Pool Water – National and European Standards

The intention of this paper is to explain to delegates the impact of two recent changes to framework of national and European regulation and guidance. The HSE introduction of the 4th edition of HSG 179, and the European Standard for Swimming Pools 15288 1 &2.

HSG 179 Managing Health and Safety in Swimming Pools, was first introduced in response to an unregulated swimming pool sector as Safety in Swimming Pools. When it was introduced prior to 1988 there were over 20 swimming pool drownings every year.

In 2008 the first European Standard for swimming pools was introduced. The revision of the European Standards BS EN 15288 1& 2 is due to come into effect later this year. The Members of CEN are the National Standardization Bodies of 34 European countries – including all the member states of the European Union (EU) and other countries that are part of the European Single Market. There are a further 18 countries not part of the agreement that also use these standards.

HSG 179 4th edition
is concerned with the general safety in swimming pools, this presentation though is only concerned with swimming pool water.

HSG 179 Starts by showing how other requirements should be used and says, 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.

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

This means that pool operators must take into account
HSG 179 4th edition
The European Standards for swimming pools and
PWTAG – Code of Practice, Swimming Pool Water book, and Website technical notes

Firstly, I have extracted from HSG 179 the relevant clauses for swimming pool water issues

The pool water treatment system

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;

Chemicals

- 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).

Germs

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.

Chemicals - Delivery on site

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

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 day 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.

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:

- an eyewash station;
- a nose and mouth respirator (EN 140:1998 and EN 141:2000);
- rubber gloves (BS 1651);
- goggles or face shield (BS 2092);
- wellington boots (BS 1870);
- apron or overalls (BS 1870);
- 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 Employees who have to work with the chemicals should be personally issued with respirators. 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.

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).

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.**

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 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.

HSG 179 4t edition Conclusion
That's it. There is nothing in HSG179 that's not more adequately covered in our Code of Practice, Swimming Pool Water book, and Website technical notes

British and European Standards for Swimming Pools
15288 – 1 Design
15288 - 2 Operation
I have extracted from 15288 1 & 2 the relevant clauses for swimming pool water issues. These are not final they can and will change.

Both standards are at formal vote stage which means no more amendments (you can put right drafting errors and grammatical issues) Formal vote means to vote for acceptance or not or abstain. As we have been involved since the inception in 2008 we would be expected to vote in acceptance. Voting is determined by the SW136 WG8 committee expected date is October 2018

European standards are developed by teams of experts who have particular knowledge of the specific sector or topic that is being addressed. The members of Technical Committees as well as sub-committees and working groups are nominated by the national standardization organizations.

Each National Standardization Body that is part of the CEN system is obliged to adopt each European Standard as a national standard and make it available in their country. They also have to withdraw any existing national standard that conflicts with the new European Standard. Therefore, one European Standard (EN) becomes the national standard in all 34 countries covered by CEN Members.

Moreover, many European Standards are also adopted as identical national standards by CEN Affiliates, which are the National Standards Bodies of 17 neighbouring countries, and by National Standardization Bodies in other countries around the world.

15288-1 Swimming Pool Design - How is it envisaged being used – as a European standard it must be considered in any new pool (by the architect) or upgrading of existing pool (by the operator)

Design is a key factor for a safe swimming pool. All of those involved in designing new pools or upgrading existing ones will need to give the highest priority to ensuring that they provide users and staff with a safe facility. Four steps need to be developed in order to achieve this:
a) the layout of the pool hall (if any) and the pool basin (including its dimensions, profile and any water features) should be designed to make the safe use and supervision of the pool achievable without complex or costly management arrangements;
b) the layout of the ancillary areas, including changing areas, clothes storage, shower and toilet areas, the plant room and chemical stores should be similarly designed for safe use;
c) the structural elements, materials, finishes and details, including the pool hall enclosure (if any), pool basin and equipment and the way they are assembled should be the most appropriate to achieving a safe-to-use physical environment;
d) relevant planning criteria for safe and functionally correct maintenance.

4 Classification
4.1 Swimming pool type 1
Pool where the water-related activities are the main business (e.g. communal pools, leisure pools, water parks) and whose use is “public” according to 3.5.
4.2 Swimming pool type 2
Pool which is an additional service to the main business (e.g. hotel pools, campsite pools, club pools, therapeutic pools, school pools) and whose use is “public” according to 3.5.
4.3 Swimming pool type 3
All pools of public use according to 3.5 except:
— pools type 1;
— pools type 2.

