{add to definitions}

Integral: Part of the device (ie sensory deprivation system) that cannot be removed without compromising the device function or physical integrity of the system.

Sensory deprivation or floatation system: A combination of water holding vessel and treatment system for the immersion and floatation of person in temperature-controlled water circulated in a closed system, and not intended to be drained and filled with each use. It is manufactured to factory specifications with specific design, plumbing, components, and suppliers such that the water is circulated, treated, and filtered via closed loop system. The sensory deprivation system may be permanently installed or portable and typically includes certain systems or components integral to the sensory deprivation system or as part of a separate manufacturer specified assembly or skid-pack: tub, box, or shell structure, liner, and support system, hand hold(s), pull(s) or rail(s), filter(s), pump(s), suction fitting(s) or drain(s), water return fittings, skimmers, piping, tubing, hose, and other air or water distribution fitting(s), heater(s), chemical disinfectant feeding systems, supplemental treatment system(s), and control system. These aquatic vessels are of a design and size such that it has an unobstructed volume of water large enough to support floatation in place for one person.

Comment [C1]: Some Float Tanks have external vats that they drain their water into between floats. It is still a closed system, but the water drains from the tank into the vat, and then returns from the vat to the tank. I'm not sure if drained and filled is specifically referencing dumping the water to the sewer and replacing it with new water, or if these systems would fall under this definition as well.

Sealed: Fabricated without openings to prevent entry of liquid.

Operating water level: Level at which water must be maintained to enable proper water circulation and skimming.

Waterline: Designed operating level or range (often near the top or middle of a water skimmer opening)

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XX Floatation or Sensory Deprivation Systems and Related Equipment

X.1 Scope

This section establishes evaluation design, and testing criteria including health and performance requirements for floatation, sensory deprivation systems, and related equipment. The criteria address factory manufactured, fully self-contained and non-self-contained, portable, and pre-fabricated sensory deprivation and floatation systems including requirements for the materials, design and construction, marking, installation and use instructions, performance of the liner or shell and structure, performance of the water treatment system (or components), including those involved in the circulation, and treatment (e.g., filtration and sanitation) of the water. Other aspects of evaluation shall be excluded.

This standard does not purport to address all safety concerns, if any, associated with the use of floatation or sensory deprivation systems. It is the responsibility of the user of this Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

X.2 Physical Evaluation

~~The product shall bear the certification Mark and other markings as required herein.~~ The product shall include clear installation, use, and cleaning instructions in the owner's manual.

X.3 Material Safety and Toxicology Evaluation

X.3.1 Toxicological risk assessment

A health effects toxicological risk assessment shall be completed on water contact parts of the final product in accordance with 3 and Annex A of this Standard.

X.3.2 Rigid pipe and fittings

Rigid plastic piping shall meet the latest requirements of:

- NSF/ANSI 14 – (NSF-pw) Plastics Piping System Components and Related Materials for potable water usage.

X.3.3 Flexible reinforced plastic spa hose

Flexible reinforced (helical or fabric) plastic spa hose shall meet the latest requirements of:

- NSF/ANSI 50 - Equipment for Swimming Pools, Spas, Hot Tubs and other Recreational Water Facilities, Section 4, and
- IAPMO Z1033 – Flexible PVC Hose for Pools, Hot Tubs, Spas, and Jetted Bathtub

X.3.4 Flexible non-reinforced plastic spa hose

Flexible non-reinforced plastic spa hose shall meet the latest requirements of:

- NSF/ANSI 50 - Equipment for Swimming Pools, Spas, Hot Tubs and other Recreational Water Facilities, Section 4.
- IAPMO Z1033 – Flexible PVC Hose for Pools, Hot Tubs, Spas, and Jetted Bathtub

X.3.5 Alternate materials

If other specific materials or components are utilized, those components and materials must be evaluated as satisfactory from the standpoint of public health and performance for the intended end-use.

