

Chemical deliveries

Contents

Section	Heading	Page
1.	Assessment	1
2.	Risk control	1
3.	Hazards associated with disinfectants	2
4.	Training	2
5.	Personal protective equipment	3
6.	Delivery, storage and handling of chemicals	3
7.	Bulk delivery of sodium hypochlorite	4
8.	Transport from offloading area to store	5
9.	Storage	5
10.	Handling of chemicals	6
11.	Disposal of wastes	6
12.	Emergency Procedures	6
	Appendix 1: Customer installation inspection	7
	Appendix 2: Small bulk discharge procedure	8

This information note is based upon the content of the National Pool Water Treatment Advisory Group's publication *Swimming Pool Water Treatment and Quality Standards* and the Health and Safety Executive Document, *Managing Health and Safety in Swimming Pools*. The British Chemical Distributors and Traders Association have contributed to the compilation of this guidance and the Health and Safety Executive have confirmed that this guidance is in accordance with their principles for chemical safety.

1. Assessment

1.1 The first step is for the employer to assess the risk of each chemical. This must be carried out by a competent person – perhaps a member of the management team for a small, stand-alone pool, or often a specialist team in a multi-function local authority department. This process will also need to call on the experience and knowledge of others, for example the assessor will need to know about:

- which chemicals are used and how they are used (including storage);
- other chemicals on site - by reference to material safety data sheets, etc;
- site location in relation to the impact of a chemical accident;
- staff training and competence in using chemicals;
- risks to health arising from micro-organisms.

1.2 Where this assessment is carried out under COSHH, there is no need for further assessment to comply with the Management of Health and Safety at Work Regulations 1992, provided the assessment is regularly reviewed and remains valid.

2. Risk control

2.1 The next step under COSHH is to prevent or control exposure to hazardous substances. Prevention is obviously best. The pool operator will need to consider whether this can be achieved by substituting a less harmful substance, or one that is compatible with other chemicals on site. This may reduce the risk to health due to fire, explosion or the production of toxic gases.

2.2 Only where prevention is not reasonably practicable can the pool operator turn to other controls. Personal protective equipment should not be the first option. Instead, the risk must be reduced to acceptable limits by 'engineering' control measures such as using the least potentially harmful chemical that can achieve the purpose intended effectively and efficiently and by isolating or physically separating chemicals from any chance of direct human exposure. These procedures must be systematically recorded to include:

- identification of the hazards;
- identification of who might be harmed and how;
- evaluation of the risks arising from the hazards, and decisions about precautions;
- recording the findings;
- regular review of the assessments and any necessary revisions.

2.3 The COSHH Regulations require suppliers of chemicals to provide a material safety data sheet (MSDS) for each chemical. It is also the installer's responsibility to provide relevant information on plant safety, etc - which may include MSDSs. There will need to be MSDSs for all the chemicals in the plant room including test reagent chemicals, cleaning chemicals, chemicals used in maintenance programmes, etc.

3. Hazards associated with disinfectants

3.1 Whichever method of disinfection is being used, it is essential that current operating instructions and current safety advice are available from the suppliers. The pool operator, or other person competent to read, understand and interpret the instructions and advice, has to produce their own written safe work procedures, which should usually include:

- safe methods of use/operation of systems;
- goods inwards procedures;
- controls on smoking, eating and drinking;
- storage arrangements;
- emergency alarms and procedures;
- spillage and waste disposal methods;
- first aid.

3.2 The hazards associated with these materials are largely those of chemical handling generally – direct contact with the chemical. There is also a risk of chlorine gas being generated if chlorine-containing chemicals come into contact with acids, or from contact between certain dry chemicals and water. Many of the chemicals used in swimming

pools can cause irritation and burning should they come into contact with the skin.

3.3 Advice on the safe design and operation of the most commonly used disinfecting systems is given in *Swimming Pool Water Treatment and Quality Standards*.