Drain water on pool surround
The pool surround shall also be designed to avoid contamination of the pool water by water flowing on the floor (e.g. rain in outdoor pools; floor/gutter washing water; chemicals in washing water).

NOTE Cleaning water can be drained into the overflow system only in case, if the drain pipe is equipped with the possibility to switch the flow to waste water drain and the water circulation is switched off.

5.13 Storage rooms/areas for water treatment chemicals

5.13.1 General

Storage rooms/areas for pool water treatment chemicals shall comply with European and national legislation (where applicable) and/or shall:

a) be provided for type 1 pools and are recommended for types 2 and 3.

b) be secured against unauthorised access;

c) be specifically designated and not be plant rooms, unless the chemicals carry no risk of fire and are contained in retention bunds of suitable design, complying with proper segregation/separation requirements;

d) be designed in accordance with the safety data sheets of the chemicals used to provide clean and dry storage with effective segregation/separation for their compatibilities and also considering the risk of fire;

e) consider proper and safe transport of chemicals;

f) provide also retention bunds of suitable design to store bulk chemicals and liquids at normal pressure. Retention bunds shall be able to contain 110 % of the volume of the liquid chemical;

g) provide storage for solid chemicals, suitably raised from the floor level;

h) be at the same level as the delivery point, or accessed directly from the outside;

Access by ramps rather than steps is preferred.

i) have suitable and appropriate ventilation. Where mechanical ventilation is provided, an alarm shall be installed in case of malfunction;

Natural ventilation is preferred as far as technically possible.

j) be located away from areas open to the public, ventilation intakes and doors or windows leading onto public areas, to reduce the risk of any toxic fumes being drawn;

k) be clearly marked, warning of the possible danger, and being accessible only to authorized staff;

Appropriate safety signs should be selected and displayed at the entrance to the storage room.

For the proper use of safety signs in chemical storage, refer to EN ISO 7010.

5.13.2 Rooms for chlorination facilities using chlorine gas

Where the use of chlorine gas is planned, this shall be stored in a specially designed, gas leakproof room which shall be at least at the same level as the surroundings. The exit of this room shall be at least 3,0 m from other room openings at the same level and at least 5,0 m away from lower-lying room openings. In the case of leakage from a gas container, the spreading of gas into neighbouring rooms shall be prevented. The room shall be equipped with:

a) an alarm for the case of escaping gas;

b) an appliance for the safe diversion of the gas;

Transport pipes of chlorine gas shall be at a negative pressure in respect to the surroundings.

5.14 Plant rooms and related equipment

5.14.1 General

Plant rooms shall be designed in compliance with valid building regulations, paying particular attention to the specific features of the technical installations.

The plant room should be a secure area for authorized personnel only. Plant rooms should be adequately sized and not used for general storage and where possible, should have an external access.

There should at least be investigations into the need for specific access (as direct access from the outdoors or specific access for maintenance), building requirements connected to the presence of chemicals in use, the possibility of achieving suitable environmental characteristics and into the possibility of proper drainage.

Plant rooms shall also incorporate adequate safety equipment related to the specific hazards and activities to be carried out (e.g. automatic fire extinguishers, gas monitoring systems).

The plan of the installed equipment shall be clearly shown and shall include the location of all the components as well as the direction of flow and nature of the fluids (acid, chlorine…)

The design of the technical plant shall consider the space needed for:

a) the equipment;

b) proper operation and especially a minimum height of 2,1 m in circulation areas;

c) repair and maintenance;

d) possible substitution of equipment.
It should be considered at the design stage measures to prevent contact between water and electrical parts of the equipment.