X.4 Performance Testing

The product shall be tested in accordance with specified requirements from the following standards:

- NSF/ANSI Standard 50 - Equipment for Swimming Pools, Spas, Hot Tubs and other Recreational Water Facilities
- NSF/ANSI 14 - Plastics Piping System Components and Related Materials
- ANSI/APSP-16 (aka ANSI/ASME A112.9.8) Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs.
- ANSI Z124.7 - Prefabricated Plastic Spa Shells
- ANSI Z124.1.2 - Plastic Bathtub and Shower Units
- add flexible liner membrane requirement for liner tear/puncture testing
- ASTM E252 - Standard Test Method for Thickness of Foil, Thin Sheet, and Film by Mass Measurement
- ASTM D374 -Standard Test Methods for Thickness of Solid Electrical Insulation

- ASTM F462 - Standard Consumer Safety Specification for Slip-Resistant Bathing Facilities
- ASTM D638 - Standard Test Method for Tensile Properties of Plastics
- ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting
- ASTM D1894 - Static and Kinetic Coefficients of Plastic Film and Sheeting
- ASTM D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting
- ASTM D4551 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane
- IAPMO Z1033 Flexible PVC Hose for Pools, Hot Tubs, Spas, and Jetted Bathtub
- UL 2017 General-Purpose Signaling Devices and Systems

X.5 Design and construction

Sensory deprivation systems shall be designed and constructed to prevent the accumulation of dirt and debris, and to facilitate inspection, cleaning, maintenance, and service of the water containment vessel. System tank, piping, and components shall not leak water during performance tests on the filtration and treatment system.

X.5.1 Accessibility

Water and air circulation system components including pumps, motors, skimmers, filters, UV system, or ozone system shall be accessible for inspection, maintenance, repair and/or replacement.

X.5.2 Sensory deprivation system shell, tub, or liner

X.5.2.1 Shell, tub, or liner: material formulation, surface material, strength

Plastic liners shall be evaluated and tested for compliance with the following requirements:

- NSF/ANSI 50 - Equipment for Swimming Pools, Spas, Hot Tubs and other Recreational Water Facilities, Section 3 and Annex A,
- System shall not leak when operated at the manufacturer maximum recommended salt concentration and water fill level.
- Systems using a liner shall have the liner tested in accordance with NSF/ANSI Standard 50, Annex G.1 for chemical resistance, via 100 day exposure to maximum recommended concentration of chemicals unless acceptable documentation attesting to chemical resistance of liner material is provided.
- Systems using a non-reinforced liner shall pass the following liner performance tests:
    - Thickness (0.030 inches or greater)
    - Puncture resistance test per ASTM D4551 or ASTM D4833
    - Indentation resistance test per ASTM D4551
    - Hydrostatic pressure test per ASTM D4551
    - Tear resistance test per ASTM D1004 (≥225lbs/in)

- Tensile strength per ASTM D638 (≥2000 psi)
- Modulus @100% Elongation per ASTM D882 (≥950 psi)

Plastic tub or shells shall be tested for and comply with the following requirements:

- ANSI Z124.1.2
  - Section 5.2 Stain resistance
- ANSI Z124.7, "Prefabricated Plastic Spa Shells"
  - Section 4.3 Surface testing
  - Section 4.4 Subsurface testing
  - Section 5.1 Colorfastness testing
  - Section 5.2 Wear and cleanability
  - Section 5.3 Cigarette test
  - Section 5.4 Chemical resistance
  - Section 6.1.2 Hydrostatic load requirements
  - Section 6.2 Empty unity loading testing
  - Section 6.3 Point Impact testing (upon rim and seat)
  - Section 7.1 Flammability (aka UL94 HB or HBF rating) or Section 5.6 Ignition of ANSI Z124.1.2

X.5.2.2 Sensory deprivation system step surface(s)

Sensory deprivation system inside steps or step landing location intended primarily for ingress/egress footing shall be slip-resisting, as defined by the requirements of:

- ASTM F462 Standard Consumer Safety Specification for Slip-Resistant Bathing Facilities, or,
- ASTM D1894-Static and Kinetic Coefficients of Plastic Film and Sheeting as appropriate for the surface and material.

X.5.2.3 Sensory deprivation system water depth

Sensory deprivation system shall be marked with color contrasting depth markings on the outside of the unit. Sensory deprivation system water depth shall not exceed 24 inches (62 cm).

X.5.2.4 Sensory deprivation system floor slope

Floors shall have a slope not exceeding one inch per foot (maximum pitch 1:12).

