident within 20 seconds;
- use of poolside rescue equipment;
- a dive to the bottom of the deepest part of the pool to recover a simulated casualty (manikin);
- CPR, first aid and spinal cord injury management;
- understanding pool features and pool activities;
- communication methods and working as a team.

Site-specific training

147 Lifeguards should have site-specific knowledge and skills to operate effectively at the locations where they work. These should relate to the PSOP. This would form part of the lifeguard's induction delivered by the pool operator.

Clothing/uniform

148 Choose clothing and footwear for lifeguards appropriate to their role, making sure it does not hamper them during an in-water rescue. Lifeguards, once trained, should continue to train, and be able to demonstrate competence, wearing their work clothing.

149 Make sure lifeguards are easily identifiable to pool users. Pool operators may wish to consider the internationally accepted colours of red and yellow. Lifeguards will usually require a whistle for attracting attention.

150 While there are practical concerns for lifeguards at outdoor pools (for example prolonged exposure to the sun or cold and wet), select clothing with rescues in mind.

Pool equipment and features

151 The risk assessment should consider hazards from the use of equipment and pool features. The risk control measures should be included in the PSOP.

Diving boards

152 Consider procedures to ensure correct and safe use, and that pool users and divers do not endanger each other. Where diving boards are positioned over an area of a main pool, some form of segregation on the surface of the water should be provided if other swimmers are using the pool.

Diving from the poolside

153 Consider carefully the advisability of allowing diving from the poolside to take place during unstructured sessions. There are some pools where, because of a lack of water depth, a high freeboard or the pool floor profile, diving from the poolside should not be permitted.

154 The risk assessment should determine if, when, and from where, diving can take place. Factors to consider include:

- water depth – The Amateur Swimming Association (ASA) recommend a minimum depth of 1.5 m for shallow diving with a forward clearance of at least 7.6 m;
- freeboard height (pool surround above the water level – the ASA recommend a height of no more than 0.38 m);
- pool floor profile;
- age/skill level of pool user;
- water features (for example wave machines);
- nature of pool session.

155 Prohibition signs should be displayed when and/or where you have identified it is not safe to dive.

156 Pictorial and written notices advising on safe diving techniques and dangerous diving actions may also be appropriate. Examples of dangerous diving actions include:

- running dives;
- backward dives;
- dives without hands in front of the head;
- indiscriminate diving;
- somersault entries;
- 'bombing'.

157 Your decisions should be based on your risk assessment.

Starting platforms

158 Unauthorised use of starting platforms should be prevented. Again, this decision will be based on the findings of your risk assessment.

Teaching platforms

159 Take account of any hazards the teaching platforms may introduce, for example:

- the inability of the lifeguard to see under (open structure) or beyond (solid structure) the platform;
- pupils slipping or falling onto the pool edge, or from the platform;
- swimming under the structure;
- swimmers colliding with the structure;
- changes in water depth.

160 Operators should ensure:

- platforms are positioned so as not to obscure the view of lifeguards;
- the use of platforms is supervised at all times;
- the maximum number of users is not exceeded (refer to manufacturers' guidelines);
- the structure is not left unattended and is removed from the pool at the end of the supervised session;
- no swimming or playing under the structure is permitted;
- the manufacturer's guidelines are followed.

Water slides

161 Make appropriate arrangements for use and supervision of the slide. Your risk assessment should consider:

- manufacturer's instructions, for example on method of riding;
- how to prevent access to the slide when not in use;

- the display of suitable instructions and safety signs appropriately sited, including at the bottom of the stairway to the launch platform and the launch platform itself;
- how to control entry and landing points and, where there is a need for lifeguards at both the entry and exit points, how to ensure effective communication between them;
- control of entry so that riders are adequately spaced;
- procedures for dealing with an accident or emergency.

162 If a lifeguard controls the entry point, duties to consider include:

- ensuring the body position of users is correct;
- spacing of users;
- preventing 'chains' of users going down the slide together;
- preventing 'head-first' entry unless the ride is designed for it;
- preventing users making a running start, thereby gaining excessive speed;
- ensuring orderly queuing.

163 If a lifeguard controls the discharge point, duties to consider include:

- ensuring that users move quickly out of the path of the slide;
- being particularly vigilant because users, especially children, may be disorientated and turbulence may make swimmers difficult to see.

Wave machines

164 Safe systems of work must be in place for use of wave machines. You should:

- refer to the manufacturer's instructions;
- use announcements requesting poor or non-swimmers to move to the beach area and pool users to clear the immediate area in front of the wave machine (if necessary). This may be supplemented by audible and visual warnings, for example flashing lights;
- consider the locations of lifeguards. Supervision is best done from the sides, to see between the waves;
- be aware that extra vigilance will be needed in view of the possible added risks depending on:
 - intervals between successive operations;
 - the effect of the waves on other features;
 - the ability to quickly and safely switch the machine off in an emergency;
- ensure that the 'grilles' are designed to be safe (ie less than 100 mm between the grille bars);
- consider the impact of a large influx of swimmers into the water when the machine is to be operated and decide how you will manage this;
- make sure that lifeguards are aware that there could be high excitement, and possible disorientation, especially among young children;

- consider pool users, particularly poor and non-swimmers and children, being struck by waves;
- make sure pool users are aware of any additional safety instructions, such as no jumping and diving while the wave machine is operating;
- ensure that, where appropriate, pool users are made aware of different wave patterns and strengths and that the waves will make swimming more difficult.

