



Aquatic Facilities

Water Spray Grounds and Interactive Water Features

Application, Design & Operating Requirements

Environmental Health Guide

Water Spray Grounds and Interactive Water Features are aquatic facilities where patrons (primarily children) become wetted from interaction and exposure to water features which may include: slides, sprays, tippers, fountains, jets, channels, pools, pumps, water screws or other such structures where the water is drained, collected for reuse.

All aquatic facilities (including Water Spray Grounds and Interactive Water Features) must, under the *Health (Aquatic Facilities) Regulations 2007*, be issued regulatory approval from the Chief Health Officer before construction and opening for use.

General design, construction and operation requirements of aquatic facilities are contained within the *Code of Practice for the Design, Construction, Operation, Management and Maintenance of Aquatic Facilities (the Code)*.

These Guidelines outline the minimum requirements for making application to design, construct and operate Water Spray Grounds and Interactive Water Features and must be read in conjunction with the Code.

1.0 APPLICATION FOR CONSTRUCTION APPROVAL

All applications for construction of an aquatic facility must be made with a completed application form, covering letter, schematic, site and other plans with specifications, as detailed on the form cover sheet.

1.1 Covering Letter

The application covering letter shall provide confirmation of the specific proposal's compliance and be accompanied by copies of all certifications and other necessary documentation detailed under the relevant sections and subsections contained within this Environmental Health Guide.

Where a Water Spray Ground or Interactive Water Feature proposal is associated with (or incorporates) a swimming pool, spa or waterslide the covering letter shall also include confirmation of compliance with the relevant sections of the Code not specifically covered within this Environmental Health Guide.

1.2 Certification - Construction

Applications for approval to construct a Water Spray Ground or Interactive Water Feature must be accompanied by written certification from an acceptably qualified aquatics designer confirming how the proposed hydraulic design satisfies the requirements of this Environmental Health Guide.

1.3 Code Classification

Water Spray Grounds and Interactive Water Features shall (when they are part of an aquatic facility containing pools, spas or waterslides) take on the same Classification as the remainder of the aquatic facility and to comply with the Code operating requirements for that particular class of facility. When they are stand-alone aquatic facilities without pools, spas or waterslides they shall be deemed a Class 4 aquatic facility for Technical Operator Requirements and Patron Supervision and Emergency Care Personnel.

2.0 WATER SPRAY GROUND AND INTERACTIVE WATER FEATURE LOCATION & AMENITY

Application covering letters shall confirm that due consideration has been given (by the applicant) for the intended location and potential impacts on the water spray ground and interactive water feature, patron amenity/health/safety, from surrounding land uses, topographical characteristics and likely climatic factors (For example: nearby water bird habitats, windblown organic material/sand/dust, noise, air pollutants/odours, storm water runoff & insect pests). Information shall also be provided describing how ongoing operating/maintenance costs will be borne.

2.1 Fencing and Security

Application covering letters shall confirm that due consideration (by the applicant) has been given for the need to fence or provide other contingencies against animal access causing contamination to the water spray/playground water collection area and to prevent potential hazards in the event of unauthorized access when the facility is not open for use.

2.2 Warning Signs

Water spray/playgrounds shall have at least one sign: WARNING - DO NOT DRINK. The sign shall have minimum lettering size of 100mm and be located in a prominent position of view to all users.

2.3 Location of Rules

Code Section 2.25 requires Water Spray Grounds and Interactive Water Features to have Spray Park Rules located in a prominent position that is easily seen by users.

2.4 Sanitary Facilities

Water Spray Ground and Interactive Water Feature users should have access to sanitary facilities including nappy changing stations, showers, toilets and handwashing facilities.

Where sanitary facilities are provided the number of toilets, hand basins etc. required should be calculated on the maximum patron number of 1 person per 2.3m² of water spray ground or interactive water feature water collection area and Section 2.20 of the Code.

Sanitary facilities within the water spray ground or interactive water feature shall be provided with a hose connection to enable the entire area to be flushed.

However, where a proposal is a stand-alone water spray ground or interactive water feature, shower and change room facilities are not mandatory.

2.5 Drinking Water Fountains

Water spray grounds or interactive water features shall be provided with potable drinking water fountains located to assure easy access.

3.0 STRUCTURAL DESIGN

Applications must confirm the proposed water spray ground or interactive water feature has been engineer designed to withstand all forces imposed by the design of the facility and its anticipated use.

3.1 Compliance and Certification

Playground equipment for use in water spray grounds or interactive water features shall comply with the requirements of AS4685.1 Playground Equipment - Part 1: General safety requirements and test methods.