X.5.3 Step dimensions, handholds, and handrails (if applicable)

X.5.3.1 Step dimensions

If the sensory deprivation system is designed with steps for descending and entering, step treads shall have a minimum unobstructed horizontal depth of 10 inches (25.4 cm) and a minimum unobstructed surface area of 240 in^2 (1550 cm^2).

X.5.3.2 Riser heights

The walkover threshold height may be high enough to contain the manufacturers recommended water level within the chamber of the sensory deprivation system. If the sensory deprivation system is designed with steps for descending and entering the riser heights shall be consistent and no less than 7 inches (17.78 cm) and no greater than 12 inches (30.48cm). If the bottom-tread serves as a bench or seat the bottom riser may be a maximum of 14 inches (35.56 cm) above the floor.

X.5.3.3 Rim step

If the rim is designed by the manufacturer for use as a step, a hand hold or hand rail shall be recommended for installation by the manufacturer. The handrail shall not be readily removable (ie without the use of tools). Hand pulls, or rails shall be made from corrosion resistant materials such as polymeric materials or metals such as SS304 or better.

X.5.3.4 Handholds

When used, handholds shall be made from corrosion resistant materials such as polymeric materials or metals such as SS304 or better. The lowest point of at least one handhold shall not be positioned greater than 9 inches above the operating water level. Handholds shall not permanently deform or detach when subject to 150 pound pull load or a 300 pound vertical load.

X.6 Barrier to entry and SVRS

X.6.1 Entry alarm as barrier or warning of entry

A door alarm may be installed in a sensory deprivation system provided the door alarm has been tested and certified. The manufacturer may recommend or supply an alarm provided it has been tested and certified by an OSHA accredited NRLT in accordance with the door wall, gate alarm requirements of UL2017.

X.6.2 SVRS

Sensory deprivation systems that utilize a SVRS shall be certified to the latest requirements of ASME A112.19.17 or ASTM F2387 by an accredited independent 3rd party that is accredited for the test standard in accordance with ISO 17025, and as pool and spa product certification organization in accordance with ISO17021.

X.7 Circulation and treatment system

X.7.1 General circulation system requirements

The manufacturer of the sensory deprivation system shall either supply or recommend the specific equipment for installation. If the equipment is not provided by the manufacturer of the sensory deprivation system, the manufacturer must specify particular manufacturers and models of components for use during the installation. The specification must reference one or more manufacturer(s) and model or size of the equipment as it applies to the following circulation, filtration, and treatment system components that are required to be supplied with the system or recommended by the manufacturer for installation with the sensory deprivation system

X.7.1.1 Turnover rate

The sensory deprivation unit shall have a circulation system (including pump and filter) sized to achieve a volumetric turnover in less than five (5) minutes when operated at the maximum flow rate of the pump(s) and filter(s) in a clean media condition.

Note: Always consult local regulations for minimum required water circulation and turnover rates and maximum water velocity through the piping, filters, and other components.

Comment [C2]: Is there a reason why a time limit is required? If the circulation system meets the turnover requirements, does the length of time make a difference? Is this because over a longer period of time the bacteria has a chance to reintroduce itself into the freshly filtered water, making the sanitation process less effective?

X.7.1.2 Balanced flow, suction, skimming, overflows, and turbulent water return piping

The piping from the skimmers, grating, overflows, water intakes, and suction fitting systems shall be hydraulically balanced such that when piping is split between two fittings, the lengths of the piping shall be equal to aid in balanced flow.

X.7.2 Equipment requirements

X.7.2.1 Filters

All filtration system components shall be designed and sized to supply sufficient flow rate to operate the filter and meet the required turn-over rate. The filter (or 1st filter if a multi-filter treatment train) shall meet the spa requirements of NSF/ANSI 50 – Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities. The entire filtration system shall be tested and evaluated for compliance with NSF/ANSI Standard 50 Section 5 filter performance tests:

- Hydrostatic pressure (1.5 x minimum working pressure of 50psi)
- Pressure loss
- Circulation performance
    - The entire system shall be designed with the water return designed to aid in circulation of the water within the chamber and in the removal of the water from the chamber for processing within the treatment system.
    - The sensory deprivation unit shall have a circulation system (including pump and filter) sized to achieve a volumetric turnover in less than five (5) minutes when operated at the maximum flow rate of the pump(s) and filter(s) in a clean media condition.
    - The entire system shall meet or exceed the 70% turbidity reduction requirement when tested using Sil-co-sil 106 (a #140 silica), in accordance with NSF/ANSI Standard 50, Section 5, and Annex B, after performing the manufacturer recommended between user cleaning procedure.
    - The entire system shall meet or exceed the filter media cleanability requirements when tested in accordance with NSF/ANSI Standard 50, Section 5, and Annex B.
    - The filter (or first filter in a multi-filter treatment train) shall meet or exceed the effective filtration area and filtration rate requirements when tested in accordance with NSF/ANSI Standard 50, Section 5, and Annex B.