Inner-tube rides

165 Where inner-tube rides are being used, consider supervising the intermediate pool and the main splashdown area to ensure that pool users are not experiencing difficulty or are becoming trapped under the water and other pool users.

166 Where inner-tube rides have been designed to produce a whirlpool effect in the intermediate pool, lifeguards will have to make sure there is a steady movement of users and, where necessary, help forward motion.

Slow and fast rivers

167 Consider:

- adequate monitoring of entry and exit points to prevent riders hitting walls or steps;
- adequate lifeguard numbers to visually cover the whole of the river path;
- the ease with which pool users can leave the stream of water;
- the procedure for cutting off/stopping the feature in an emergency.

Falling rapids

168 These involve riders descending an inclined channel in a fast-flowing stream of water. There may be intermediate pools with weirs at the start of separate sections of the channel. Consider:

- positioning lifeguards to provide observation of the complete ride, and to allow easy access if there is an emergency;
- the control of the entry point, and of the flow of users in each section of the ride, to prevent congestion and an increased risk of injury by rider-to-rider impact;
- a procedure for rescuing panicking, injured or unconscious users.

Inflatable play structures

169 Usually, larger inflatables are tethered to prevent them moving in the pool. Make sure the means of anchorage/tethering does not create a hazard to pool users. Before buying a piece of equipment, consider its suitability to the pool. Make sure that:

- you position it, so users cannot fall from it onto the pool edge;
- you ensure there is an adequate depth of water if a user dives or falls from the structure. If the inflatable is not a floating structure, for example it takes the form of a water slide, you should consider access and depth of water into which it discharges;
- there are enough anchorage points in the pool surround and in the inflatable itself, and they are of suitable strength;
- if an electric blower is used, it is suitable in wet conditions;
- it is cleaned, maintained and inspected in line with the manufacturer's instructions;
- you assess the need for additional supervision given that:
 - inflatables restrict vision through the water, including people directly under the inflatable, and that they encourage users to congregate in a small area;
 - there may be a risk of entanglement;
 - swimmers may be more likely to participate in boisterous behaviour.

170 Underwater lights and cameras may make it easier to see people underneath the equipment.

171 Rafts and small inflatable toys can pose many of the problems associated with the larger inflatables and the risks should be considered when they are being used. If they are to be used by less able swimmers, rafts and toys should be restricted to shallow water.

Movable floors and bulkheads

172 Consider:

- how using these features complicates sight lines;
- the difficulties where steep changes in level occur;
- the procedures for lowering floors or moving bulkheads.

173 Include the detailed supervision requirements for the various alternative settings of the bulkheads and movable floors, highlighting any hazards which need to be considered, including the need for additional ladders in the pool.

Spa pools

174 Individual supervision may not be necessary, depending on the siting of the spa pool, but you should consider a system of regular checks.

175 Spa pools pose a significant risk of spreading legionella bacteria if not properly cleaned and maintained. HSE has published guidance on *Control of legionella and other infectious agents in spa-pool systems* (www.hse.gov.uk/pubns/books/hsg282.htm).

Emergency equipment

176 The risk assessment should identify any essential rescue equipment. It should be kept in its proper place, checked daily and must be maintained in good working order.

Maintenance of plant and equipment

177 Regular and correct maintenance of buildings, plant and equipment is important in ensuring the health and safety of employees and pool users. You must provide and maintain plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health.

178 The designer's (or manufacturer's) instructions should specify the preventive maintenance procedures and intervals. They should also indicate the competence and/or qualifications for those carrying out the work.

179 Manufacturer's instructions on operation of plant and equipment should be available to attendants, for example by attaching copies to the plant itself.

180 Pool operators should ensure that inspections and tests are carried out at the specified intervals as a preventative measure, and any remedial action is promptly dealt with.

181 Where divers are used for installing, maintaining, repairing or cleaning swimming pools, the requirements of the Diving at Work Regulations and Approved Code of Practice should be followed. If suitable specifications are not available from designers or manufacturers, you should draw up your own, and include them as part of normal operating procedures.

Protecting the public

182 Suitable precautions should be taken to protect the public who may be present during maintenance/work activities. Effective measures should be taken to prevent unauthorised public access to a pool intended to be out of use. In particular consider where the public may have access – unauthorised or otherwise – alongside a pool which is empty, or at a reduced depth. Pool operators should consider who may be at risk, and the possible need for edge protection.

Cleanliness

183 Pool operators should ensure that:

- floors and stairs are kept clean, drained where necessary, and are not slippery;
- premises are kept clean, including internal walls, ceilings, furniture and fittings;
- appropriate containers are provided for waste material;
- refuse and trade waste are disposed of regularly;
- spillages are promptly cleared up.

Heating, ventilation and air-conditioning systems

184 Effective and suitable ventilation should be provided throughout the building by a sufficient quantity of fresh or purified air. This can be achieved by mechanical ventilation or air-conditioning systems.

185 Where necessary, for reasons of health and safety, ventilation equipment should be fitted with audible or visual warning of any failure of the ventilation system.

186 Careful consideration should be given to any air recirculation system where pool hall air is to be used because recirculation of contaminants could increase overall contamination levels. Further advice is available in the *Workplace health, safety and welfare. Workplace (Health, Safety and Welfare) Regulations 1992. Approved Code of Practice and guidance* (www.hse.gov.uk/pubns/books/l24.htm). The swimming pool hall, changing rooms and other occupied areas should be maintained at a comfortable temperature and have an adequate number of air changes per hour. Recommendations for pool water and air temperatures are published in the PWTAG code of practice (www.pwttag.org.uk).