3.1.1 Construction Materials

All materials used to construct a water spray ground or interactive water feature shall comply with Section 2.4 of the Code

3.1.2 Playground Equipment Certification

Applicants shall ensure manufacturers of chosen playground equipment have supplied them with written certification confirming the chosen playground equipment complies fully with AS4685.1, and have supplied them the necessary product information as detailed in Section 3 of AS4685.1. Copies of manufacturer documentation shall be attached with the application and applicants shall provide written undertaking to adhere to all product manufacturers' instruction recommendations regarding construction, operation, supervision and maintenance requirements.

3.2 Stairs, Ladders and Platforms

All stairways, ladders and platform requirements shall comply with Appendix 5 of the Code when water features are constructed above ground level or if there are changes in level across the site.

3.3 Elevated Interactive Features

Where elevated interactive features exist with a likely fall height exceeding 50cm the active floor surface surround shall incorporate impact attenuation in accordance with the playground equipment manufacturer instructions.

3.4 Surfaces and Gradients

3.4.1 Water Collection Areas

All water collection areas are to have compliant slip resistant surface which is water impervious, smooth and free of any features or undulations that may cause a trip hazard or other injury in compliance with Appendix 6 Category B of the Code.

Water Collection areas should slope no more than 8% (8cm for every 100cm length).

3.4.2 Water Collection Area Grading

The water collection area and any associated water feature shall be graded towards drainage outlets to prevent any surface water accumulation with a minimum 1:200 grade.

3.4.3 Water Retention

Where water is allowed to be retained for a short period of time within the water collection area, the depth of the retained water shall not exceed 15 cm.

3.5 Concourse and Walkways

All concourse and walkway surfaces are to have compliant slip resistant surfaces which are water impervious, smooth and free of any features or undulations that may cause a trip hazard or other injury and shall comply with Appendix 6 Category B of the Code.

3.5.1 Drainage

Where a concourse is provided around a water collection area, it shall be adequately drained to prevent surface water accumulation and graded in such a manner as to prevent water entering the water collection area

3.5.2 Interconnecting Walkways

Water spray grounds or interactive water features with more than one water collection area shall be linked by walkways with surfaces that minimize the transfer of soil/grass and other material into the water collection area.

3.5.3 Wash-down

Water spray ground pads or interactive water features shall have hose connections of sufficient number provided in close proximity to allow water collection area wash down and rinsing as required. Soiled wash/rinse water shall be diverted to waste.

3.5.4 Storm Water

Waste water and storm water shall be disposed of in a manner approved by the responsible authority. Storm water systems shall make provision for likely rainfall events relative to the water collection area surface area.

3.6 Garden Areas

All garden areas located within a water spray ground or interactive water feature shall be designed to prevent soil movement onto walkways, concourse and into the water collection area.

In locations where patrons are likely to carry sand or other debris on their feet, foot showers shall be provided to rinse feet before entering a water collection area. Wastewater from foot showers shall be discharged to waste. The use of foot baths is prohibited.

Areas surrounding the water collection area and associated concourse/walkways shall be maintained in such a manner as to minimize ingress of soil, grass.

3.7 Lighting

Artificial lighting shall be provided at all water spray ground or interactive water features that operate at night, or which do not have adequate natural lighting, so that all areas of the water collection area can be readily seen.

4.0 SPRAY/WATER FEATURES

4.1 Finish

Spray features set at ground level are to be flush with the surface and the size of any jet or opening is to be no greater than 13mm.

4.2 Trip, Entrap and General Hazard

Spray/water features or interactive water features should be designed and installed so as not to pose a tripping or entrapment hazard or any form of a risk due to water velocity, force, weight or loss of vision.

4.3 Water Pressure

The operating pressure of water spray ground or interactive water features must be controlled by design or pressure relief valves so that excessive pressures cannot injure users. Water circuits must have pressure relief valves to prevent excessive pressure caused by blocked or restricted outlets.

4.4 Suction Outlets

Suction outlets located within a water spray ground or interactive water feature are prohibited.

4.5 Indoor Ventilation

Indoor water spray ground or interactive water features shall be adequately ventilated, either by natural or mechanical means.

4.6 Electrical Wiring/Equipotential bonding

Electrical wiring shall not pass overhead within a 6m horizontal distance of a water spray ground or interactive water feature. All metallic objects within the water spray ground or interactive water feature shall be equipotentially bonded to the pump systems common earth.

5.0 PLANT ROOM SAFETY AND SECURITY

5.1 Access

All water spray ground or interactive water feature water collection/storage/treatment tanks shall have entry and exit access openings for cleaning and be of adequate size to permit rescue of all persons who may enter. Such openings shall, when not within secured plant rooms, be lockable requiring special tools to open.