4. Training

4.1 The COSHH Regulations require that staff involved in the handling and use of chemicals should receive appropriate training and instruction. Even the most thorough arrangements to comply with the COSHH Regulations will fail unless all employees are aware of the risks associated with their work and how these risks can be avoided. ISRM Pool Plant Operators Courses are one way of providing this training. ISRM can also provide customised training packages for operators to meet their specific on-site requirements.

4.2 Only competent people should handle chemicals.

4.3 Training will need to include sufficient knowledge and understanding of the chemicals for staff to be alert to any changes affecting safety. Staff must be trained and clear written procedures should be distributed to all employees involved in the operation of plant or the handling of chemicals. The written procedures will need to include:

- control measures;
- labelling and safety notices;
- MSDSs (maintained on site) for all chemicals used;
- information on delivery, storage, handling and use.

4.4 The training for the safe operation and use of equipment and chemicals will need to:

- be related specifically to the operation and maintenance of the particular plant, hazards associated with it, and substances used. Employees' attention should be drawn to any manufacturers' instructions, and copies made conveniently available (eg secured to the plant itself);
- be given to all appropriate employees to ensure that plant is never operated by untrained staff;
- include pool managers, to ensure they understand the functioning of the pool water system, including the plant and associated hazards, sufficiently to supervise safe operation;
- include the use, care and maintenance of personal protective equipment;

- require those who have been trained, to demonstrate that they can operate and maintain the plant safely.

4.5 Pool operators will need to check that staff understand and follow all procedures and responsibilities. Monitoring and review of the effectiveness of arrangements should then follow e.g. checking that where provided, PPE is used as required. Details of actual training sessions will need to be recorded and reviewed. Information, instruction, and training are the essential requirements for all staff involved in the storage, handling, and use of swimming pool chemicals.

5. Personal protective equipment

5.1 The Personal Protective Equipment Regulations 1992 require pool operators to assess and provide necessary personal protective equipment (PPE) when performing certain tasks. It is recommended that pool operators take the advice of suppliers of equipment and chemicals as to what PPE is needed. Information is detailed on the MSDS. Some or all of the following protective clothing may be needed during delivery, handling of materials, cleaning or maintenance:

- dust masks and face protection;
- eye protection (to British Standard EN 166: 1996) 24;
- aprons or chemical suits;
- boots;
- gauntlets;
- respirators.

5.2 Respirators

Where chlorine gas is used, or there is any risk of generating chlorine or bromine gas by accidental mixing of chemicals, it is particularly important to provide precautions against exposure to toxic gases. Sufficient canister respirators for all employees liable to be present at any one time should be kept available in or near plant rooms. Canister respirators should be located in the immediate area where the leak may occur and also at the entrance door to these areas where they can be used by staff who may have to go into the area where a leak is apparent.

- 5.2.1 Employees who have to work with the chemicals should have respirators on personal issue. The type of respirator, training, instructions and maintenance arrangements should be determined as part of the assessments.
- 5.2.2 Canister respirators can only deal with low concentrations of toxic gases. Pool operators need to consider suitable emergency

procedures for more serious leaks, where appropriate in consultation with the fire authorities.

5.2.3 Canister respirators should only be used as a last resort. Where they are used, it is important that attention be paid to the manufacturer's instructions, in particular the limitations of the product, and that canisters are replaced immediately after the seal has been broken.

6. Delivery, storage and handling of chemicals

6.1 The principles and advice given here can, in some cases, also be applied to small systems using small quantities of materials.

6.2 Chemicals should be kept only in the containers in which they were received from the suppliers, or containers intended for that purpose and correctly marked with the safety information and product identity. The pool operator has a duty to use suitably marked containers that have been specifically designed to hold chemicals. Temporary unlabelled containers should not be used.

6.3 Delivery on site

6.3.1 When chemicals are to be delivered, sufficient space for parking and manoeuvring should be provided close to the storage area. Precautions (eg supervision, warning signs, or barriers) should be taken as necessary to protect the public or employees who may have access to the delivery area. Materials should be moved into storage as soon as possible, and never left unattended in a public area.