187 Where, for heat recovery purposes, ventilation air is recirculated, you must take care to ensure there is not a build-up of harmful compounds in the pool hall air – a minimum of 30% fresh air should be provided. Care should be taken with ventilation to avoid draughts.

188 Wet air conditioning systems can harbour legionella bacteria if they are not managed properly. Hot and cold water systems, which include hot and cold water outlets, such as showers, should be managed along with your pool water system to ensure safety (see www.hse.gov.uk/legionnaires).

189 High temperature, poor humidity control and inadequate ventilation or air distribution can be major factors in any potential deterioration of the pool structure and finishes, and can increase risks associated with electrical fittings. The concentration and efficiency of pool staff, and users' safety, can also be affected.

190 A safe environment depends on good standards of design and installation of systems and equipment. When you commission new installations, they should be assessed to ensure that they meet the original design specification.

191 There are requirements for the design, construction, installation and operation of pressure equipment, used for example in the pool's heating system (see www.hse.gov.uk/pressure-systems).

192 A written scheme of examination, which has been approved by a competent person, must be prepared before a system can be operated. The system must also be properly maintained in good repair, to prevent accidents and incidents.

Safe working practices

193 Pool operators should ensure that:

- pipework is lagged if it is likely to become hot enough to cause injury (this may not apply if pipes are at a high level);
- where necessary, pipelines are marked either with warning signs or labels in accordance with the Health and Safety (Safety Signs and Signals) Regulations – your risk assessment will decide this. If the risk is not significant, there is no need to provide a sign. If the contents of the pipelines change regularly, there is no need to mark them, provided other equally effective measures are in place to protect employees;
- entry to a confined space is carefully controlled under a safe system of work in accordance with the Confined Spaces Regulations.

Asbestos

194 You must take reasonable steps to find out if there are materials containing asbestos in the premises, how much is present, where it is and what condition it is in. A record of the findings must be made and kept up to date and you should manage the risks to health that exposure to asbestos may cause (see www.hse.gov.uk/asbestos).

Lighting

195 Suitable and sufficient lighting should be provided (by the use of natural light) so far as is reasonably practicable and maintained throughout the building.

196 Automatic emergency lighting, powered by an independent source, should be provided where sudden loss of light would create a risk, for example during a power failure, so that emergency evacuation procedures can be carried out safely.

197 See *Workplace health, safety and welfare. Workplace (Health, Safety and Welfare) Regulations 1992. Approved Code of Practice and guidance* (www.hse.gov.uk/pubns/books/l24.htm) and *Lighting at work* (www.hse.gov.uk/pubns/books/hsg38.htm) for more information.

Glazing

198 Glazing, including windows in transparent or translucent surfaces in walls, partitions, light fittings, doors and gates should, where necessary for reasons of health and safety, be made of safety material or protected against breakage.

199 If there is a danger of people coming into contact with glass, it should be marked, or the pool operator should incorporate features to make it apparent. You should consider, as part of your risk assessment, whether there is a foreseeable risk of people being injured either by direct contact with glazing, or as a result of the glazing being broken.

Maintenance of glazing

200 To ensure that the standard of lighting is maintained:

- external windows should be kept clean;
- artificial lighting should be maintained in good working order, with units kept clean (where appropriate), and a provision made for replacement if a defect causes illumination to fall below a safe level where a view of the pool bottom is impaired;
- central controls for emergency lighting should be checked daily and in accordance with BS EN 50172;
- illumination values should be checked annually to make sure there is no deterioration.

201 Access for cleaning windows and light fittings poses some particular problems in addition to the general problems associated with working at heights. See www.hse.gov.uk/cleaning/topics/window-cleaning.htm.

Electrical installations and equipment

202 Contact with live electrical equipment can result in death or serious injury. It can also result in damage to property and lead to other types of injuries, such as falls. See www.hse.gov.uk/electricity for more information about hazards and management of risks.

203 The risk of injury from electric shock is magnified by the wet and corrosive conditions in pools and associated areas. Pool operators must take appropriate precautions. The Electricity at Work Regulations set out the legal requirements for safe electrical installations, equipment and safe working practices.

204 Work on electrical installations and equipment requires specialist knowledge and skills. It should only be undertaken or supervised by those who possess the appropriate knowledge or experience to ensure the work is done safely.

Fixed installation

205 Fixed electrical installations and any subsequent alterations, extensions and repairs should be to a suitable standard, such as *Requirements for electrical installations* BS 7671:2008+A3:2015 (also known as the Institution of Engineering and Technology (IET) Wiring Regulation, though these Regulations are not in fact statutory duties). BS 7671:2008 sets out, among other things, the types of electrical systems suitable for different locations within the pool complex, the application of measures against electric shock, and the types of switchgear and accessories that may be suitable.

206 The responsibility for ensuring that the electrical installation is effectively earthed and bonded where necessary rests with the pool operator. Operators should seek specialist advice on this if necessary.

207 Where possible, switches should be fitted to enable parts of the installation to be disconnected from the supply. These switches should be of the type designed to provide electrical isolation so that maintenance, modification and/or repair can be undertaken safely.