5.14.2 Filtration plant room and related equipment
The design of the room/area and of the equipment for the filtration plant shall take into consideration the need for proper installation of the equipment, especially the need to load filter media, operation and maintenance, and the possible need to change the vessels.
The design of the filtration plant shall consider sufficient space for maintenance

5.14.3 Disinfection and pH control plant room and related equipment
Automatic chemical and dosing regulation systems provide the best opportunity to maintain safe water quality conditions and are required for type 1 pools, and recommended for type 2 and 3 pools.
NOTE In some national regulations, automatic chemical and dosing regulation systems are mandatory, independent of pool types.
Dosing systems shall conform to the following requirements:
a) dosing systems shall be specific for each chemical;
b) dosing systems shall be designed to avoid potentially harmful effect of leakage to the environment and staff;
c) dosing systems shall be fail-safe under conditions of abnormal behaviour and require specific restarting;
d) dosing lines shall be identified with the chemicals they carry and shall be marked with the direction of flow;
e) injection points for different chemicals shall be separated by a safe distance apart from each other;
f) unintentional syphoning of chemicals from containers into the pool water circuit shall not be possible; suitable interlocking between dosing and water circulation shall be provided in order to prevent any unforeseen chemical accumulation in the pool water circuit;
g) Different liquid hazardous chemicals where they are provided in tanks and containers shall be held in separate retention bunds. Each bund shall be capable of holding at least 110 % of the individual chemical container stored. Bunded areas should be clearly marked, giving details of the contents;

h) CO2 installation shall be located in a well-ventilated area or provide specific ventilation. Always secure cylinders in a vertical position when in use or stored. Consider the installation of a CO2 warning device in the plant room to alert of accumulation.
Where possible, the complete equipment for disinfection and pH control should be installed in a different room to the filtration plant.
NOTE Dependent upon the type of system (e.g. ozone) used, it will require additional space in the plant room and for this reason is best incorporated at the design stage of a swimming pool.

5.14.4 Coagulation and Flocculation equipment
If using a granular media filter, coagulation and flocculation equipment, when needed, shall be designed and operated in order to improve filter efficiency to enhance the water quality at least up to the expected requirements of national standards and/or valid regulation.
A coagulant can also be used to help remove pathogens (e.g. cryptosporidium) from swimming pool water where there has been a faecal contamination in which case equipment should be provided to achieve the necessary procedure (see EN 15288-2).
Automatic dosing equipment is preferred.
The application point shall be:
a) as far in front of the filter as is practicable, to ensure good mixing before the flow reaches the filter media;
b) in a position suitable to ensure proper distribution to one or more filters;
c) in a position suitable to avoid interference with the readings of the analysers;
d) remote to dosing points of incompatible chemicals.
NOTE Typical values are:
— action time ≥ 10 s;
— flow speed of the water in the return pipes < 1,5 m/s;
— mixing area provided immediately following the injection point;
— water speed in each filter < 30 m/h.

6 Pool water distribution effectiveness

Examination of the pool water distribution effectiveness is needed to assess whether the treated water is distributed in all areas of the pool tank. The examination shall take the form of a dye test according to Annex A, which demonstrates how the water is distributed throughout the pool tank.
The lowest volume flow (e.g. part-load operation) shall be set.
The dye test shall be carried out in every pool in the following cases:
a) in new-build pools before they are handed over for operation;
b) if there have been any remedial changes which can impact on the effectiveness of the pool water distribution (e.g. hydraulic of individual circuits and inlets/outlets);
c) if there is a suspected distribution problem affecting water quality.
NOTE For example caused by moveable pool floors or moveable bulkheads.
An important condition for the distribution effectiveness is an appropriate design of the inlet system, bearing in mind the speed limits at inlet specified in EN 13451-3.

BS EN 15288 1 Conclusion
That's it. There is nothing in BS EN15288 1 that's not more adequately covered in our Code of Practice, or Swimming Pool Water book, and/or Website technical notes

This is not a coincidence this was the purpose in our attending the working group meetings and in our playing a significant role in the UK SW136 WG8 meetings.

PWTAG role for the future is to incorporate specific reference in the Code of Practice or Technical Notes where the guidance is compliant with this standard. To make it explicit.

15288 - 2 Swimming Pool Operation – How is it envisaged being used
The standard provides a framework for enhancing consumer protection and confidence by identifying hazards and putting controls in place to manage them, demonstrating compliance to customers and suppliers. The standard can reduce swimming pool accidents and illnesses to cut related costs and reduce the risk of
prosecution and litigation. The standard can act to achieve cost savings, efficiencies and compatibility of pools throughout Europe. The use of this standard can engage and motivate staff with better, safer working conditions. Finally, this standard can be used to support public policy objectives and, where appropriate, offer an effective alternative to regulation.
This standard provides a means of review and assessment of the hazards associated with public swimming pools; their monitoring and assessment; and activities available for their control through education of users, and good operation and management. The standard includes both specific guideline values and good practices. It addresses a wide range of types of hazard, including hazards leading to drowning and injury, water quality, contamination of associated facilities and air quality.