6.3.2 For bulk deliveries, a written delivery procedure should be agreed with the supplier, in accordance with hazard data sheets (placed in the written procedures file and regularly reviewed). The supplier should ensure that the installation is suitable to receive the proposed chemical delivery. (see appendix 1). Incompatible materials (e.g. 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. Unloading points should be clearly labelled.

6.4 Access

6.4.1 The nearer delivery vehicles can get to the chemical store the better. (See below for bulk delivery.) The access road and the offloading area should allow a clear, safe approach with minimal manoeuvring. Unloading should not

be on the public highway; if it has to be - for some good reason - the local authority must give permission, warning signs and pedestrian barriers must be used and the general public supervised to prevent them entering the unloading area.

- 6.4.2 The offloading area should be concrete or equivalent, at the same level as the store, with a drain to a sump (or a local authority-approved drain) and a good supply of hosed running water. Written procedures to deal with spillages must be approved (emergency services and local water companies), understood and available to staff. Staff should be trained thoroughly in the methods, precautions and requirements to deal with spillages. They should also be communicated to the driver by signboards in the delivery area or in hard copy when reporting to the designated, competent person on site. (Spilt, dry materials if uncontaminated can sometimes be swept up, stored and used at an early opportunity but check first with the supplier for the safest procedure.) The disposal of contaminated waste is subject to waste disposal regulations.
- 6.4.3 The offloading area should be clearly labelled with the appropriate warning signs. Incompatible materials (eg acid and alkali) delivered in the same vehicle should be effectively segregated on the vehicle, and throughout their delivery into separate storage.

6.5 Offloading

- 6.5.1 In general, cylinders and other containers of over 25kg will be delivered either on vehicles with a tail lift, or on platform vehicles with a slide or skid that allows containers to be lowered to the ground. A delivery dock at the same height as the delivery vehicle is an acceptable alternative, as is a forklift truck.
- 6.5.2 The driver may need help offloading. No delivery should go ahead if there is no-one to receive it. The responsibility for offloading and unloading is joint between customer and driver. The driver's responsibility ends when the container reaches ground or dock level. The driver's role does not include delivery into the store. No container must ever be dropped to the ground.
- 6.5.3 Lifting gear may also be used. The safe working load (SWL) should not be exceeded, and regular inspection, testing and certification is crucial.

7. Bulk delivery of sodium hypochlorite

- 7.1 The connection of intermediate bulk containers to bulk storage tanks of sodium hypochlorite is a critical process, needing careful preparation physically and organisationally. A written procedure should be agreed and all necessary requirements checked prior to unloading taking place (see appendix 2). The tank, which should be clearly marked should, ideally, be on an outside wall in the storage room, fitted with a contents gauge or level indicator so that the level (the other side of the wall) can be read during delivery. If this is not the case and it cannot be read, and the fill point is remote from the tank, a fill guard alarm system with warning lights (whose operation can be checked before each delivery) should be fitted. The chemical should not be pumped across a pavement. If there is a permanent fill line, it must not pass through public areas, and may need to be protected. It should drain back to the tank.
- 7.2 Bulk tanks are normally at least 1,500 litres, to take 1,000 litres from the intermediate bulk container. The tank should be marked so that it is clear when it needs to be filled, and when it is full.
- 7.3 The pipework should be specific to the delivery of that product, to prevent delivery hoses being incorrectly connected up. It is important that any other chemical delivered in bulk has a separate, different size or type of connection. Pipework fill points should be clearly labelled and locked when not in use.
- 7.4 The whole process should be the specific responsibility of a nominated member of staff (the competent person). That supervisor and nominated staff must have had suitable training on the product and its operation, and:
- have a clear knowledge of the offloading procedures and hypochlorite handling precautions;
 - supervise the offloading operation throughout;
 - make sure the correct product is being delivered and that the quantity supplied corresponds to that ordered;
 - make sure that there is room in the tank for the full quantity being delivered;
 - pay particular attention to the level in the bulk tank, before and during offloading;
 - check that the drain valves on the storage tank filling line are closed;
 - instruct the driver to connect the flexible hose to the correct intake pipe; check that the connection has been made correctly, and that there is no restriction to flow;
 - sign the discharge consent notice before instructing the driver to start pumping;