5.2 Security

All water spray ground or interactive water feature tanks, plant and equipment must be secured against any unauthorized access.

5.3 Ventilation

Plant room must have adequate ventilation and proper provision for chemical storage. Chemicals should be stored so they are available only to water spray ground or interactive water feature operators.

6.0 WATER CIRCULATION AND FILTRATION SYSTEMS

Water circulation and filtration designs incorporating a holding tank and/or distribution tank shall ensure that the water will on discharge satisfy the minimum chemical and microbiological water standards prescribed in Sections 5.1 and 5.3 of the Code.

6.1 Outlets

The design, size, number and location of water collection area drainage outlets shall ensure: complete surface drainage, outlets may be readily cleaned and shall not cause entrapment hazards to patrons.

6.2 Drains

Water flow through drains from the water collection area shall only be under gravity.

6.3 Plumbing Gradient

Water collection area, drainage diversion and return drainage plumbing system shall be graded and designed so all water will be drained from the system and at no time contain trapped water.

6.4 Drain Gross Pollution Traps

Water collection area drainage and return plumbing system design shall incorporate appropriate means to remove sand or other likely contaminants from the return water enroute to the treatment system (e.g. use of sand/lint traps, screens etc.).

6.5 Drain Diversion

Water collection area drainage systems are to incorporate a means to divert all water collection area water for discharge to waste. Water collection area drains must be diverted to waste for cleaning purposes prior to use and whenever the facility is not open to patrons.

6.6 Top Up Water

All top-up water must be filtered and treated before it may be used/reused to water collection area features.

6.7 Filtration System

Code Sections 3.3, 3.4 filtration/treatment systems must comply with all relevant requirements.

6.8 Turnover

Filtration/treatment systems must achieve complete water system turnover at least once every 30 minutes.

6.9 Operation

Filtration and treatment equipment shall be kept operating/circulating at all times a water spray ground or interactive water feature is open for use and it shall commence operating a minimum of 2 hours before the first use and continue operating 2 hours after the last use. Where the water spray ground or interactive water feature is an independent aquatic facility, the filtration system shall operate continuously during periods of high usage.

7.0 WATER DISINFECTION

All water used in a water spray ground or interactive water feature shall be treated with both a residual biocide and by ultraviolet light at all times and be maintained within Critical Control Point Specifications. (See also Section 8.0 Baffling and Section 8.1 Calculating the effective C.t)

7.1 Disinfection with Chlorine

Disinfection by chlorination is the primary method used to kill disease-causing pathogens in water. Pathogen destruction is measured in terms of Contact Time or concentration over time (C.t) at a specific pH and temperature.

7.1.1 Contact Time

The Contact Time (C.t) for all water used in a water spray ground or interactive water feature shall be kept at a minimum of 15mg/L.min. All water treatment systems and tank designs must ensure 100% of water for water spray ground or interactive water feature use has undergone an absolute minimum of 15 mg/L free chlorine concentration for 1 minute contact time at the required pH level before use; and ensure water will on discharge satisfy the minimum chemical and microbiological water standards prescribed in Sections 5.1 & 5.3 of the Code.

7.2 Disinfection with Ultraviolet light

In addition to chlorine ultraviolet (UV) light disinfection must be provided to treat all water used in a water spray ground or interactive water feature as a barrier against *Cryptosporidium.spp.* and *Giardia*.

7.2.1 Ultraviolet Light Intensity

Ultraviolet light disinfection systems shall provide a validated dosage equivalent to 40mJ/cm² or greater at the end of lamp life and comply with one or more of the following:

- American National Standards Institute and National Sanitation Foundation (ANSI/NSF) Standard 50.
- Australian/ New Zealand Standards (AS/NZS) 4348 Water Supply – Domestic type water treatment appliances – Performance requirements.
- ISO 9000:2000 Quality management systems accreditation or listings.

7.2.2 Ultraviolet Light Failsafe

All UV light systems shall include an automatic audible alarm to warn of a UV light disinfection unit malfunction or impending shutdown and be equipped with an automatic mechanism for shutting off the power to the UV light source whenever the protective UV unit cover is removed.

UV light systems shall be interlocked to ensure complete system shutdown upon UV failure

7.2.3 Ultraviolet Light Design

All UV lights shall be:

- installed in an enclosure designed to protect the operator against electrical shock or excessive radiation and that provides protection from UV exposure.
- installed in a protected enclosure not subject to extremes of temperature.
- provided onsite with a spare UV lamp and other necessary equipment to effect prompt repair by qualified personnel properly instructed in the operation and maintenance of the equipment; and
- able to provide a readout of UV dose, UV intensity and flow rate.