The intention of this standard is to provide a structured and methodical approach to meeting the needs of swimming pool safety. It lists the main hazards gives ways in which these may be addressed, and states what actions a pool operator should take to attain the standard.

The principle put forward by the UK was quite simple:
- List the hazards
- List the precaution to take for the hazards
- List what needed to be done to verify that sufficient action had been taken to meet the standard

Other countries could not come to terms with this approach so we ended up with
- A list of hazard categories
- General safety precautions against general hazards
- A list of verification measures that could be used to show compliance
- What to provide for public information in terms of safety
- An appendix of all the detailed hazards and how to mitigate these, the intention being that all these and perhaps more, would construct the requirements for the standard

It's not what was intended and while a lot better than the previous model can be made much better still by bringing all the hazards and ways of mitigating against them into one composite list, which is what we in the UK first put together.

In effect, we have a standard containing swimming pool hazards and solutions that is best delivered in a pick and mix way, here is in what's in the mix for swimming pool water issues

The standard starts with a requirement for a structure of :

- A written safety policy
- Written procedures
- Monitor and Review

Focussing just on swimming pool water issues

7.7.4 Operational requirements for cleaning and disinfecting the premises
Procedures shall include how to select the appropriate cleaning and disinfecting agents. Manufacturers' requirements shall be followed regarding application and storage. When floors are cleaned during pool operation, precautions shall be taken to protect against related risks (e.g. slippery surfaces, chemicals, long hoses, and machinery).
Where cleaning materials may come into contact with the pool water, the chemicals used shall not adversely react with the chemicals used in the pool water. Particular attention shall be paid to avoid contamination of pool water by detergents and disinfectants, which could also affect the pool water control devices.

7.7.5 Operation of water circulation systems
In accordance with EN 15288-1 a dye test of the water circulation system of every pool shall be performed at the time of commissioning. A dye test should also be performed when significant changes to the water distribution system are made and to help resolve a pool water quality problem that may be caused by ineffective distribution and circulation.
Procedures for the operation of the water circulation system shall primarily conform to the operating instructions given by the manufacturer of the equipment. The procedures shall include a requirement to maintain a log book for the equipment

7.7.9 Operation for selection, safe delivery, storage, handling and use of chemicals
Procedures for selecting chemicals shall specify the criteria for selecting the most suitable and safe products, based on relevant standards and on the information given by the supplier.
Written agreed procedures for safe delivery of chemicals shall be established and practised between the supplier and the pool operator, on the basis of a safe delivery location, secured from public access, and in conformance with the safety information available from the Safety Data Sheets. They shall include a safe means of unloading the chemicals to the delivery area.
In case of bulk delivery, suitable precautions (e.g. specific coupling, separate fill points clearly marked) shall be taken to prevent a chemical product being poured into the wrong tank.
Procedures for safe storage and handling of chemicals shall:
a) conform to the related Material Safety Data Sheets;
b) state the environmental conditions (e.g. temperature, humidity, effectiveness of ventilation) to be provided, and the means to check and record them;
c) require that only trained and authorized staff can store and handle chemicals;
d) require that the correct Personal Protective Equipment (PPE) be used for each type of chemical and for each activity;
e) ensure appropriate and safe instructions are provided about how to handle and where to store each chemical, including the equipment (e.g. for transport) needed;
f) provide safe instructions to deal with cases of spillage;
g) indicate the maximum quantity of each product which can for safety reasons be stored at the same time in each location;
h) indicate where and how to dispose of empty containers/packages safely.

7.7.10 Applying and controlling chemicals in pool water
Chemicals shall be provided and controlled to ensure the pool water quality conforms to applicable standards and/or regulations.

