



Proposed Revisions to ANSI/APSP/ICC-5 2011 (R2022) *American National Standard for Residential Inground Swimming Pools* PUBLIC REVIEW DRAFT 2024-02-09

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This draft is subject to change until approved by the PHTA Standards Consensus Committee (SCC) and ANSI (American National Standards Institute).

The current edition of the standard is ANSI/APSP/ICC-5 2011 (R2022) *American National Standard for Residential Inground Swimming Pools* and is available to view free of charge and for purchase at www.phta.org. Draft revisions are noted by ~~strike through~~ for draft deletions and underline for draft additions.

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Proposed Revisions to ANSI/APSP/ICC-5 2011 (R2022) *American National Standard for Residential Inground Swimming Pools*

1 Scope

1.1 Residential pools. This standard applies to permanently installed residential inground swimming pools intended for noncommercial use as a swimming pool by not more than three owner families and their guests and exceeding 24 in. (61 cm) in water depth.

EXCEPTION: Separate ponds, fountains, decorative water features, and reflecting pools or other similar bodies of water that are not intended for bathers are outside the scope of this standard.

1.2 Construction. This standard covers specifications for new construction and remodeling of residential inground swimming pools and includes design, equipment, operation, and installation.

1.3 Variation in designs. This standard permits variations in equipment, and design, including special features such as, but not limited to ledges, beach entries, waterfalls, fountains, bridges, tanning shelves, grottoes, seats, benches, in pool tables and bar stools, walls over 12 in. (305 mm) elevated or angled walls or beams, scuba pools, spas, lap pools, swim spas, spillways, slides, coves, walls, etc. to accommodate special needs consideration and advances in technology.

1.3.1 Special purpose pools. Examples of special purpose pools include, but are not limited to, training pools, island pools, scuba pools, polo pools, spas, and lap pools.

1.4 IMPORTANT SAFETY CONSIDERATION: The variations in ~~para-section~~ 1.3 shall consider safety for the intended use and the circulation of the swimming pool water.

1.5 Normative References. The following ~~standards-documents~~ provisions that, through reference in this text, constitute provisions of this American National Standard.

1.5.1 At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the ~~standards-documents~~ indicated below.

ACI 302.1: ACI 302.1R-15, *Guide to Concrete Floor and Slab Construction*

ANSI Z21.56: ANSI/CSA Z21.56-2019, *Gas-fired Pool Heaters, same as CSA 4.7*

NFPA 54: ANSI Z223.1/NFPA 54-2021, *National Fuel Gas Code*

~~ANSI/ASME A112.19.8 2007, *Suction Fittings for Swimming and Wading Pools, Spas, Hot Tubs and Whirlpool Bathtub Appliances*~~

ANSI/NEMA MG 1-2022, *Motors and Generators*

ANSI/NFPA 58-2020, *Liquefied Petroleum Gas Code*

ANSI/NSF 50-2023 (i199r2), *Equipment and Chemicals for Swimming Pools, Spas, Hot Tubs, and Other Recreational Water Facilities*

ANSI/ASHRAE Standard 62.1-2022, *Ventilation for Acceptable Indoor Air Quality*

ANSI/ASME A112.1.2-2012 (R2022), *Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors)*

ASTM F1346-23, *Standard Performance Specification For Safety Covers And Labeling Requirements For All Covers For Swimming Pools, Spas And Hot Tubs*

~~ASTM F2208 (2008), *Standard safety specification for residential pool alarms*~~

~~ANSI/NFPA 70®-2023, *Article 680 of the National Electrical Code® (NEC®)*~~

~~OSHA Standard 29, CFR1910.1000 Table Z-1~~

~~UL 1081 (2008), *Standard for swimming pool pumps, filters, and chlorinators*~~

ANSI/UL 1261-2017 (R2022), *Standard for Safety for Electric Water Heaters for Pools and Tubs*

ANSI/UL 60335-2-40-2022, *Standard for Household and Similar Electrical Appliances – Safety – Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers*

CSA C22.2 NO. 236-15 - *Heating And Cooling Equipment (Bi-National Standard With UL 1995)*

ANSI/UL 1995-2015a, *Standard for Safety for Heating and Cooling Equipment*

ANSI/AHRI Standard 1160-2023 (I-P), *Performance Rating of Heat Pump Pool Heaters*