7.3 Critical Control Points - Fail Safe

A fail-safe system must be installed to automatically shut down when critical control point (CCP) limits have been breached. The key CCPs are as follows:

- pH to be maintained between 7.2-7.8.
- free chlorine contact time >15mg/L.min
- UV disinfection system is activated and performing within target intensity.
- filtration pumps feeding the filtration system must be functional at all times.
- sampling feed line feeding real-time monitoring instrumentation are flowing during operation.

8.0 BAFFLING

The use of baffles can minimise short-circuiting of water flowing through a holding tank. A baffled holding tank will increase the effective detention time for water to pass through the holding tank and therefore increase the effective chlorine contact time for the system. Baffles may also reduce the total volume of water required to achieve adequate disinfection and the size of the holding tank.

Where used baffles must be factored into the calculation of the contact time of the system to demonstrate an effective Ct.

8.1 Calculating the Effective C.t

Effective C.t is a function of the concentration of free chlorine residual, the volume of water to be used, flowrate, and type of baffle; using the following formula:

$$C.t = [Cl]_{\text{residual}} \times V/Q \times f$$

Where:

- C.t – concentration.time (mg/L.min)
- [Cl]residual – concentration of the chlorine at the outlet (mg/L)
- Q – feature flow rate (m³/min)
- V – volume of contact tank (m³)
- f – baffling factor

A worked example of how to calculate the effective C.t is given in Appendix 1.

8.2 Baffling Factors

The following baffling factors may be used in the design of holding tanks

Baffling Classifications and Factors

Baffling Classification	F	Baffling Description
Unbaffled (mixed flow)	0.1	None, agitated basin, very low length to width ratio, high inlet and outlet flow velocities
Poor	0.3	Single or multiple unbaffled inlets and outlets, no intra-basin baffles
Average	0.5	Baffled inlet or outlet with some intra-basin baffles
Superior	0.7	Perforated inlet baffle, serpentine or perforated intra-basin baffles, outlet weir or perforated launders

Examples of holding tanks and associated baffles can be found in Appendix 2.

9.0 GENERAL OPERATIONAL REQUIREMENTS

The classification of an aquatic facility is based on its design and use. Sections 5, 6 & 7 of the Code provide additional information regarding water chemistry, management qualifications and general sanitation/operational requirements.

9.1 Operations Manual

Section 7.8 of the Code requires all aquatic facilities to have an Operations Manual.

9.2 Water Testing

Section 5.4 of the Code requires that an approved manual water chemistry test kit must be provided and stored onsite at all times for daily water chemistry testing. To ensure the filtration and treatment equipment are operating in accordance with their design, the system should be checked daily 30 minutes before opening, and every 2 hours during operation.

9.3 Filter and Treatment Operation

Filtration and treatment equipment shall as a minimum be kept operating/circulating at all times a water spray ground or interactive water feature is open for use and it shall commence operating a minimum of 2 hours before the first use and continue operating 2 hours after the last use.

9.4 Electrical Storms

Outdoor water spray ground or interactive water features shall not be used during electrical storms.

9.5 Auto Shut Down

Unmanned water spray ground or interactive water features should incorporate automatic or remote shutdown arrangements in the event required water chemistry levels is not being achieved or when electrical storm activity is imminent.

9.6 Interlocks

Where separate spray feature and water filtration/treatment pumps are used, spray feature pumps must be locked into the filtration/treatment pumps so they will not operate when filtration /treatment pump is not operating.

9.7 Treated Water Ratio

Where separate spray feature and water filtration/treatment pumps are used, the ratio of the flow rate of water supplied to the spray features directly from the treatment tank must not exceed 3 times the filtration/treatment system flow rate.

9.8 Auto Top Up

System operating water volumes/levels shall be maintained continuously by automatic top-up control and overflow systems.

9.9 Cleaning and Draining

Water spray ground or interactive water feature water treatment tanks shall regularly be drained and cleaned at a frequency necessary to maintain water quality.

9.10 Water Contamination

If the water spray ground or interactive water feature has been contaminated by either faeces or blood, users should be directed to vacate the water collection area. The water spray ground or interactive water feature should be drained the recirculation system cleaned and both water spray ground or interactive water feature and treatment system be decontaminated. Ensure proper operation of the water collection areas prior to re-opening.

9.11 Rubbish

Rubbish and refuse shall be collected, handled and disposed of in a sanitary manner.

10.0 FINAL APPROVAL FOR USE

Approval to operate is issued by the Chief Health Officer and is subject to:

- certification by the installer that construction is in accordance with the construction approval,
- a final inspection of the finished works,
- comparison of work with the approved plans, specifications and conditions,
- adequate management; and
- satisfactory microbiological testing.