208 Socket outlets should not normally be located in wet areas. Where they are, they should be of a type suitable for that environment, in accordance with BS EN 60309-2:1999+A2:2012, IEC 60309-2:1999 (formerly known as BS 4343). Particular care should be taken where hoses or water jets are used.

209 The supply to these outlets, and those used to supply leads and equipment to be used in wet areas, should be protected to reduce risk from electric shock. This can be either by the use of earth monitoring systems (particularly for 415 V ac supplies) or supplies fed via non-adjustable residual current devices (RCDs) with a rated tripping current not exceeding 30 mA. Pool operators may need specialist advice regarding installation of RCDs.

210 RCDs should be:

- installed in a damp-proof enclosure (the test button and reset button should be accessible but exclude damp getting in) and all cable entries should be properly sealed (see the manufacturer's instructions);
- protected against mechanical damage and vibration;
- checked daily by operating the test button;
- inspected weekly, together with the equipment it is supplying, during the formal visual inspection;
- tested every three months by an electrician using appropriate electrical test equipment.

211 The tests should not be carried out on RCDs when loss of power may affect other work activities or the public in the complex.

Potentially flammable atmospheres

212 It is unlikely an explosive atmosphere will be created in any chemical treatment area. However, if electrical equipment is to be used in an area where an explosive atmosphere could occur, for example adjacent to an electrolytic sodium hypochlorite generator which produces hydrogen as a by-product, or where there is a possibility of an explosive dust cloud, it should be suitable for such use. See BS EN 60079-14:2008 for guidance on the selection and installation of suitable equipment.

Portable electrical equipment

213 Electrical equipment should not normally be used in wet areas. Where it is necessary to use portable electrical equipment at or near the poolside, it must be selected and used carefully to reduce electrical risks. The use of certain types of equipment will eliminate, or reduce substantially, these electrical risks, for example:

- air-powered tools;
- equipment designed to withstand immersion in water;
- battery-operated tools;
- 25 V waterproof portable hand lamps (IP56 or IP57, or IPX6 or IPX7);
- 50 V tools fed from a safe extra low voltage (SELV) system;
- 110 V tools fed from a reduced low voltage (RL V) system. This is usually an isolating transformer (see BS EN 61558-1:2005+A1:2009) that is centre tapped to earth on the secondary output winding.

214 A voltage as low as 50 V can be fatal to someone immersed in the water, so pool operators should consider fitting electrically powered equipment used on or adjacent to the pool or over the pool, with restraints or erecting barriers to stop it falling into the water.

215 Mains voltage audio and similar equipment should not be allowed on or near the side of the pool unless it was specifically designed for use in or around water. Pool operators should ensure that third parties, for example aqua aerobics coaches, do not bring unsuitable electrical items onto the poolside. Electrical equipment not designed for use in or around water should be located in a dry room away from the pool and where possible equipment such as loudspeakers and electronic clocks should be situated out of reach of pool users and water. In addition, they should be connected by permanently installed cabling with proper connection facilities. Where temporary installations are used during non-programmed sessions, equipment and cabling should be situated out of reach of pool users.

216 Some items of equipment can also involve greater risk than others. Extension leads are particularly liable to damage – to their plugs, sockets, connections and the cable itself. Other flexible leads, particularly those connected to equipment which is often moved, can suffer from similar problems.

217 HSE's booklet *Maintaining portable and transportable electrical equipment* (www.hse.gov.uk/pubns/books/hsg107.htm) gives general advice on the electrical safety aspects of maintaining portable and transportable equipment.

Swimming pool design

218 Effective management of health and safety in any swimming pool starts with careful design. Those involved in specifying, designing or constructing new pools or refurbishing existing ones, must provide, so far as is reasonably practicable, a safe facility for pool users and staff.

219 It is advisable to include an experienced facility manager on the pool design/refurbishment team. It may not be possible to include the person who will ultimately manage the facility. But someone from the client organisation, or who is managing a similar facility elsewhere, could give advice and guidance during the various development stages of the project.

220 Factors to consider which can impact on worker and pool user safety include:

- designing the layout of the pool hall, pool tank (including its dimensions, profile, impact of glare and reflection, and any water features), to make the safe use and supervision of the pool easy to achieve without complex or costly management arrangements;
- designing the layout of the ancillary areas, including the plant room, changing, clothes storage, shower and toilet areas, for safe use;
- selecting structural elements – materials, finishes and details which are used in the construction of these areas – including the pool hall enclosure, tank and equipment, and the way they are assembled, to achieve a safe-to-use physical environment.

Role of the designer

221 Designers have a duty under the Construction, Design and Management Regulations (CDM) (see www.hse.gov.uk/construction), to eliminate hazards that may give rise to risks, and reduce risks from any remaining hazards.

222 The main sources of published technical guidance for swimming pool design are: BS EN 15288–1 *Swimming pools: Safety Requirements for design* and the Sport England Swimming Pools Design Guidance Note: *Sport England Design Guidance Note for Swimming Pools* (www.sportengland.org);

- Sport England *Appendix 1: Pool Types and Technical Design Issues* (www.sportengland.org);

- Sport England *Appendix 2: Servicing the Building* (www.sportengland.org);
- Sport England *Appendix 3: Construction and specification considerations* (www.sportengland.org);
- Sport England *Appendix 4: Improvement and alterations to existing swimming pools* (www.sportengland.org);
- Sport England *Appendix 5: Further Information* (www.sportengland.org).