ANSI/UL 60335-2-40-2022, *Standard for Household and Similar Electrical Appliances – Safety – Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers*

U.S. Code of Federal Regulations, 16 CFR, Part 1303

U.S. Code of Federal Regulations, 16 CFR, Part 1207

ANSI/NSF 14-2023 (i136r1), *Plastics Piping System Components and Related Materials*

ASTM D1527-99(2005), *Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80 (Withdrawn 2014)*

ANSI/ASTM D2846/D2846M-2019a, *Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems*

ANSI/ASTM F437-2021, *Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*

ANSI/ASTM F438-2023, *Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40*

ANSI/ASTM F439-2019, Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

CSA B137.6:23, Chlorinated polyvinylchloride (CPVC) pipe, tubing, and fittings for hot and cold-water distribution systems

ANSI/ASME B16.15-2018, Cast Copper Alloy Threaded Fittings: Classes 125 and 250

ANSI/ASTM D2464-2023, Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

ANSI/ASTM D2466-2023, Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

ANSI/ASTM D2467-2020, Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

CSA B137.2:23, Polyvinylchloride (PVC) injection-moulded gasketed fittings for pressure applications

CSA B137.3:23, Rigid polyvinylchloride (PVC) pipe and fittings for pressure applications

ASTM A182/A182M-23, Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service

ASTM A403/A403M-22b, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

ASTM B88-22, Standard Specification for Seamless Copper Water Tube

ASTM B447-12a(2021), Standard Specification for Welded Copper Tube

ASTM A312/A312M-22a, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

ANSI/ASTM D1785-2021a, Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

ANSI/ASTM D2241-2020, Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

ANSI/ASTM D2672-2020, Specification for Joints for IPS PVC Pipe Using Solvent Cement

1.5.2 The most current published edition of APSP or PHTA standards referenced in the text shall be applied.

ANSI/PHTA/ICC-7 2020, American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs and Catch Basins

ANSI/APSP/ICC-11 2019, American National Standard for Standard for Water Quality in Public Pools and Spas

ANSI/APSP/ICC/NPC-12 2016, American National Standard for the Plastering of Swimming Pools and Spas

ANSI/APSP/ICC/NPC 12, Supplement A-2019, *American National Standard for the Plastering of Swimming Pools and Spas* (supplement to ANSI/APSP/ICC/NPC-12-2016)

ANSI/APSP/ICC-13 2017, *American National Standard for Water Conservation Efficiency in Pools, Spas, Portable Spas and Swim Spas*

ANSI/PHTA/ICC-15 2021, *American National Standard for Residential Swimming Pool and Spa Energy Efficiency*

ANSI/APSP/ICC-16 2017, *American National Standard for Suction Outlet Fitting Assemblies (SOFA) for Use in Pools, Spas and Hot Tubs*

ACI, American Concrete Institute, 3800 Country Club Drive, Farmington Hills, MI 48331, (248) 848-3800, www.concrete.org

CSA Group, 8501 East Pleasant Valley Road, Independence, OH 44131-5516, (416) 747-4124

National Electrical Manufacturers Association (NEMA), 1300 N. 17th Street, Suite 1847, Rosslyn VA 22209, (703) 841-3200, www.nema.org

NFPA, 1 Batterymarch Park, Quincy, MA 02269, (617) 770-3000, www.nfpa.org

NSF International, 789 N. Dixboro Rd, P.O. Box 130140, Ann Arbor MI 48113, (734) 769-8010, www.nsf.org

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), 1791 Tullie Circle NE, Atlanta, GA 30329, (404) 636-8400, www.ashrae.org

American Society of Mechanical Engineers (ASME), 3 Park Avenue, 20th Floor, New York, NY 10016, (212) 591-8562, www.asme.org 11-12.