11.0 MORE INFORMATION

For more information regarding the design and construction of water spray/playgrounds please contact the Managing Scientist Water, Environmental Health Directorate on 9222 6409.

Appendix 1 Effective C.t calculation

The following two examples demonstrate the potential impact of effective disinfection by using baffles. Both examples have the same tank volume, flow rate and chlorine concentration. Only the baffle factor changes. The tank volume, flow rate and chlorine concentration are only used as an example.

Example 1 – Baffle factor – Unbaffled $f = 0.1$

Step	Worked Example
1. Required $C.t$ at 15 mg/L.min	15 mg/L.min
2. Determine baffle factor (f)	Unbaffled $f = 0.1$
3. Measure or determine: tank volume, feature flow rate, and free chlorine concentration	Tank volume (V) = 300 m ³ Feature flow rate (Q) = 5 m ³ /min Chlorine concentration $[Cl]$ = 0.4 mg/L
4. Calculate actual $C.t$	$Actual\ C.t = 0.4\ mg/L \times (300\ m^3 / 5\ m^3/min) \times 0.1$ $Actual\ C.t = 2.4\ mg/L.min$
5. Compare actual $C.t$ to required $C.t$	With an actual $C.t$ is lower than the required $C.t$ effective disinfection is not provided. Need to respond with better baffle and/or higher free chlorine concentration
Compliance solutions	When an actual $C.t$ is lower than the required $C.t$ effective disinfection is not provided. Possible solutions are to: <ul style="list-style-type: none"> • Install baffles to increase the effective detention time; and/or • Increase operational water volume; and/or • Decrease feature flow rate; and/or • Increase chlorine concentration.

Example 2 – Baffle factor – Superior $f = 0.7$

Step	Worked Example
1. Required $C.t$ at 15 mg/L.min	15 mg/L.min
2. Determine baffle factor (f)	Superior $f = 0.7$
3. Measure or determine: tank volume, feature flow rate, and free chlorine concentration	Tank volume (V) = 300 m ³ Feature flow rate (Q) = 5 m ³ /min Chlorine concentration $[Cl]$ = 0.4 mg/L
4. Calculate actual $C.t$	$Actual\ C.t = 0.4\ mg/L \times (300\ m^3 / 5\ m^3/min) \times 0.7$ $Actual\ C.t = 16.8\ mg/L.min$
5. Compare actual $C.t$ to required $C.t$	With an actual $C.t$ is higher than the required $C.t$ effective disinfection is not provided. Need to respond with better baffle and/or higher free chlorine concentration
Compliance solutions	The actual $C.t$ is higher than the required $C.t$, effective disinfection will be provided.

Appendix 2 - Baffling Classification Examples.