- use agreed communication signals to stop the driver from pumping if the procedure goes wrong in any way and to indicate when the correct amount has been offloaded;
- when the right amount has been offloaded, close the valve on the filling line; when drainage stops, instruct the driver to disconnect the flexible hose;
- deal with any spillages and drainage by washing them away to sump or drain;
- sign the discharge consent and consignment notices after delivery.

7.5 The pool's written emergency plan should cover bulk storage, i.e. the spillage of entire contents of bulk storage, as well as all chemicals stored on site. The appropriate protective clothing should be worn.

8. Transport from offloading area to store

8.1 Chemical containers should not be left unattended at the offloading site, especially where it is open to the public. In any case, materials should be stored away in a cool place as soon as possible - especially sodium hypochlorite, whose decomposition is accelerated by sunlight (causing pressure rise and possible fracture of the container).

8.2 In accordance with manual handling regulations (see HSEs guides – *Manual Handling Operations Regulations 1992* and *Manual handling: Solutions you can handle*), heavy containers need appropriate handling procedures which accord to the number of staff needed to handle the weight/volume safely. There are suitably designed trolleys or similar equipment which can be used to transport cylinders and heavy drums. Cylinders and drums should be kept upright and not rolled or dragged.

The transfer, whether by lifting or not, of materials into a banded area needs care.

Materials should not be transferred into containers not designed for that purpose. Empty containers should not be left on site or used for other purposes. They should be disposed of safely in accordance with written procedures as soon as possible.

8.3 Containers should be kept upright, and never rolled. Nothing of 45 litres or over should be lifted by one person; or even two, ideally. Instead, custom-built wheeled carriers should always be used. Any carrier used for corrosive liquid containers should have a warning label. Some containers (of sodium hypochlorite,

for example) have ventilated caps. Such containers should be handled carefully after transit, in case there is corrosive liquid on the outside.

8.4 If different chemicals are on the same carrier, they should be adequately segregated. Acid and alkali should not be transported together on the same carrier; nor should calcium hypochlorite and chloroisocyanurates.

9. Storage

9.1 Storage rooms should:

- be clearly marked, warning of the possible danger, and be secure locations accessible only by authorised employees;
- not be plant rooms unless the chemicals carry no risk of fire and are contained in bunds of suitable design, as outlined in the final paragraph of this section;
- be at the same level as the delivery point and accessed directly from outside (ideally by ramp rather than steps). This will assist ventilation, and movement of materials (including in an emergency);
- not be situated close to public areas, doors, windows or ventilation intakes. This reduces the risk of any release of toxic fumes being drawn into the building;
- have adequate natural ventilation to the open air in a safe position (ie not to a public area, or to a place from where fumes may enter the building). If adequate natural ventilation is not reasonably practicable, mechanical ventilation should be provided. Where failure of ventilation would pose a serious hazard (eg for a chlorine gas store), a flow switch should be incorporated in any mechanical system to sound an alarm in case of fan breakdown;
- in the case of chlorine gas, this is safest when stored in a specially designed sealed room that in case of a major leakage from a cylinder prevents the gas from escaping;
- provide clean and dry storage for solid materials so that risk of mixing or spilling is minimal (raised on pallets or stilts to avoid contact with any water which may enter the store). All liquid chemicals shall be banded;
- protect containers from direct sunlight, and isolate them from hot pipework or plant.

9.2 In addition, it is important that storage rooms should be capable of a minimum of half an hour fire resistance for all chemicals, in view of risks from over-heating, such as:

- fire;
- dangerous fumes being given off;
- leakage from damaged plastic containers;
- an explosion of pressurised containers.