ASTM International, 100 Barr Harbor Dr, West Conshohocken, PA 19428, (610) 832-9585, www.astm.org

National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269 (617) 770-3000, www.nfpa.org

Occupational Safety and Health Administration, DOL, 200 Constitution Ave, Washington, DC 20210, www.osha.gov

Underwriters Laboratories (UL), 333 Pfingsten Road, Northbrook, IL 60062, (847) 272-8800, www.ul.com

U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250; toll free (866) 512-1800; order online from <http://bookstore.gpo.gov>

1.6 Other standards. This standard does not apply to pools and spas covered by: *ANSI/APSP-1 Standard for Public Swimming Pools*

ANSI/APSP/NSPI-2 Standard for Public Spas and Swim Spas

ANSI/APSP-3 Standard for Permanently Installed Spas and Swim Spas

~~ANSI/APSP-4~~ *Standard for Aboveground/Onground Residential Swimming Pools*

~~ANSI/APSP-6~~ *Standard for Residential Portable Spas and Swim Spas*

~~ANSI/APSP/IAF-9~~ *Standard for Aquatic Recreation Facilities*

~~ANSI/APSP-11, American National~~ *Standard for Water Quality in Public Pools and Spas*

1.7 Workmanship. All work shall be performed in accordance with the latest most current published edition of ~~APSP~~*PHTA Workmanship Guidelines and Practices for Residential Inground Swimming Pools and Spas.*

1.8 Definitions.

ALTERATION. See Remodel.

BEACH ENTRIES. Sloping entries starting above the waterline at deck level and ending below the waterline (Does not refer to sand only); ZERO ENTRY.

CIRCULATION SYSTEM. The mechanical components that are a part of a recirculation system on a pool or spa. Circulation equipment may be, but is not limited to, categories of pumps, hair and lint strainers, filters, valves, gauges, meters, heaters, surface skimmers, inlet/outlet fittings, and chemical feeding devices. The components have separate functions, but when connected to each other by piping, perform as a coordinated system for purposes of maintaining pool or spa water in a clear and sanitary condition.

DEEP AREA. Areas of water depth exceeding ~~five~~ 5 ft (5 ft, 1.52 m).

DESIGN WATERLINE. The centerline of the skimmer or other point as defined by the designer of the pool or spa.

DECK. An area immediately adjacent to or attached to a pool or spa that is specifically constructed or installed for sitting, standing, or walking. Decks include dry decks and perimeter decks.

DRY DECK. All pedestrian surface areas within the aquatic venue enclosure not subject to frequent splashing or constant wet foot traffic. The dry deck is not perimeter deck or pool deck, which connect the pool to adjacent amenities, entrances, and exits. Landscape areas are not included in this definition.

PERIMETER DECK. The hardscape surface area immediately adjacent to and within 4 ft (1.2 m) of the edge of the swimming pool also known as the "wet deck" area.

DRY DECK. See DECK.

DIVING AREA. Area of a swimming pool that is designed for diving.

DIVING PLATFORM. Stationary platform designed for diving.

DIVING STAND. Any supporting device used for supporting a springboard or diving board.

DRAIN. A suction outlet, comprising a fitting, fitting assembly, cover/grate, and related components that provide a localized low-pressure area for the transfer of water from a swimming pool, wading pool, spa, or hot tub. (See SUCTION OUTLET).

~~**DYNAMIC HEAD.** The sum of the total resistance caused by friction and/or changes in elevation, of the water flow through the entire circulation system that the pump has to overcome to achieve the necessary flow rate.~~

EPA-REGISTERED PRODUCT. A product bearing the EPA stamp indicating that it meets EPA standards for efficacy, human health and safety, environmental impact, use instructions, and product labeling. All products that claim to kill or control bacteria, algae, etc., are required to be registered.

HANDHOLD. That portion of a pool or spa structure or a specific element that is at or above the design waterline that users in the pool grasp onto for support.

MANUFACTURED DIVING EQUIPMENT. Manufactured diving equipment shall include diving boards, jump boards, springboards, and starting platforms. Architectural features such as decorative rocks and elevated bond beams are not considered to be manufactured diving equipment.

MANUFACTURED OR FIELD FABRICATED DIVING EQUIPMENT FOR INGROUND SWIMMING POOLS. (diving board/stand combination or manufactured platform). The term “field fabricated” covers diving platforms that may be fabricated on site, including but not limited to: platforms incorporated into elevated planters or water features, split-level decks, boulders, or diving rocks that may be poured into or mounted on a pool deck, etc.

PERIMETER DECK. See DECK.

PERIMETER FLOW POOL. A pool where the water surface is lifted and flows over the perimeter of the pool into a surrounding gutter that delivers water to the circulation system.