Figure 1. Un-Baffled Conditions

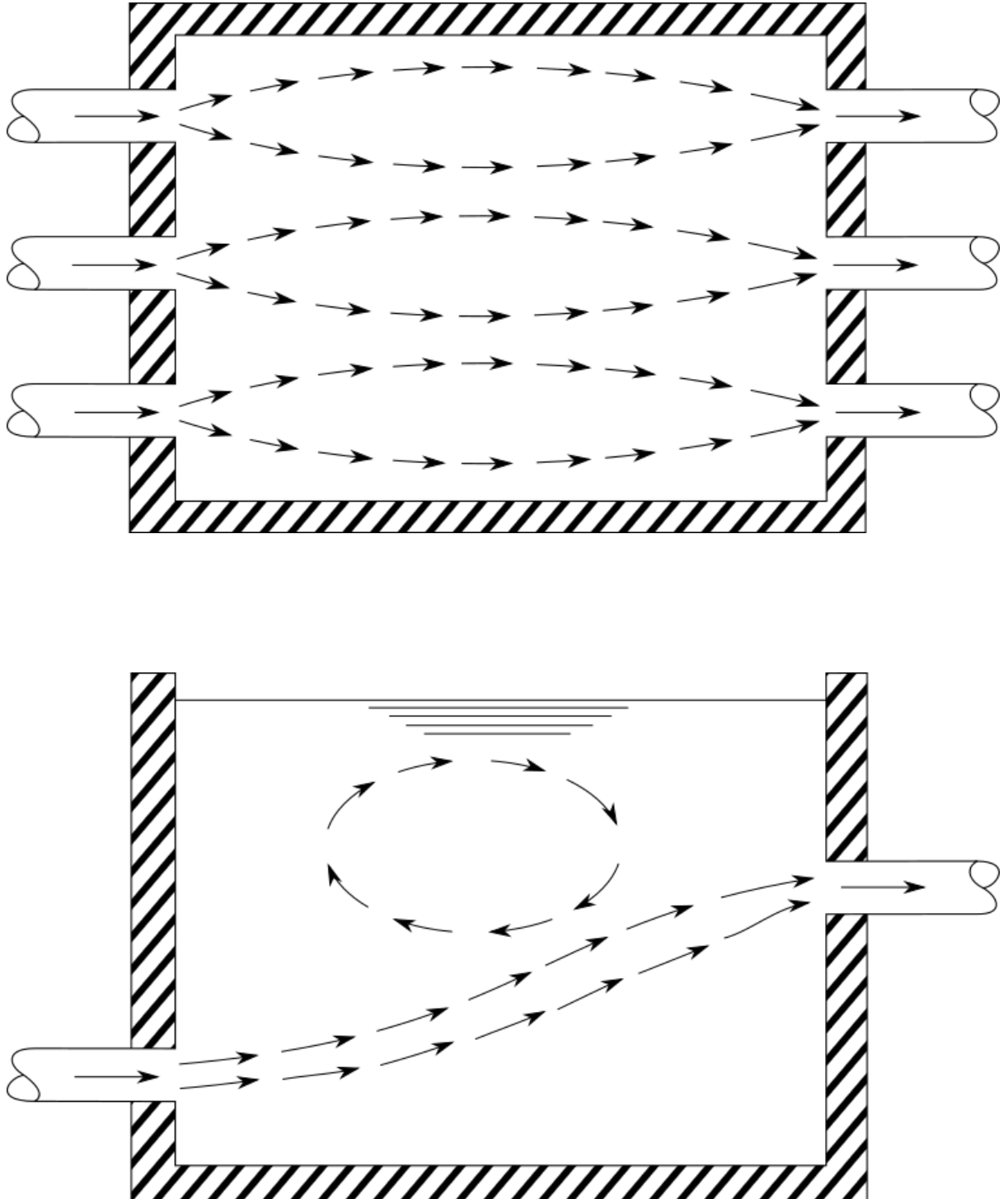


Figure 2. Poor Baffling Conditions