Procedures for the application of chemicals shall:
a) specify safe systems of work when preparing solutions;
b) forbid smoking when handling chemicals;
c) require direct application of chemicals in the pool basin only as a special procedure or emergency measure when procedures shall:
    1) describe the working practices that will ensure proper dilution of the chemicals into the pool water, to avoid peaks and to ensure water quality always complies with applicable standards and/or regulations;
    2) ensure that users are not present;
d) where automatic dosing is employed, procedures shall:
    1) state how to supply/recharge the chemicals to the dosing equipment;
    2) state how to set monitoring and control equipment to provide a water quality that complies with the applicable standards and/or regulations;
    3) state how to monitor and maintain the control equipment to provide the required pool water quality;
    4) define appropriate safe maintenance procedures for the equipment during periods of shut-down.

7.7.11 Monitoring physical, chemical and microbiological quality of pool water
Procedures for monitoring the pool water quality shall prescribe:
a) the physical, chemical and bacteriological water quality parameters to be achieved;
b) the correct way of sampling and testing the water, for both automatic and manual testing equipment;
c) how and when chemical and bacteriological testing of the water shall be carried out to ensure pool water meets applicable standards and/or regulations;
d) the type, method and frequency of each test;
e) the proper way of recording and storing the related findings;
f) how to store the reagents for chemical tests and how to check their fitness for purpose (e.g. compliance with expiry dates);
g) calibration method and frequency of the equipment used for water analysis, referring to the manufacturer's instructions.

7.7.12 Technical staff
7.7.12.1 Deployment
Procedures shall state the duties, number of staff, level of responsibilities and the required qualifications for the respective jobs. They shall take into consideration:
a) the type of swimming pool;
b) the size of the pool basins;
c) the type, technology and size of the technical equipment;
d) manufacturers' guidance;
e) the operational timetable.

7.7.12.2 Training pool technical staff
The procedures shall define the type of training required for every role in respect of:
a) the type and size of the equipment;
b) the technology used;
c) the materials and chemicals used;
d) the manufacturers' recommendations.
Procedures shall also state:
e) the required level of knowledge in basic water treatment technology;
f) the required level of knowledge in pool procedures for maintaining water quality;
g) the necessary training.

7.8.5 Additional specific procedures for selected emergency cases
7.8.5.1 Procedure in case of water contamination
Procedures shall state what to do to restore the situation when there is physical, biological or chemical contamination of the pool
Each emergency action taken in response to a contamination of the pool shall be recorded together with the action taken.

7.8.5.2 Physical contamination
Procedures for dealing with broken glass, debris, dirt etc requiring the removal of the contamination and cessation of bathing until the situation is restored to normal.
7.8.5.3 Biological contamination
7.8.5.3.1 Faeces
7.8.5.3.1.1 Solid
Procedures shall state what to do to restore the situation when solid faecal contamination is detected, to ensure that there are no related risks for the users.
NOTE A typical sequence foresees the following steps:
a) remove the solid stool;
b) verify that the chlorine level is within the limits.

7.8.5.3.1.2 Liquid
Procedures shall state what to do to restore the situation when liquid faeces contamination of the pool water is detected, to ensure that there are no related risks for the users. Closure of the pool will probably required together with remedial action to ensure the risks to health from the contamination is removed by physical
(filtration) or chemical (UV, ozone, superchlorination) means. The expertise of local health authorities shall be considered.
7.8.5.3.2 Blood/Vomit
If substantial amounts of blood or vomit are spilled into the pool, it should be temporarily cleared of people, to allow the pollution to disperse and any infective particles to be neutralised by the residual disinfectant.
Operators should confirm that disinfectant residuals and pH values are within the recommended ranges.
7.8.5.3.3 Dead animals, animal faeces
Remove the source of contamination where possible and confirm that disinfection is at appropriate levels.
7.8.5.4 Chemical
If the chemical has reduced the clarity of the pool to an unsafe level then bathing should cease and time allowed for the turnover of the pool to restore the clarity. Chemical levels should be checked to ensure normal operation.
If the chemical has interfered with the normal chemical balance of the water and is putting the health of bathers at risk then the action necessary may require cessation of bathing and adjustment to the chemical content of the pool water to restore the balance to normal levels.
When contamination of the water is from chemical sources such as cleaning chemicals in the pool water then procedures should include ensuring the proper functioning of the chemical control and dosing equipment.