223 Paragraphs 224-235 outline the main safety considerations when designing or refurbishing a swimming pool. Designers are advised to refer to swimming pool technical guidelines for detail on design and material specification.

Building materials and specifications

Pool tank

224 Pool tank profile:

- Avoid abrupt changes in depth and steep gradients.
- Identify changes in depth by using colour-contrasted materials or patterned finishes to make them clear to pool users. Select colours that will not reduce the visibility of a body lying on the pool bottom.
- Consider additional hazards that could be created by the introduction of movable floors or bulkheads.

225 For the pool tank edge:

- Consider colour-contrasting the edge with the pool water to make it clearly visible to pool users in the water and on the pool surround. This is particularly important for deck-level pools where the pool edge may be partially submerged. Where the pool tank bottom slopes gently from a beach area to deeper water, you may not need to highlight the water's edge, providing there are no 'upstands' or steps between the pool and its surrounds.
- Consider providing fixed raised pool ends for main pools with deck-level edge channels, where a pool is used predominantly for training and/or racing. The raised ends help the pool user to easily identify the end walls of the tank.

226 For pool tank detailing consider:

- ensuring the pool tank has no sharp edges or projections that could cause injury to pool users, especially below the water level;
- recessing handrails into the pool tank, so it is not possible for limbs to become trapped between the grab-rail and the rear wall of the recess or the tank wall (see BS EN 13451:2);
- recessing resting ledges into the pool wall, or providing colour-contrasted ledges to alert pool users to its presence;

- providing suitable protective covers or grilles for wave machine openings, sumps, or inlets and outlets of the pool water circulation system, that are designed to prevent limbs and fingers getting trapped.

227 Pool tank bottom:

- Consider providing a slip-resistant, non-abrasive finish on the end walls of the pool as a turning pad to aid tumble turns or for swimmers starting backstroke events.
- Provide a slip-resistant, non-abrasive finish on the beach area of leisure pools and other shallow water areas where pool users may become unbalanced, for example when a wave machine or other feature is operating.
- Avoid pool floor patterns which would make it more difficult to recognise a body at the bottom of the pool.

Access to the pool and the pool hall

228 Circulation in 'wet' areas and around the pool: So far as reasonably practicable:

- avoid abrupt changes in floor level, including steps, to prevent slips;
- use non-slip floor covering;
- design access to the pool hall from changing rooms or pre-swim shower areas to present the bather with shallower water;
- locate access stairs to slides to minimise the possibility of pool users queuing near deeper water;
- design the pool surrounds and other circulation areas to ensure the free flow of bathers and the avoidance of congestion, to take account of how the pool is used.

229 Access to the pool tank: Consider providing:

- a barrier where access from the changing/shower areas is directly adjacent to the pool tank to prevent running from that area straight into the pool;
- built-in steps or ladders, appropriate to the pool design, to provide easy and safe entry to, and exit from, the water. See BS EN 13451-2, for recommended dimensions;
- ramps to give less-abled pool users easier access to the pool. If a ramp is provided in a main pool, ensure it does not protrude into the bathing/swimming area.

Floors and finishes

230 Slip resistance: Specify:

- slip-resistant floor finishes, considering gradient, surface roughness, moisture displacement, the profile and surface pattern of the finish and foot grip;
- floor gullies, gutters and valleys that do not constitute a tripping hazard, with drainage outlets without sharp edges, and that are easy to maintain and clean.

231 Walls: Consider:

- providing wall finishes to circulation areas which are smooth to above head height;
- designing any projecting piers or columns with a rounded or bull-nosed edge.

232 Glazing:

- Provide glazing of the appropriate specification to ensure it can withstand body impact (BS 6262: Part 4).
- Protect windows against ball impact, for instance through the use of impact-resistant toughened glass or polycarbonate sheeting or netting, if the pool is used for ball sports.
- Minimise the amount of reflection and glare caused by the glazing which could affect the view of lifeguards and pool users. This problem is frequently cited as a cause of the lifeguards' inability to safely supervise the pool.

Specialised pool design elements

233 Many swimming pools contain a number of features (for example diving boards, starting platforms, water slides, wave machines, movable floors, bulk heads, inner tube rides, slow and fast river rides, falling rapids and spas) which present their own particular requirements to ensure safe operation.

234 References to design advice for such features are given in Appendix 1 of Sport England's *Swimming Pool Design Guide*.

Managing design problems

235 While good design will eliminate many potential hazards in a new pool, you may have responsibility for an existing pool, where you cannot make changes to its layout or major features. The risk assessment process can be used to identify any physical or procedural changes or management measures to enable the pool to be used safely.

The pool water treatment system

236 This section aims to protect employees, contractors and pool users from risks from operating pool water treatment systems. These include:

- irritation of skin, eyes and the respiratory system by chemical disinfectants and disinfection by-products;
- infection due to inadequate control of micro-organisms;
- delivery and storage issues;
- the possibility of fire due to some disinfectants being strong oxidising agents;
- leaks of toxic gases. The most serious being the uncontrolled escape of chlorine gas, following inadvertent mixing of a chlorine-based disinfectant with acids;
- working in confined spaces;
- use of inappropriate or defective electrical equipment.

237 Treatment of pool water is essential to ensure that employees and pool users are not exposed to risks of infection from contamination of the pool water by microbiological organisms. Detailed technical guidance on types and efficacy of pool water treatment systems and associated risks is contained in the PWTAG Code of Practice and the *Swimming Pool Water Book* (<http://pwtag.org/the-swimming-pool-water-book>).