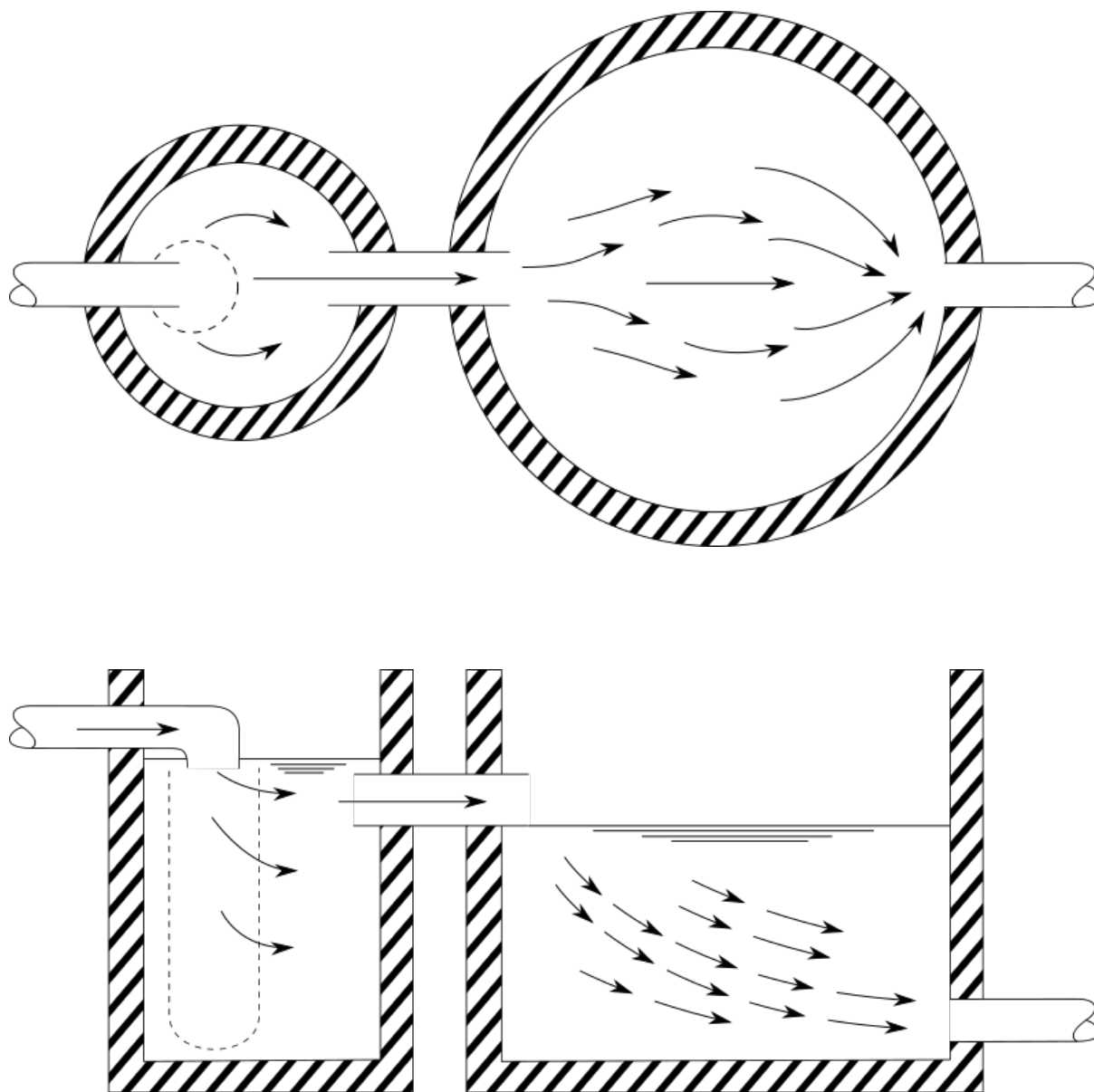


Figure 3. Average Baffling Conditions

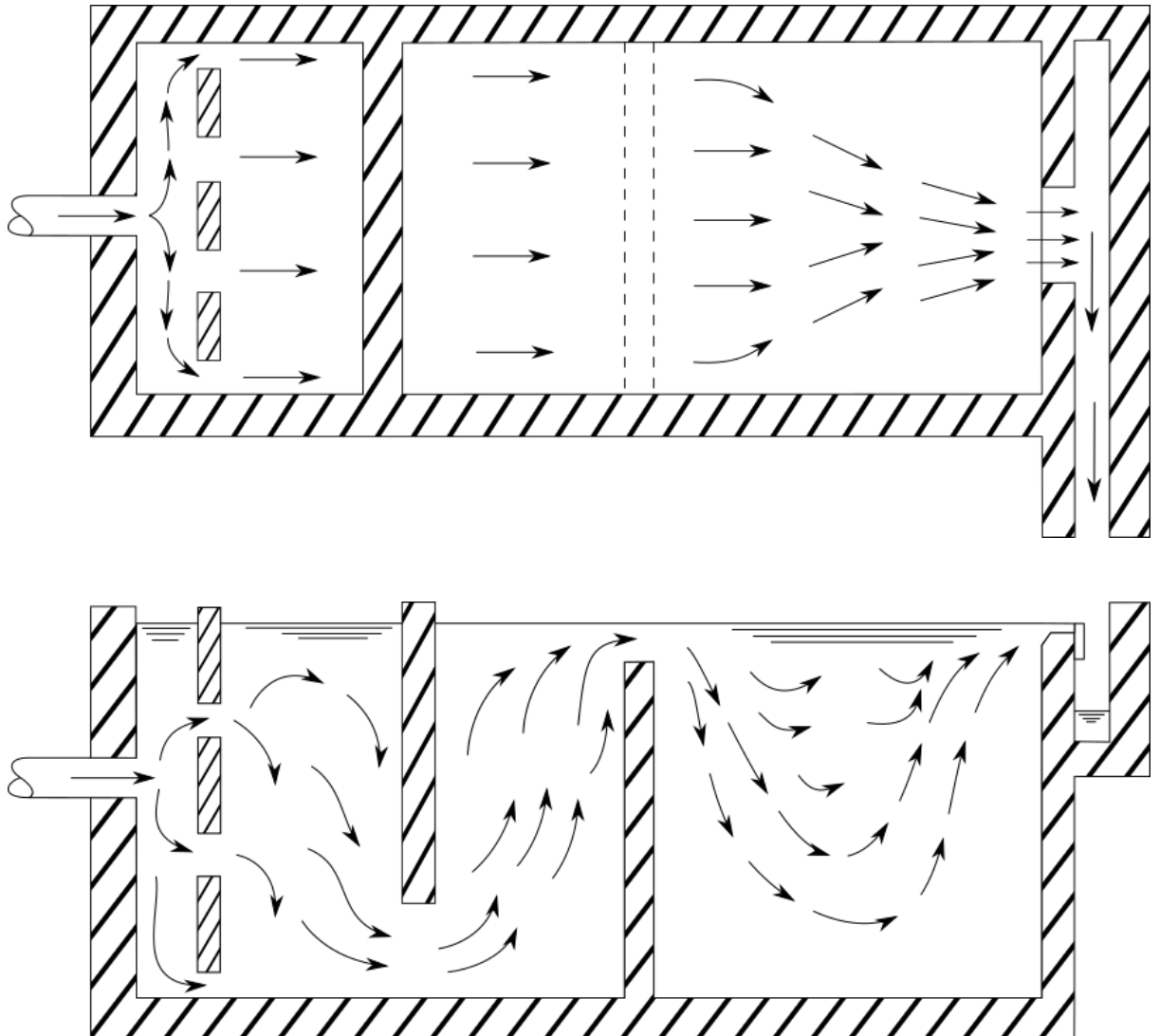