Comment [C3]: Has this test actually been attempted with float water to make sure the Epsom salt does not skew the turbidity readings?

Filters integral to the sensory deprivation system shall meet the requirements, but a separate filter data plate and operational instructions are not required if the filter information is provided in the sensory deprivation system equipment manual. A sensory deprivation system utilizing a self contained or non-self contained skid-pack with a filter(s) must comply with the requirements of this section.

X.7.2.2 Surface skimming, overflow or perimeter grating, and turbulent water intake systems

The sensory deprivation system shall be designed with an integrated skimming system designed to aid in rapid removal of floating debris and contaminants. The system shall draw water from the top of the water vessel via one or more of the following: perimeter overflow grating, gutter system, skimmers, or turbulent water intakes. All systems shall be marked with their ideal operating water level and acceptable range.

X.7.2.2.1 Recessed surface skimmers (when used)

All recessed surface skimmers shall meet the requirements of:

- NSF/ANSI 50 – Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities, Section 3 and 9.
- Skimmers shall be externally vented to atmosphere whether integral to the sensory deprivation unit or not: (example, a vent hole in the skimmer cover or lid, a vented entry to the skimmer weir, or other means).

- Systems shall be marked (either on the skimmer face or shell structure) with their ideal operating water level and acceptable range.
- Skimmers integral to the sensory deprivation system shall meet the requirements, but a separate skimmer data plate and operational instructions are not required.

X.7.2.2.2 Non-recessed surface skimmers (when used)

All non-recessed surface skimmers shall meet the requirements of:

- NSF/ANSI 50 – Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities, Section 3 materials formulation and corrosion resistance, and
- Skimmer and housing when installed in the floatation tank shall have one of the following design features
  - External vacuum break on the skimmer throat entry.
  - Housings whose inlet may be closed during part of the operation cycle shall not sustain damage or permanent deformation when exposed to a negative pressure of 25 in Hg (85kPa).
  - The skimmers shall be installed with a vacuum vent line externally vented to atmosphere on the suction piping from the skimmer housing whether integral to the sensory deprivation unit or not.
- Skimmer strainer basket shall be easily removable for cleaning.
- Skimmer strainer basket volume and open area dimensions shall comply with NSF/ANSI Standard 50 spa size requirements.
- Skimmer trimmer valves (when used) shall comply with NSF/ANSI Standard 50.
- Skimmer weir, a non-recessed skimmer shall have a weir that operates freely with continuous action and adjusts automatically to variation in water levels over the manufacturer prescribed operating water level at the maximum flow rate of the sensory deprivation system.
- The skimmer system shall be evaluated for entrainment of air through the skimmer system. The skimmer system shall be capable of 50% of flow to the filter without air entrainment when the system is operated at the sensory deprivation system manufacturer's recommended operating water level.
- Systems shall be marked (either on the skimmer face, interior structure or liner or outside shell structure) with the operating water level or acceptable range of water level.

X.7.2.2.3 Perimeter over flow grating or gutter system (when used)

All recessed perimeter overflow grating or gutter system shall meet the requirements of:

- NSF/ANSI 50 – Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities
- Systems shall be marked (either on the gutter, overflow system or shell structure) with their ideal operating water level and acceptable range.

X.7.2.2.4 Turbulent water intake and skimming appurtenance (when used)

All other appurtenances installed at the water line and designed to draw surface waters from the sensory deprivation tank into the filtration and treatment system shall meet the following requirements:

- NSF/ANSI 50 – Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities, Section 3 materials formulation and corrosion resistance, and
- Appurtenance housing when installed in the floatation tank shall have one of the following safety features
  - Housings whose inlet may be closed during part of the operation cycle shall not sustain damage or permanent deformation when exposed to a negative pressure of 25 in Hg (85kPa).
  - The appurtenance shall be installed in a dual configuration at the end of hydraulically balanced (same length and same diameter) piping.
- The system shall be evaluated for entrainment of air. The system shall be capable of 100% of system flow to the filter without air entrainment when the system is operated at the sensory deprivation system manufacturer recommended operating water level.