238 Hot and cold water systems also present a foreseeable risk of exposure to legionella bacteria if not properly managed. See www.hse.gov.uk/healthservices/legionella.htm.

239 All showers should be managed in accordance with HSE's L8 *Legionnaires' disease. The control of legionella bacteria in water systems* (www.hse.gov.uk/pubns/books/l8.htm).

Control of Substances Hazardous to Health Regulations (COSHH)

240 COSHH requires employers to control substances that are hazardous to health. These can take many forms and include chemicals, mists, vapours, fumes, gases and asphyxiating gases and germs that cause diseases (www.hse.gov.uk/biosafety/infection.htm).

Typical hazardous substances include:

- sodium hypochlorite;
- calcium hypochlorite;
- chlorinated isocyanurates;
- acids;
- bromochlorodimethylhydantoin;
- bromine;
- microbiological organisms in pool water, for example, legionella and cryptosporidium (due to contamination from a failure to manage pool water quality and hot and cold water systems or a breakdown of existing control measures. Faecal fouling will also introduce risk of infection from harmful organisms).

241 See www.hse.gov.uk/coshh for more information.

Training on hazardous substances

242 Pool operators must provide information, training and instruction for employees who work with substances hazardous to health (www.hse.gov.uk/coshh/basics/training.htm). This includes cleaning and maintenance staff.

243 Pool operators should also ensure that contractors understand their responsibilities and follow procedures. Pool operators should monitor compliance with procedures and review them periodically and after any incidents. There is more information on managing contractors at www.hse.gov.uk/managing/delivering/do/organising/managing-contractors.htm.

Delivery, storage and handling of chemicals

The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)

244 Dangerous substances are any substances used or present at work that could, if not properly controlled, cause harm to people as a result of a fire or explosion. They can be found in nearly all workplaces and include chemicals used for pool water treatment such as calcium hypochlorite and bromochlorodimethylhydantoin. There is more guidance on DSEAR at www.hse.gov.uk/fireandexplosion/dsear.

245 Advice on delivery, storage and handling of chemicals is given in the PWTAG publication *Swimming pool water – treatment and quality standards*.

Delivery on site

246 When materials are delivered, make sure there is enough space for manoeuvring and parking close to the storage area. Take precautions (for example supervision, warning signs, or barriers) to protect the public or workers who may have access to the delivery area. Move materials into storage as soon as possible, and do not leave them unattended in a public area.

247 Pool operators must have safe systems of work in place to ensure that bulk deliveries of chemicals are properly managed. This will include:

- a delivery procedure agreed with the supplier and haulage company;
- procedures to ensure that incompatible materials are effectively segregated;
- designated pipework with connections that are easily identifiable and unique in size and/or shape so as to prevent inadvertent misconnection;
- making sure employees wear any required Personal Protective Equipment (PPE);
- making sure emergency procedures are in place if there is a spillage.

248 For bulk deliveries, a written delivery procedure should be agreed with the supplier, in accordance with hazard data sheets. Incompatible materials (for example acid and alkali), if delivered in the same vehicle, should be effectively segregated. Where sodium hypochlorite is delivered from a tanker to a bulk tank, the pipework and connections should be specific to that delivery, to prevent delivery hoses being incorrectly connected up. Loading points should be clearly labelled.

249 Further information is available in *A guide to workplace transport safety* (www.hse.gov.uk/pubns/priced/hsg136.pdf).

Storage

250 See www.hse.gov.uk/chemicals for guidance on storage of chemicals.

Plant room

251 The plant room should be a secure area for authorised staff only. Plant rooms should be adequately sized and not used for general storage, or for storing hazardous chemicals, unless appropriate precautions are taken.

252 The pool operator must provide suitable information, instruction and training for employees operating pool water treatment plant and equipment and ensure that a risk assessment of the plant room is carried out.

253 The plant room should contain the necessary PPE to ensure the health and safety of anyone handling hazardous substances. PPE provision will depend on risk and may include:

- an eyewash station;
- a nose and mouth respirator (EN 140:1998 and BS EN 14387:2004);
- rubber gloves (BS EN 420:2003);
- goggles or face shield (BS EN 166:1996);
- wellington boots (BS EN ISO 20345:2011);
- apron or overalls (BS EN 14605:2005 and EN 13034:2005);
- a full-face respirator, to Chemical Works Regulation 1922.

254 Information on plant room protocol can be found in the PWTAG code of practice.

Handling

Personal Protective Equipment (PPE)

255 Where it is reasonably practicable to do so, engineering controls, such as automatic dosing systems, must be used in preference to PPE. PPE must only be used as a last resort, but even where engineering controls and safe systems of work have been applied, some hazards might remain. If so, pool operators must identify the PPE required for specific tasks and the level of protection it provides. Suppliers of equipment and chemicals will be able to provide advice on the technical specifications of their PPE. See www.hse.gov.uk/toolbox/ppe.htm for more information.

Respiratory Protective Equipment (RPE)

256 Where a COSHH assessment identifies that RPE is necessary, it should be provided on personal issue. The type of respirator, training, instructions and maintenance arrangements must be determined as part of the COSHH assessment.

257 Canister respirators can only deal with low concentrations of toxic gases. Pool operators must have suitable emergency procedures for more serious leaks, where appropriate in consultation with the fire authorities.