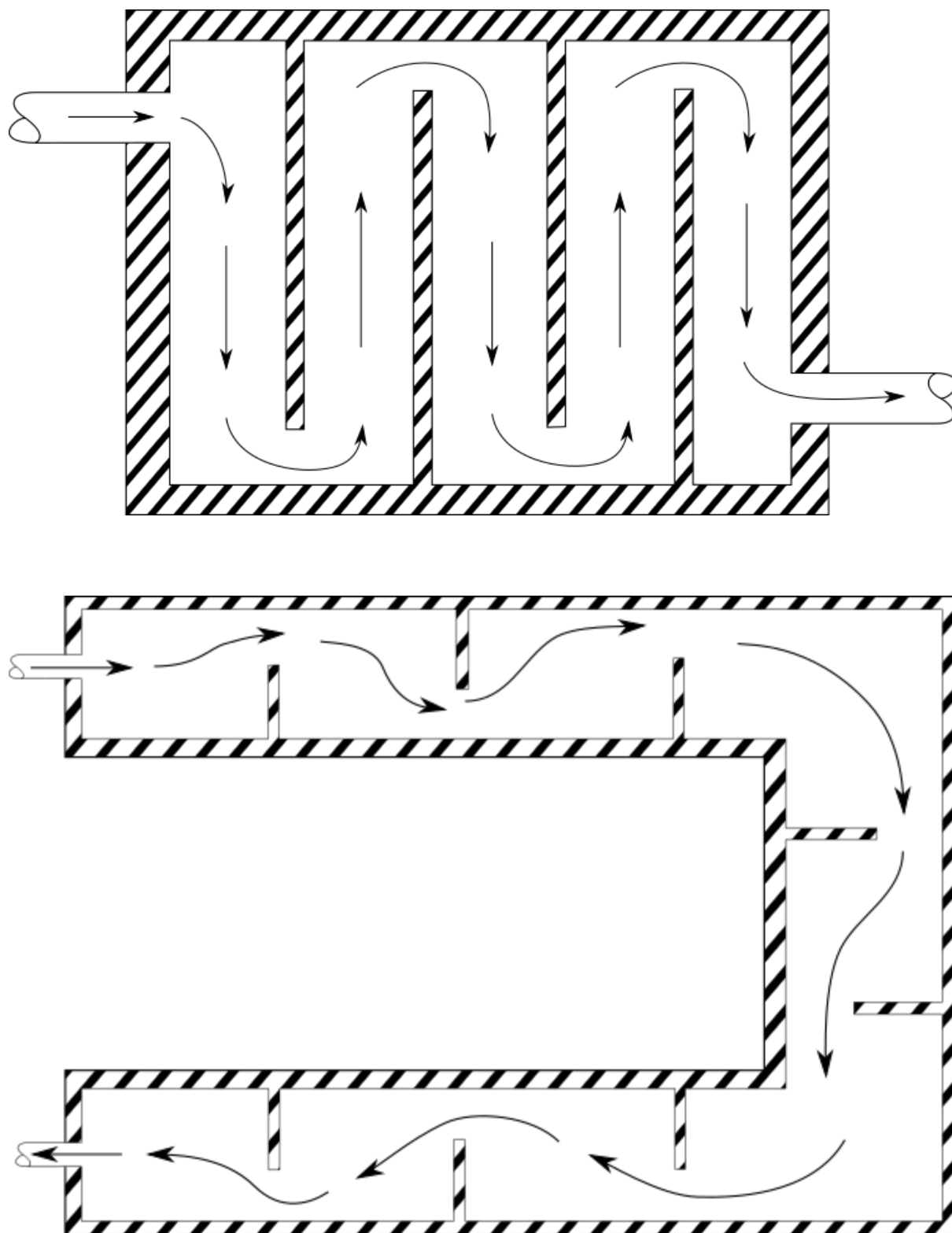


Figure 4. Superior Baffling Conditions



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