- Systems shall be marked (either on the water intake appurtenance, interior structure or liner or outside shell structure) with the operating water level or acceptable range of water level.
- The system shall be tested for compliance with the finger admittance and entrapment testing of APSP-16.
- The system shall be tested for compliance with the limb admittance and entrapment testing of APSP-16.
- The system shall be tested for compliance with the hair entrapment risk based upon APSP-16 at the full system flow rate in a clean filter condition.
- The system shall be tested for compliance with the body entrapment risk based upon APSP-16 at the full system flow rate in a clean filter condition.
- The system shall show no permanent deformation or damage that creates an underwater risk of entrapment after application of a vertical load of 300 pounds
- If the system is to be installed outside or exposed to UV light and weathering it shall be evaluated and tested for UV exposure and 70% tensile and impact material strength retention in accordance with APSP-16.

X.7.2.2.5 Air Blower and air induction systems (when used)

The requirements of this section apply to systems integral systems that induce or allow air to enter the sensory deprivation system either by means of a power pump or passive design:

- Air blower systems shall prevent water backflow toward the device via one or more of the following mechanisms:
  - Backflow prevention valve
  - Hartford loop (i.e. piping loop to prevent water backflow),
  - Installation height of the blower is above the water line
- Air intake sources shall not introduce water, dirt or contaminants from outside the unit.
- Integral air passages shall be able to withstand 150% the manufacturer's maximum rated working pressure for a minimum of 5 minutes.
- Air blower tubing shall meet or exceed the tubing performance requirements of NSF/ANSI Standard 50 and IAPMO Z1033.

X.7.3 Pump(s)

The water circulation pumps shall be certified to the spa temperature requirements of NSF/ANSI Standard 50 for performance including, hydrostatic pressure, pump curve, strainer performance (if applicable). The pumping system shall be tested to verify circulation system flow rate and volumetric turn-over of the total system water volume within 5 minutes.

X.7.3.1 Pump mounting, access, and support

Pumps shall be mounted per pump manufacturer's specifications. Pumps shall be accessible for inspection, service, and maintenance. Pumps shall be supported to prevent damage to the pump and piping due to settling or other movements.

NOTE: Sensory deprivation systems utilizing self-contained or non-self contained skid-pack with a pump(s) must comply with the requirements of this section.

X.7.3.2 Pressure and suction circulation piping, (when used)

Circulation piping (pressure and suction) used in the floatation or sensory deprivation system shall be certified to NSF/ANSI 50 or NSF/ANSI Standard 14 (for potable water end-use, ie NSF-pw)

X.7.4 Valves, (when used)

Valves used in the floatation or sensory deprivation system shall be certified to NSF/ANSI 50 or NSF/ANSI Standard 14 (for potable water end-use, ie NSF-pw).

X.7.5 Fully submerged suction fittings, or suction outlets, (when used)

Suction fittings used in the floatation or sensory deprivation system shall be certified to APSP-16 by an accredited independent 3rd party that is accredited for the test standard in accordance with ISO 17025. Suction fittings, as installed, shall be evaluated for proper installation in accordance with the limitations of the suction fitting product listing as it relates to:

- Installation orientation (floor or wall), and
- Installation configuration (single or dual as some units must be in pairs), and
- Maximum flow rating for the specific opening to which the fitting is affixed.

X.7.6 Sanitation and treatment systems

X.7.6.1 Water sanitation via chlorine and bromine

Water sanitation in the sensory deprivation system shall be accomplished using chemicals registered by the United States Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act, as recommended in the manufacturer's manual. The applicable requirements of NSF/ANSI Standard 50 shall apply to equipment recommended or supplied by the sensory deprivation unit manufacturer for use in chlorine/bromine sanitation.

Comment [C4]: With a float tank that is restricted to a single bather load, is it possible to consider a Ozone / UV system or an H2O2 / UV system as a system of primary disinfectant?

Comment [C5]: Is there concern about harmful health effects from chlorine byproducts such as trichloramines in the air in such a small enclosed space?