REMODEL. To install cosmetic changes, accessory add-ons, or modernizations. Can be for either residential or commercial installations.

RENOVATE. To restore or repair all or part of a pool structure and/or its component parts, including the rebuilding and/or replacing of worn or broken parts. See Remodel.

SECONDARY DISINFECTION SYSTEMS. Disinfection processes or systems installed in addition to the required primary disinfection systems designed to achieve a minimum 3-log (99.9%) reduction in the number of infective *Cryptosporidium parvum* oocysts per pass.

SHALLOW AREAS. Portions of a pool or spa with water depths of less than or equal to 5 ft ~~five ft~~ (5 ft, 1.52 m).

SLIP RESISTING. A surface that has been treated or constructed to significantly reduce the chance of a user slipping. The surface shall not be an abrasion hazard.

SPECIAL PURPOSE POOL. A pool intended to be used exclusively for a specific activity, such as swimming instruction, diving, competition, or physical therapy.

SUCTION OUTLET. A submerged aperture or fitting, other than a skimmer, on the sidewall or bottom of a swimming pool or spa through which water under negative pressure (vacuum) is drawn from the pool or spa to the pump or circulation system.

SUCTION PIPING (INFLUENT). Piping that is connected to the suction side of the pump.

SUN SHELF. An area of a pool that adjoins the pool wall with a water depth less than 12 in. (305mm) and is used for seating and play.

SUPPLEMENTAL TREATMENT SYSTEMS. Systems or processes which are not required on residential pools and spas for health and safety reasons but may be used to improve water quality and/or enhance overall system performance.

SWIMMING AREA. Area of pool greater than three feet (3 ft, 914 mm) in depth, that is devoted to swimming.

SWIMOUT. An underwater seat area that is placed completely outside of the perimeter shape or the diving envelope of the pool. ~~When~~ Where located at the deep end, swimouts are permitted to be used as the deep-end means of entry/exit of the pool.

~~LOVE SEAT.~~

WATERLINE. The waterline shall be defined in one of the following ways:

1. Skimmer system: The waterline shall be at the midpoint of the operating range of the skimmers when there are no users in a pool or spa.
2. Overflow system: The waterline shall be at the top of the overflow rim.

WATERTIGHT. Closely sealed, fastened, or fitted so that no measurable water passes through.

WET DECK. See PERIMETER DECK.

2 General Design Criteria

- 2.1 Materials of components and accessories.** The materials of components and accessories used for permanently installed inground residential swimming pools shall be compatible with the user and the environment in which they are installed. The materials shall be capable of fulfilling the design, installation, and the intended use requirements in this standard.
- 2.2 Selection of materials.** The selection of materials, manufactured components, accessories, and construction processes shall be such that external surfaces and edges that are exposed to the user are arranged and finished so that they will not constitute a cutting, pinching, puncturing, or abrasion hazard.
- 2.3 Entrapment avoidance.** There shall be no protrusions or other obstructions in the swimming area, which may cause the entrapment or entanglement of the user.

3 Plans and Permits

- 3.1 Approval by state or local authority.** Prior to construction, remodeling, or alteration of a permanently installed residential pool, plans and specifications shall be submitted as required by the state or local authority for review, approval, and issuance of a permit.

4 Structural Design

- 4.1 Structural design.** The structural design and materials used shall be in accordance with accepted structural engineering practices and methods.
- 4.2 Freezing.** In climates subject to freezing temperatures, the pool shell shall be designed and constructed to protect it from structural damage due to freezing.

5 Pool Dimensions and Tolerances

5.1 Diving Pools Dimensions and Tolerances

5.1.1 General requirements. Design dimensions shall comply with the specifications in this standard. The pool shall be constructed to these design dimensions within the tolerances listed in 5.1.1.1.

5.1.1.1 Construction tolerances. There shall be construction tolerances allowed on dimensional designs. The length, width, and depth shall be limited to a tolerance of plus or minus 3 in. (± 76 mm). All other dimensions, except the location of the design waterline, shall be limited to a tolerance of ± 2 in. (± 51 mm), unless otherwise specified by the design engineer. The construction tolerance for the location of the design waterline shall be in accordance with the following:

- Waterline on a tiled surface: $\pm 1/4$ in. (6.35 mm).
- Waterline on surfaces other than a tiled surface: $\pm 1/2$ in. (12.7 mm).

