



TECHNICAL NOTE

13 – Interactive water features

9th January 2024

The last 15 years or so have seen interactive water features become popular – outdoor jets, sprays etc designed for children and in some respects taking the place of paddling pools. Their design and use is very different from the more traditional, decorative water features like fountains that are not designed for interaction (though they may be used that way). Unless interactive water features are planned and designed properly, they can represent (and have) an infection risk, partly because of the way they are used.

Definitions

It is important to distinguish between interactive water features that should be accessed and decorative water features that should not be accessed. Different guidelines apply. Paddling pools are different again. Decorative water features are dealt with in TN67; paddling pools are covered in Swimming Pool Water, and a separate technical note is in preparation.

Interactive water features are primarily about interaction: children playing in water sprayed or pumped through a variety of devices. These features include geysers, rooster tails, mushrooms, water cannons, spiral sprays, and ground gushers. Plaza features are slightly different. They are areas of hard standing with water jetting up from the ground. When a plaza feature is switched off, the area can revert to use for retail, food markets etc. Whether or not they have been explicitly designated as interactive, they will attract children and their water should be treated to the standard of interactive water features.

Interactive water features are sometimes installed as alternatives to traditional paddling pools, and their water quality must be safeguarded to at least the same extent. Users, typically children, are positively encouraged to enter and interact with the various features.

Most features can be activated by push buttons. Within such an environment, it is likely that some water will be swallowed (although this is not intended and should be discouraged).

How interactive water features work

These play features vary from the very basic to the more sophisticated. The sprays etc are installed in a surround which may be hard (e.g. stone) or softer (e.g. rubber) and the surround itself may be encircled by grass or hardstanding such as tarmac.

The water usually drains through the surround into a holding tank. From there the water is pumped to the sprays etc (sometimes via another holding tank). Disinfectant is introduced at some stage in this. If



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the water volume is inadequate, and the water is not properly filtered and disinfected, microorganisms introduced on bare feet, shoes and clothing for example, may be spread to users via the water features. In some cases, pet dogs may access the water feature with children plus wild birds may access the area outside of use. As a result, they could be a number of sources with a number of bacterial and viral microorganisms. This can be a particular problem as people are likely to swallow water from the features both deliberately and accidentally.

To counter such risks, their water management should really be in line with that recommended by PWTAG for swimming and paddling pools. And it is equally important that each installation should be subject to a risk assessment. The risk assessment should take into account the operating water temperatures and fluctuations depending on ambient weather.

Risk assessment

A risk assessment is required by health and safety legislation. It should take into account intended and non-intended use. All features (including decorative features like fountains) should be formally assessed for microbiological risks. The principal risks are cryptosporidiosis and giardiasis (from diarrhoea in the feature) if filtration is inadequate, and legionellosis and other bacteriological and viral infections resulting from inadequate disinfection such as norovirus. The risk assessment should be reviewed at least every two years.

It is worth bearing in mind that at least the risk of drowning – present even with a paddling pool – is generally absent with interactive water features.

Design guidelines for interactive water features

There are a number of design guidelines that should be followed. They all follow the principles of water treatment described in the PWTAG book, *Swimming Pool Water treatment and quality standards*.

- The maximum number of users possible at any one time is a matter between the designer and operator, but a figure of one bather per 1m² of surface area should be considered (as for paddling pools). Deciding what constitutes the surface area can be problematical given the varied designs, but defining it by a 1.5m band round all features is sensible. This may require staff to oversee the feature in good weather as numbers could easily be exceeded, and not all features will have gates and fences, so numbers of bathers can be restricted.
- Water treatment should be based on the anticipated number of users, not the volume of water in the system. A circulation rate of 0.5m³ per user per hour should be adequate.
- Then the holding tank volume should be enough to give a turnover period of about 20 minutes. This calculation may call for a holding tank volume larger than that supplied by manufacturers.



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- Ideally, there should be one tank for the returning play water to drain to and another tank which supplies the sprays etc with treated water. It should be possible for the former to run to waste (rather than the second tank) in the event of fouling. And when the feature is out of use, water should also be diverted to drain. One model system has filtration and chemical disinfection applied as the water passes from the collecting tank to the spray feeding tank. Circulation should be continuous 24 hours a day. If there is not complete separation of drain and supply waters, there is an infection risk that has to be taken into account in the risk assessment.
- Disinfectant residuals levels may need to be higher than in swimming pools – perhaps 3-5mg/l of chlorine, for example (4-6mg/l bromine).
- UV should be dosed at a rate of 60 mJ/cm².
- Trained staff may need to be alert to the need to react to poor microbiological test results with higher disinfectant levels. An audible alarm for low disinfectant values could be useful.
- Chemical values (including pH value) should be checked every two hours (in use; also one hour before use) and bacteriological quality at least once a month. Where the system is automatically dosed and comparable readings are obtained then physical testing should be undertaken a minimum of 3 times per day with other reading recorded from the controller. Water samples should be taken from a jet. Water quality should be as detailed in Swimming Pool Water.
- Medium-rate sand filtration (with coagulation) and good, continuous (preferably automated) disinfection and pH control should be fitted.
- Backwashing frequency should reflect the varying levels of use of such features.
- Realistic access to the plant room is important. Underground plant rooms with access through a trap door are unlikely to be satisfactory. In any case, the plant room must have adequate ventilation and proper provision for chemical storage. Operators must make the room secure when the feature is not in use, and must be aware of the Confined Spaces regulation.
- There should be proper procedures in place for closing down in winter and starting up in spring.

Operational guidelines for interactive water features

Not all of these will be practicable for every facility. Their application should be tempered by a realistic appreciation of the particular circumstances.

- Interactive water features can be extremely popular, so the users may need to be supervised in their use and the number entering controlled.
- Animals and their contamination must be excluded; directly and through warning notices for pet owners. Vermin and even birds should be excluded as much as possible.
- Footwear should be removed before entering and there should be a system that allows legs and feet to be washed (running directly to drain). Low level foot showers would be ideal. Toilets should be available nearby and their prior use encouraged.



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- The surfaces around the features must be anti-slip and resistant to the chemicals used.
- There should be signs warning against bringing in any breakable bottles, cups or mugs, and against drinking the water from features.
- There should be a written procedure to ensure staff know what to do if there is fouling with diarrhoea or vomit see technical note no 2.
- The whole area inside the fence must be kept clean and disinfected if there is any fouling.
- Babies in ordinary nappies should be discouraged and special swimming pants used instead.