258 RPE must fit the wearer and provide adequate protection from exposure to the hazardous substance.

259 As people come in all sorts of shapes and sizes it is unlikely that one particular type or size of RPE facepiece will fit everyone. Fit testing will ensure that the equipment selected is suitable for the wearer. See www.hse.gov.uk/respiratory-protective-equipment for more information.

Faecal fouling

260 A significant risk associated with using swimming pools, particularly those used by babies and very young children, is the hazard caused by faecal fouling. Pool operators must have procedures to cover faecal fouling incidents. Staff must be trained in these procedures.

261 For detailed guidance on dealing with faecal fouling see PWTAG Technical Note 1229 (<http://pwtag.org/technicalnotes/1229>).

Other hazards associated with the disinfection system

Hypochlorite and acid systems

262 Pool water treatment systems that dose the pool water, either automatically or manually controlled, with either calcium or sodium hypochlorite and acid, have on occasions resulted in the release of chlorine gas into the atmosphere.

263 Most incidents have happened when water circulation has stopped or been reduced but the automatic dosing system has continued to operate. This produces a build-up of hypochlorite and acid which react together to produce chlorine gas. The gas is then discharged into the pool hall when water circulation is restored. This possibility must be taken into account in the EAP.

264 The loss of water circulation or reduced flow can be caused by failure of the pumps, loss of prime, manual isolation of the pumps during maintenance, or the operation of bypass valves (which reduce water flow within the pipeline).

265 Further guidance on controlling the risks from chlorine is available in *Safety advice for bulk chlorine installations* (www.hse.gov.uk/pubns/books/hsg28.htm) and in *Safe handling of chlorine from drums and cylinders* (www.hse.gov.uk/pubns/priced/hsg40.pdf). Detailed information on the different chemicals that are available for use in swimming pools, with advice to help you choose can be found in PWTAG's *Swimming pool water: Treatment and quality standards for pools and spas* (www.pwtag.org.uk).

Chemical spillage

266 Any spillage should be cleared away using a safe method. The method for clearing spillage recommended by the supplier and the pool operator should be displayed on a notice together with the provision of the necessary equipment and its location. Care should be taken to prevent any chemical entering a drain unless it is safe to do so.

Leak of toxic gases

267 There should be an EAP for dealing with any major release of toxic gas. The procedure should include arrangements for:

- evacuating the whole site, if necessary;
- co-ordinating with the emergency services, including informing them immediately of hazardous substances present (unless they already have this information).

Chemical dosing

268 Pool chemicals can be used as supplied or mixed before dosing. Whatever system is used, it is important that it is carried out by competent staff. Chapter 9 of PWTAG's *Swimming pool water: Treatment and quality standards for pools and spas* (www.pwtag.org.uk) provides information on:

- principles and practice;
- dilution and dissolving;
- dosing strengths and amounts;
- equipment types and operation;
- automatic control;
- chlorine gas;
- circulation feeders.

269 Chapter 16 deals with maintenance of the equipment.

Other risks

Confined spaces

270 Cleaning or maintenance activities may require employees or contractors to enter confined spaces. A confined space is a place which is substantially enclosed (though not always entirely, for example a pool balance tank after it is emptied), and where serious injury can occur from hazardous substances or conditions within the space or nearby (for example lack of oxygen).

271 If work is required on plant or equipment in confined spaces, pool operators must have arrangements in place to ensure the work can be done safely. The following principles apply:

- avoid working in a confined space whenever possible, for example by doing the work outside;
- follow a safe system of work if working inside;
- make appropriate arrangements for rescue in an emergency.

272 There is detailed guidance on managing the risks from work in confined spaces at www.hse.gov.uk/confinedspace.

Emergency procedures

273 Initiating emergency procedures at the earliest stage of an incident can significantly reduce the impact on people, premises and the environment. You should develop a procedure for dealing with emergencies. Consider the range of possible events, taking into account the following:

- the nature and quantities of the dangerous substances stored;
- the location of the storage facility and its design;
- the people, both on-site and off-site, who may be affected;
- possible environmental impacts.

274 Pool operators must have procedures in place to respond to emergencies. The level of detail of these procedures should be proportionate to the risk. These should be detailed in an EAP and must be in place for:

- toxic chemical spillage;
- release of toxic gas;
- fire and explosion.

275 Pool operators' emergency procedures should include:

- containing and controlling incidents so as to minimise the effects and to limit danger to people, the environment and property;
- implementing the measures necessary to protect people and the environment;
- a description of the actions which should be taken to control the conditions at events and limit their consequences, including a description of the safety equipment and resources available;
- arrangements for training staff in the duties they will be expected to perform;
- arrangements for informing local authorities and emergency services.

276 The emergency plan should be simple and straightforward, flexible and achieve necessary compliance with legislative requirements. Separate on-site and off-site emergency plans should be prepared.

Emergency operating procedures/training

277 Emergency procedures should include instructions for dealing with fires, leaks and spills. The procedures should describe how to:

- raise the alarm and call the fire brigade;
- tackle a fire or control spills and leaks (when it is safe to do so);
- evacuate the site, and, if necessary, nearby premises.

Area evacuation

278 Evacuation of areas if there is a fire or toxic gas emission should be addressed in an emergency evacuation procedure. This should specify designated safe areas, assembly points and toxic gas shelters. The procedure should also identify responsible staff whose duties during area evacuation include:

- responsibility for a specific area;
- ensuring roll calls are undertaken to identify missing persons;
- communication of missing persons to central emergency services.