Comment [C6]: There is research to show that an H2O2 / UV system can be an effective form of sanitation. Is it possible to explore the idea of using this as an acceptable method of float tank sanitation?

X.7.6.2 Automatic controller

If an automatic controller is used to monitor water chemistry or administer water treatment chemicals in the sensory deprivation unit, the controller shall be NSF/ANSI Standard 50 Certified for the applicable use parameter(s).

X.7.6.3 Level of disinfection system performance

Sensory deprivation system disinfection systems shall be sized to meet varying regulatory requirements. The sensory deprivation system manufacturer shall specify or require at least one size/type system of Level-1, Level-2, or Level-3 disinfection system be installed. The sensory deprivation system manufacturer shall recommend or supply disinfection systems capable of meeting one or more of these levels:

1) Level 1-provide a minimum of 3 pounds of chlorine per day per 1,000 gallons of water volume.
2) Level 2-provide a minimum of 1.5 pounds of chlorine per day per 1,000 gallons of water volume.
3) Level 3-provide a minimum of 0.5 pounds of chlorine per day per 1,000 gallons of water volume.

Sensory deprivation systems for public use shall not require direct or hand feeding of chemicals except in extreme cases such as super-chlorination or water balancing. Systems shall be of one or more the following types and shall meet the applicable requirements of this NSF/ANSI Standard 50:

- Mechanical chemical feeding systems, or
- Flow through chemical feeding systems, or
- Electrolytic in-line or batch chlorine/bromine generators, or
- Electrolytic batch or off-line chlorine/bromine generators

Water sanitation equipment integral to the sensory deprivation system shall meet the requirements, but a separate data plate and operational instructions are not required if the information is contained within the sensory

deprivation unit. Sensory deprivation systems utilizing a non-self contained skid-pack with a chemical treatment system(s) shall comply with the requirements of this section.

NOTE: Always consult and comply with the local regulatory authority having jurisdiction regarding chemical feeding requirements and system sizing. Some jurisdictions require Level 1 (sized) chemical treatment systems and automatic controllers.

X.7.6.4 Mechanical chemical feeders (when used)

Mechanical chemical feeder (primary disinfection system), shall be certified to NSF/ANSI 50. Mechanical chemical feeders shall be installed such that they are electrically interlocked with the pump (ie chemical stops being produced or flowing from the unit into the piping when the pump is off). Chemical feeders shall be sized to deliver sufficient halogen disinfectant to raise the free available chlorine level by 2.0 ppm (or bromine level by 4.0 ppm) after performing the manufacturer recommended between user cleaning procedures.

X.7.6.5 Flow through chemical feeders (when used)

Flow through chemical feeder, (primary disinfection system), shall be certified to NSF/ANSI 50. Flow through feeders shall be installed such that they are electrically interlocked with the pump (ie chemical stops being produced or flowing from the unit into the piping when the pump is off). Chemical feeders shall be sized to deliver sufficient halogen disinfectant to raise the free available chlorine level by 2ppm (or bromine level by 4ppm) after performing the manufacturer recommended between user cleaning procedures. Flow through feeders shall not utilize stabilized chemicals such as di-chlor or tri-chlor tablets.

X.7.6.6 In-line electrolytic or brine batch type chemical generator, (when used)

In-line electrolytic or brine batch type chemical generator, (primary disinfection system), shall be certified to NSF/ANSI 50. Electrolytic chlorine or bromine feeders shall be installed such that they are electrically interlocked with the pump (ie chemical stops being produced or flowing from the unit into the piping when the pump is off). Electrolytic chlorine or bromine chemical feeders shall be sized to deliver sufficient halogen disinfectant to raise the free available chlorine level by 2ppm (or bromine level by 4ppm) after performing the manufacturer recommended between user cleaning procedure.

X.7.6.7 Supplemental or secondary treatment systems (shall be used)

Comment [C7]: What is the reason that a supplementary system is required when using Chlorine / Bromine?

At least one of the following supplemental or secondary treatment systems shall be specified by the manufacturer for installation or supplied by the manufacturer with the floatation system.

- Ozone treatment systems
- UV treatment systems
- Copper/Silver ion systems

The supplemental or secondary treatment system shall be integrated into the floatation system design such that it is electrically interlocked with the circulation pump for use during each between user cleaning cycle of the unit.