9.3 Different types of chemicals should be effectively segregated in storage and use. This is particularly important where different disinfectants, or acids and disinfectants, may come into contact with each other and produce chlorine gas, fire or an explosion. Storage should be designed to eliminate/minimise the risk of this possibility. For further guidance refer to HSG71 *Chemical warehousing the storage of packaged dangerous substances* (ISBN 0-7176-1484-0)

9.4 Each liquid chemical, whether in tanks or drums, should be in a separate bund; each bund should be capable of holding 110% of the chemical stored. Bunds must allow for puncture of the drums or tanks. Bunded areas should be clearly marked, giving details of the contents.

10. Handling of chemicals

10.1 Employees shall be provided with protection against some chemicals. The risk assessment must take this into consideration and determine the most appropriate protection to be used. Safe systems of work should be followed to protect employees from contacting, ingesting or inhaling harmful materials. For example: conditions for weighing and diluting materials should be carefully controlled and protective equipment supplied. Such areas must be ventilated, and local exhaust ventilation will need to be considered.

10.2 Smoking should be prohibited when handling chemicals.

11. Disposal of wastes

11.1 As part of the water treatment process the pool operator should consult the relevant waste disposal authority about the disposal of wastes. The manufacturer's instructions concerning disposal of containers and materials should also be followed.

12. Emergency Procedures

12.1 First Aid

12.1.1 The first aid provisions should include equipment for dealing with the consequences of direct contact with chemicals; for example, by providing eyewash bottles in case of chemicals coming into contact with the eyes. Eyewash facilities should be located in close proximity to the hazard to enable immediate action. A washbasin with running water should be provided in case of chemicals coming into contact with the skin.

12.1.2 Similarly, it will be appropriate, in circumstances where a member of staff could be subject to severe exposure to a harmful chemical that full-body douche-type showers are provided for emergency use.

12.2 Chemical spillage

12.2.1 Any spillage should be cleared away using a safe method. The degree of danger needs to be assessed quickly so that relevant, safe action can be taken. 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.

The emergency action procedures should contain the necessary detail of the early action to be taken e.g.

- Clearing the area
- The extent and magnitude of the spill
- Assessment of the ability to deal with the position or whether emergency services are needed.

Remember that the usual standard of PPE will give minimal protection, i.e. to deal with minor spills. If the quantity of spilled substance is substantial or if there is reaction producing heat or gas, staff should be trained to identify these circumstances so that the emergency services are called at an early stage, and that staff and public are not exposed to risk.

Care should be taken to prevent any chemical from entering a drain unless it is safe to do so.

12.3 Major leak of toxic gases

12.3.1 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).
- Incident team of trained staff to deal with these situations

12.3.2 In certain exceptional circumstances (e.g. where more than 10 tonnes of chlorine are stored) the premises may be subject to the Notification of Installation Handling Hazardous Substances Regulations 1982, or the Control of Major Accident Hazards Regulations 1999. The local HSE office should be consulted, as necessary.

Customer installation inspection

Inspection By	Date:	Person(s) Met
Distribution Centre		

PRODUCT		GRADE		Load Size	
CUSTOMER			PLANT		
ADDRESS			Tel No.		
			Fax		
STOCK TANKS			NEW		IN USE
Unique identifier no. and description					
Materials and lining			Condition		
Dimensions			capacity		tonnes
					litres/gallons
Height of base of tank above ground level					
Overflow size		Location		Leading to	
Vent Size		Location		Leading to	
Vent Type:	Straight Stack	Rain Cover	Flame Arrestor	PRV Valve	Vapour Return
Is a fume scrubber fitted? Y / N / NOT REQUIRED					
Type of heating (if applicable)					
Bund dimensions & construction		Height		Depth	
		Width		Leads to Effluent	
How is stock of material found?					
Is stock tank labelled? Y / N					
Has stock tank been site water tested? Y / N					
STOCK TANK OUTLET/DRAIN LINES					
No. of outlet valves		Bore		Type	
Mark Location of outlet valves					
Size of outlet lines			Material		
No. of drain valves		Bore		Type	
Location of drain valves					
Size of drain lines			Material		
FILLING LINE					
Material		Bore		Length	
Does filling line enter tank at top? Y / N		Dip		Splash Bottom Fill	
Maximum height of filling line above ground level					
Has filling line been pressure tested with water or is in use? Y / N					