279 In certain exceptional circumstances premises may be subject to COMAH where threshold quantities of dangerous substances identified in the regulations are kept or used. Further information is available at www.hse.gov.uk/comah/index.htm.

First-aid provision for direct contact with chemicals

280 Pool operators' first-aid arrangements should include equipment close to the hazard for dealing with the consequences of direct contact with chemicals, for example:

- eyewash bottles in case of chemicals coming into contact with the eyes;
- a wash basin with running water in case of chemicals coming into contact with the skin;
- where there is a risk of full body contamination, operators should provide an emergency drench shower to allow staff to immerse themselves.

281 The delivery of water should be at high volume but low pressure to reduce the risk of injury or further contamination. The volume should be sufficient to immediately drench the person (for showers, typically 75 l/min, for eye-wash 1.5 l/min) and there should be sufficient flow to last around 15 minutes. Consequently, simply using hoses connected to mains water is not suitable.

282 Employees must be trained in the proper use of such equipment and it should be maintained in accordance with the manufacturer's instructions and tested weekly.

Danger of contamination

283 All chemicals generating chlorine on contact with water (calcium and chlorinated isocyanurate and bromochlorodimethylhydantoin) need to be kept cool (temperatures should not exceed 30°C), in closed containers and away from dampness and contamination by organic materials such as grease. Ammonia is particularly dangerous in contact with chlorinating agents. Some chemicals react with strong acids and some with alkalis or even each other. Do not attempt to mix chemicals, even apparently similar types. Only use chemicals in the specific circulation feeder designed for them.

Appendix 1 Further legislation

Corporate Manslaughter and Corporate Homicide Act

1 This legislation ensures that companies and organisations can be found guilty of corporate manslaughter as a result of serious management failures resulting in a gross breach of a duty of care. Although the offence is not part of health and safety law, it represents an important element in the corporate management of health and safety.

2 The act, which came into force on 6 April 2008, clarifies the criminal liabilities of companies, including large organisations, where serious failures in the management of health and safety result in a fatality. The Ministry of Justice leads on the act. There is more information on the Corporate Manslaughter page of the CPS website at www.cps.gov.uk.

Workplace (Health, Safety and Welfare) Regulations

3 The Workplace (Health, Safety and Welfare) Regulations cover a wide range of basic health, safety and welfare issues such as lighting, temperature, cleanliness and ventilation. They apply to most workplaces and expand on the general duties under the HSW Act. See www.hse.gov.uk/pUbns/priced/l24.htm.

Provision and Use of Work Equipment Regulations

4 The Provision and Use of Work Equipment Regulations (PUWER) expands on the general duties of the HSW Act and require that work equipment supplied to employees is suitable, used safely and properly maintained. PUWER makes more explicit the general duties already placed on employers, the self-employed and people in control to provide safe plant and equipment. See www.hse.gov.uk/work-equipment-machinery/index.htm.

Construction (Design and Management) Regulations

5 The Construction (Design and Management) Regulations (CDM) apply to construction projects (including, for example, refurbishment and demolition).

6 The regulations place duties on clients, designers and contractors, and require suitable management arrangements to be in place for construction work from concept to completion. Guidance on the regulations can be found at www.hse.gov.uk/pubns/books/l153.htm.

Electricity at Work Regulations

7 The Electricity at Work Regulations cover health and safety duties for the safe use of electricity at work. The regulations require that electrical installations and equipment are properly constructed, maintained and fit for the purpose and environment in which they are used. This is particularly important in the humid or wet environments associated with swimming pools. For further details see www.hse.gov.uk/pubns/priced/hsr25.htm.

Manual Handling Operations Regulations

8 Manual handling is the transporting or supporting of loads by hand or by bodily force.

9 Pool operators must consider the risks from manual handling to the health and safety of their employees. If risks exist, the Manual Handling Operations Regulations apply, see www.hse.gov.uk/msd/backpain/employers/mhor.htm.

Diving at Work Regulations

10 The Diving at Work Regulations cover all dives when one or more divers undertake work activities. The regulations apply to everyone, from the client, who commissions the work, to the diver undertaking the work. Everyone involved has a responsibility to ensure the health and safety of those taking part in the diving project. The regulations seek to control, through risk assessment, the hazards and risks associated with diving. The employer has a responsibility, so far as is reasonably practicable, to plan and manage the work to protect the health and safety of everyone taking part. See www.hse.gov.uk/diving/index.htm.

Regulatory Reform (Fire Safety) Order and Fire (Scotland) Act

11 These replace most fire safety legislation and require that people who have some level of control in premises must take reasonable steps to reduce the risk of fire and make sure people can escape safely if there is a fire. Pool operators, like any other employer, have a duty to comply with them. Where you or another employer do not have control over parts of the workplace, there is a responsibility on the person who does (usually the owner or landlord) to make sure those parts comply with the regulations. See www.hse.gov.uk/toolbox/fire.htm.

Confined Spaces Regulations

12 These regulations apply in all premises and work situations in Great Britain subject to the HSW Act, with the exception of diving operations and below ground in a mine (there is specific legislation dealing with confined spaces in these cases). See www.hse.gov.uk/confinedspace/.

The Work at Height Regulations

13 The purpose of these regulations is to prevent death and injury caused by a fall from height. If you are an employer or you control work at height (for example facilities managers or building owners who may contract others to work at height) the regulations apply to you. See www.hse.gov.uk/work-at-height/index.htm.

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

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