Secondary treatment systems may be supplied with or recommended for installation and use by the sensory deprivation system manufacturer provided they are certified to NSF/ANSI 50 or are tested as a system in accordance with the burst safety testing, 3-log bacterial disinfection efficacy, operational protection, life testing, and quantity of ozone (for ozone systems) testing requirements of this standard:

Note: Consult with local regulatory jurisdiction having authority regarding the use of NSF/ANSI Standard 50 Certified secondary treatment systems such as ozone systems, copper/silver ionizers, or UV systems

X.7.6.8 Operational protection ozone, UV, and or copper/silver system testing

Supplemental water sanitation and treatment systems shall be evaluated for operational protection in accordance with NSF/ANSI Standard 50 requirements

X.7.6.9 Ozone systems and ozone concentration in the sensory deprivation system water

Systems that incorporate ozone treatment shall be tested for ozone injection methods and assessed for exceeding the potential ozone level in the water (off gassing requirements) of NSF/ANSI Standard 50, Section 13.10, via testing in accordance with Annex H. Ozone levels exceeding 0.1 ppm (0.2mg/m3) are not acceptable in the water when tested in accordance with Annex H of NSF/ANSI Standard 50.

Comment [C8]: Will this accomplish maintaining safe levels of Ozone gas in the air as well? Is there any testing that needs to be done in this enclosed environment to make sure Ozone gases do not exceed the 0.1ppm OSHA levels for air quality over an 8 hour period?

X.8 Sensory deprivation system initial disinfection efficacy test

The system shall be tested for disinfection efficacy in accordance with NSF/ANSI Standard 50, Annex H requirements and the requirements noted herein. Sensory deprivation systems that use both primary (such as chlorine and bromine) and secondary water treatment (such as ozone, copper/silver, or UV) *shall be tested for disinfection efficacy without use of the primary disinfectant system to assess the level of performance of the secondary system.*

- Ensure water level, temperature, salt and if applicable copper/silver content are per manufacture specification
- Verify that there is no free available chlorine or bromine in the water
- Inoculate water with challenge constituents per Annex H of NSF/ANSI 50
- Perform manufacturer's recommended between user maintenance/cleaning
    - No chlorine/bromine chemical dosing (primary halogen generation or feeding system shall be turned off for this testing of the secondary treatment system)
    - Ozone at manufacturer recommended level/output
    - UV generator operating at manufacturer recommended level or irradiance
    - Copper/Silver ion system operating at manufacturer recommended level/output
- Record circulation system influent/effluent, ORP, and effluent UVT during testing
- Samples shall be taken from the sensory deprivation tank or chamber user area.
- Acceptance criteria: three (3) log reduction or kill (99.9%) of challenge bacteria in the sensory deprivation tank water after completion of the between user cleaning procedure.

X.9 Sensory deprivation system life test, simulated 3000 hour life test sequence

After successful initial disinfection efficacy testing, the entire treatment system shall undergo a simulated 3,000 hour life test to address stresses on the equipment and treatment system over time and from repeated on off cycling of the pump, filtration, UV, ozone, and or chemical feeding systems after each user.

X.10 Sensory deprivation system disinfection efficacy testing after the life test

After the simulated 3,000 hour life testing, the system shall be evaluated for disinfection efficacy to evaluate the impact of life testing on system performance. After completion of the life testing, the system shall achieve 3-log kill or reduction of the two challenge organisms from NSF/ANSI Standard 50, Annex H.

This requirements shall apply to any equipment recommended or supplied by the sensory deprivation system manufacturer for use in treatment of sensory deprivation chamber water, including:

- Ozone systems,

- UV light systems,
- Copper and silver ion generators,

Supplemental water treatment equipment integral to the sensory deprivation system shall meet the requirements, but a separate data plate and operational instructions are not required. Sensory deprivation system utilizing a non-self contained skid-pack with supplemental treatment equipment shall comply with the requirements of this section

NOTE: Always consult and comply with the local regulatory authority having jurisdiction regarding supplemental sanitation and treatment equipment requirements and system sizing.