Customer installation inspection – supplementary form for solvents

Inspection By	Date:	Person(s) Met
PRODUCT		
CUSTOMER		

VAPOUR RETURN SYSTEM		
Connection type and size (Tick as appropriate)	1.5" Male Camlock	2" Table D/E
	2.5" Male Camlock	OTHER (specify)
Connection faces: Downwards / upwards / outwards at above / below ground level		
Type of valve:	Ball / Gate / Diaphragm / NRV	Bore
Is point marked? Y / N		
Is point securely clamped? Y / N		
Pipe bore?	Material:	Vertical lift or fall:

Chemical bulk deliveries	APPENDIX 2
---------------------------------	-------------------

Small bulk discharge procedure

FINAL CHECKS BEFORE DISCHARGE			
Driver safety precautions	YES	NO	IF ANY OF THE ANSWERS ARE 'NO' CONTACT BASE FOR FURTHER DETAILS
Inlet labelled			
Hose connection sound and inlet pipe secure			
Water hose available? NB note if shower also available			
Earthing system available? (If applicable)			

CUSTOMER NAME (Print)	DRIVER NAME (Print)	DESPATCH NOTE NO.

Combined check (driver and customer)

Product (include grade and strength)	
--------------------------------------	--

- 1) IBC LABEL, TANK INLET & DELIVERY NOTE ALL SAME PRODUCT.
Driver to check that any hypochlorite pressure bins are painted black with additional hypochlorite label directly above valve

Customer check only

- 2) TANK HAS CAPACITY FOR DELIVERY QUANTITY.

Customer check only

- 3) TANK VENTING AND EQUIPMENT IS SOUND.
NB – Pressure Discharge – Vent 4" minimum – absolute minimum 3". Pump Discharge – Vent 3" minimum – absolute minimum 2".

SIGNED AT SITE AND PRIOR TO EACH INDIVIDUAL DISCHARGE			
	IBC NO. OR POT NO.	CUSTOMER (Signature)	DRIVER (Signature)
TANK 1			
TANK 2			
TANK 3			
TANK 4			
TANK 5			
TANK 6			

ADDITIONAL INFORMATION

- i) PPE requirements are hard hat, goggles/visor, chemical suit, gauntlets, PVC/nitrile Wellingtons (preferable or safety boots)
- ii) On completion of the above for each IBC, the driver will proceed with the delivery of the order
- iii) The driver is not permitted to discharge product if the above points are not authorised by the customer
- iv) Thank you for your co-operation in ensuring the safe operation of this discharge procedure



Training for pool plant and spa operation

Join the 5000 sport and recreation staff who successfully complete an ISRM pool or spa plant operation course every year. These are the definitive nationally recognised technical qualifications used by more local authorities and private leisure operators in the UK than any other training provider.

- National Pool Plant Foundation Certificate
- National Pool Plant Operators Certificate
- National Pool Plant Revalidation Certificate
- National Spa Pool Operators Certificate

For information on forthcoming courses courses taking place across the UK, contact ISRM on Tel: 01509 226474, or visit www.isrm.co.uk

A typical National Pool Plant Operators Certificate course will cover:

- Water characteristics
- Circulation
- Contamination of water
- Filtration
- pH and alkalinity
- Safety and C.O.S.H.H.
- Disinfection of water
- Filtration plant ancillaries
- Chemicals used in water treatment
- Operation of filters
- Water testing
- Energy conservation
- Disinfection equipment
- Heating and ventilation