NOTE According to the degree of contamination and taking into account the pool characteristics, one or more of the following actions could be integrated in the procedures:
a) evacuate the pool basin;
b) empty, clean and disinfect the pool basin, refill and treat the water (for low volume pool);
c) apply a coagulant if technically possible;
d) increase the level of free chlorine or equivalent disinfectant to the top of the permitted range;
e) vacuum sweep the pool bottom, sending the water to the waste;
f) in case of faecal contamination, wait from minimum 1 filtration cycle;
g) backwash the filters.

7.8.5.7 Operational procedures in case of chemical emergencies threatening the users
Procedures for a chemical emergency threatening the users shall state at least the following:
a) how to raise the alarm for the appropriate emergency services;
b) how to deal with users who have been contaminated;
c) how to determine when evacuation is required (e.g. in case of significant toxic gas emission) and the related guidelines (e.g. against wind direction), or segregation of the affected area is sufficient.

7.8.5.8 Loss of water clarity
Procedures shall be provided where a loss of water clarity threatens the safety of the pool users where bathers cannot easily be viewed underwater.

Table A

Possible hazard	**Possible cause**	**Possible consequence (possible harm)**	**Possible hazard related measure**
Unsatisfactory/unsafe water quality	Operator non-compliance with appropriate procedures regarding chemicals and control equipment	Lack of visibility Diseases, infection and irritation of eyes and upper respiratory tract. injury/ death	a) Ensuring that appropriate procedures are in place b) Ensuring that the pool operators have appropriate training a) Maintaining the pool water quality in accordance with requirements b) Taking appropriate tests
Inappropriate/unsafe storage and handling of chemicals (e.g. for cleaning, disinfection, water treatment)	Operator non-compliance with appropriate procedures regarding the handling and storage of chemicals	Emission of toxic gas, poisoning/death/fire/ explosion	a) Ensuring that appropriate procedures are in place b) Ensuring that the pool operators have appropriate training c) Ensuring compliance with written operational procedures for the pool.
Pool water contamination from pool users, faecal, blood or vomit	Illness acquired before use of pool Cut from defective structure e.g. sharp tiles Lack of supervision by parents Lack of instructions and monitoring Non-wearing of swim nappies	Spread of potential infectious disease Illness	a) Use appropriate admission policies, to deter people from using the pool when ill b) Enforce adult to child supervision ratios c) Apply remedial measures d) Written EAP detailing actions for each type of incident e) Enforce rules re wearing of Swim Nappies
Non-compliant parameters of water (pH, concentration of disinfectant, chloramines, stabilizer...) leading to bacteria and/or algae growth in water	Malfunction of the automatic dosing systems, lack of maintenance	Diseases, infection and irritation of eyes and upper respiratory tract.	a) Comparing the values indicated by the automatic dosing system with those obtained with other measuring equipment regularly b) Strictly respecting the frequency and procedures for maintenance, control and cleaning operations of these systems as recommended by the manufacturer
Inadequate visual aspect of water (presence of abnormal debris, unclear water) or abnormally high consumption of disinfectant	Inadequate turnover or dead areas in the pool basin due to insufficient filtration flow-rate caused by clogged filtering media or pump strainer. Automatic system (indicating the filter is clogged and/or cleaning the (filter) is out of order or has malfunctioned	Psychological impact Eye and respiratory irritation Disease/infection	a) Checking procedures, systems, hydraulic circuit regularly

BS EN 15288 2 Conclusion
That's it. There is nothing in BS EN15288 2 that's not more adequately covered in our Code of Practice, or Swimming Pool Water book, and/or Website technical notes.

This is not a coincidence this was the purpose in our attending the working group meetings and in our playing a significant role in the UK SW136 WG8 meetings.

PWTAG role for the future is to incorporate specific reference in the Code of Practice or Technical Notes where our guidance is compliant with this standard. To make it explicit.

As I pointed out earlier the European Standard that you have seen a draft of today will change. So don't take this as gospel. You will need to obtain a copy of the revised standard when released later this year. £190 or £85 for members. Or you could go to the website of Ireland Active and download a copy for free. That is until the NSAI find out!!! Or of course you can just use the PWTAG Code of Practice and get not only the European standard requirements but the HSE requirements and PWTAG national guidelines, all together in one precise document for free!