X.11 Data plate

Each sensory deprivation system shall have a data plate that is permanent and easy to read. The data plate shall have, at a minimum, the following information:

- Manufacturer's name and address;
- Model and serial number;
- Date of manufacture or installation
- Maximum number of users (bathers);
- Maximum recommended temperature;
- Reference to use of only EPA registered chemical disinfectants with the primary disinfection chemical feeding system;
- Recommended between user cleaning cycle process and cycle time
- Warning that no user shall be in system during the cleaning cycle
- Recommended water quality parameters, including pH, temperature, sanitizer level (such as 1-5 mg/L (ppm) Free Available Chlorine, or 2-6 mg/L (ppm) Total Bromine)
- Dry weight, water capacity, and filled/occupied weight;
- Certifiers mark attesting to compliance with requirements of this standard;

X.12 Owner's manual

A comprehensive manual or manual package shall be provided with each sensory deprivation system covering important areas and contains an explanation of the system operational process.

For sensory deprivation systems utilizing components certified under NSF/ANSI 50, separate component manuals shall be included in the manual package. If the component is integral to the sensory deprivation system, equivalent information shall be provided in the sensory deprivation system manual.

X.12.1 Safety

This section shall include, at a minimum, the following information:

- Warning against entry or habitation within the unit during the cleaning cycle
  - Literature for systems that do not incorporate certified suction fittings that are installed in accordance with the product's certification shall prohibit entry into the system while the circulation pump is operational
- Electrical hazards;
- Drowning hazards;
- Appropriate injury and health hazards
- Avoidance of slip and fall hazards
- Barriers

- When a sensory deprivation system is installed safety, barriers, and layers of protection can help reduce risk. Examples of layers of protection include use of barriers to entry such as fences and alerts to entry such as alarm devices. The manufacturer may recommend or supply a barrier or layer of protection provided it has been tested and certified to one of the following standards:
    i. Door walls or gates with alarms, certified to UL 2017, or
    ii. Fences, certified to ASTM F 1908, ASTM F 2286,

NOTE: Always consult and comply with the local regulatory authority having jurisdiction regarding safety, barriers, and the layers of drowning protection required.

X.12.2 Sensory deprivation system specifications

This section shall include, at a minimum, the following information:

- Maximum number of users (bathers);
- Footprint dimensions;
- System height;
- Effective filtration area;
- Heater output;
- Water capacity;
- Dry weight;
- Filled weight, assuming average occupant weight of 175 lbs.;
- Dead weight, assuming average occupant weight of 175 lbs.;
- Electrical requirements;

X.13 Installation instructions

Installation instructions shall include, at a minimum:

- Ventilation requirements and instructions, if installed indoors;
- Site preparation;
- Assembly of system;
- System leveling;
- Electrical requirements and precautions:
- Ozone, UV, Copper/Silver Ionization systems, mechanical chemical feeders, electrolytic in-line or brine/batch type chemical feeders shall be installed such that they are electrically interlocked with the circulation pump.

X.14 Operating, care, and maintenance instructions

Operating, care, and maintenance instructions shall include, at a minimum:

- Salt and water start-up and replacement schedules, procedures, and frequency;
- Jet control operations (if applicable);
- Temperature adjustment operations;
- Lighting control, for interior lighting (if applicable);
- Draining instructions;
- Instructions for prevention of freezing and winterizing (if installed exposed to elements)
- Filtration system maintenance, including skimmers, suction fittings, filter cartridge removal, cleaning, and installation;
- Cleaning and care instructions for system, shell or liner, and exterior;
- Cleaning and ventilation process after each use/user session;

- Daily cleaning and ventilation process;
- Care and cleaning before and after extended periods of non use such as vacation care instructions;

X.15 Water quality and maintenance instructions

Water quality instructions shall include, at a minimum:

- Methods for testing the sensory deprivation system water
- Methods for adding chemicals to the water;
- Methods for maintaining the proper water chemistry;
- Recommended water quality parameters;
- Basic chemical safety guidelines;
- Recommended test frequency;
- Statement specifying use of EPA registered chemicals for water sanitation;
- Statement reading “Maintaining your sanitizer at the recommended levels at all times will decrease the occurrence of unsafe bacteria in your water” (or equivalent).

X.16 Service information

Service information shall include, at a minimum;

- Warranty;
- Statement that consumer should not attempt to repair non-user serviceable components.
- Troubleshooting guide;
- List of user serviceable components/parts;
- Contact information for manufacturer or service company