NOTE: Negative construction tolerances shall not be applied to the shallow area dimensions of the Minimum Diving Water Envelope given in Table 1, p. 4.

5.25.1.2 Perimeter shape. No limits are specified for shapes of pools.

Consideration shall be given to circulation and safety to the user.

5.35.1.3 Walls—Requirements

5.3.15.1.3.1 Walls in the shallow area and deep area of the pool shall not slope greater than 11° (5:1 slope ratio) to a transition point of the floor (see Figure 1). The transition to the bottom of the pool between points D and E (see Figure 3) shall not be less than 2 ft 3 in. (686 mm) below the waterline.

5.3.25.1.3.2 As shown in Figure 2, at the depths of Point A and Point B, the walls are permitted to continue to join the floor.

Figure 1 Maximum allowable wall slope

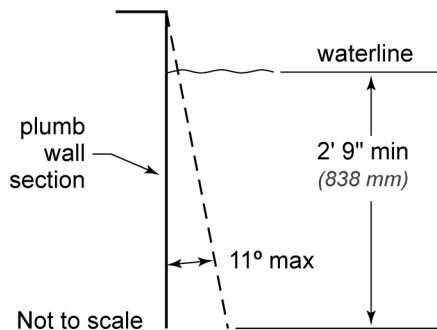


Figure 2 Typical pool design configurations

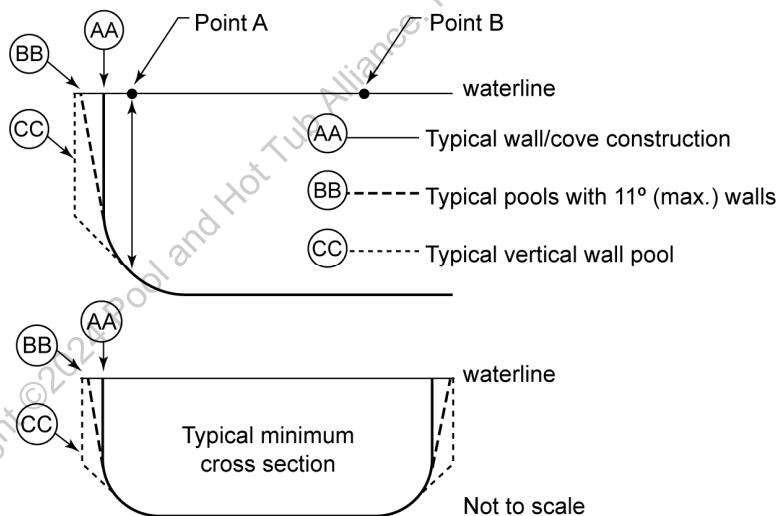
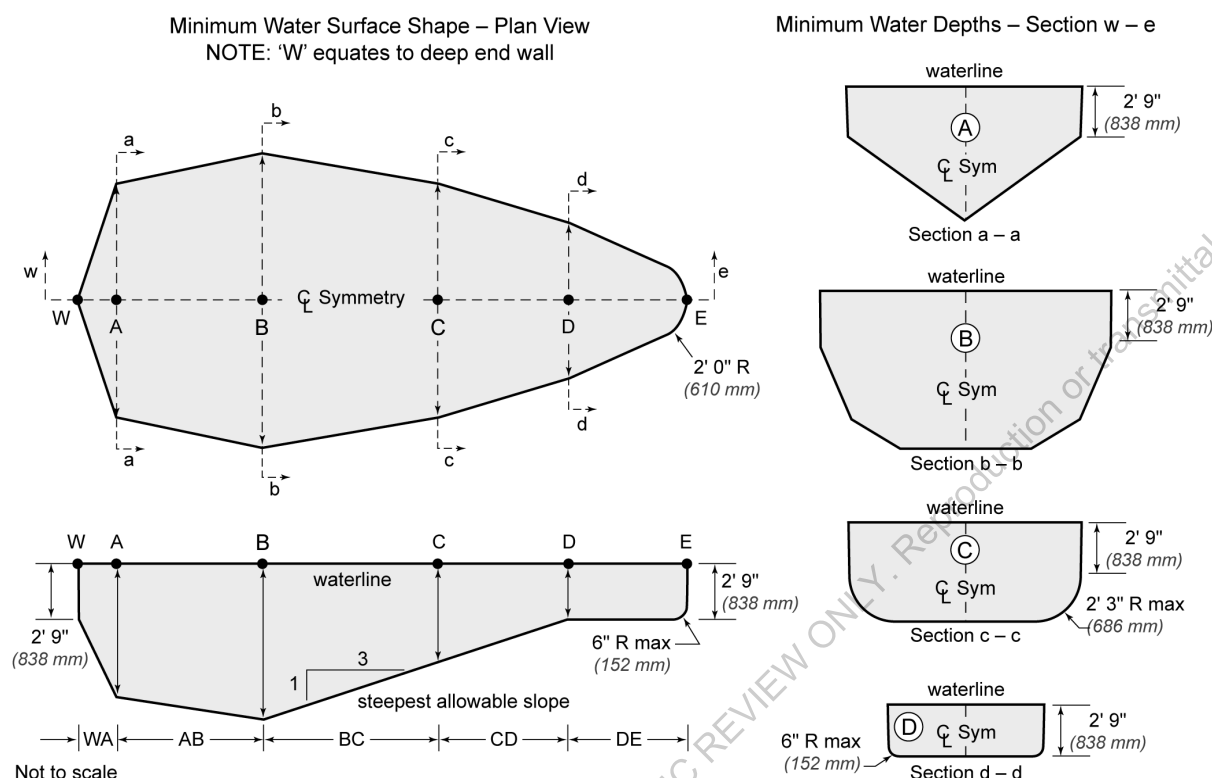
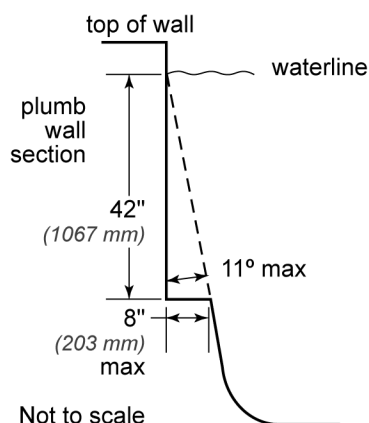
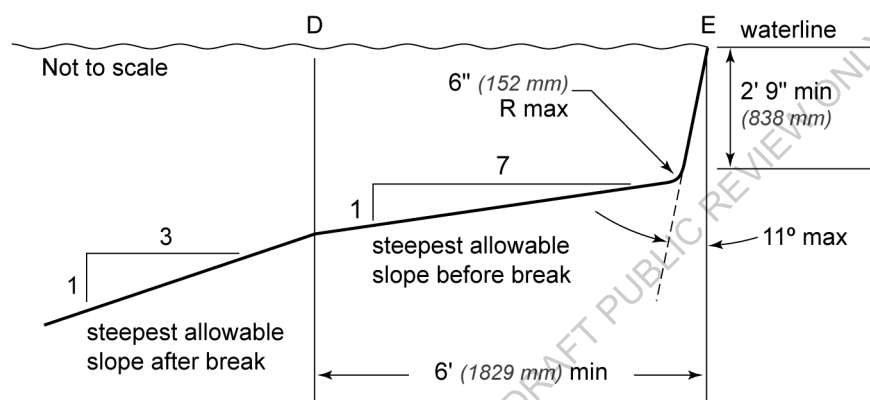


Figure 3 Minimum diving water envelope**Table 1. Minimum diving water envelope for swimming pools designated types I-V**

Pool Types	Minimum Depths at Point				Minimum Widths at Point				Minimum Lengths between Points					
	A	B	C	D	A	B	C	D	WA	AB	BC	CD	DE	WE
0	Manufactured diving equipment is prohibited													
1	6' 0" (1.82 m)	7' 6" (2.29 m)	5' 0" (1.52 m)	2' 9" (838 mm)	10' 0" (3.05 m)	12' 0" (3.66 m)	10' 0" (3.05 m)	8' 0" (2.44 m)	1' 6" (457 mm)	7' 0" (2.13 m)	7' 6" (2.29 m)	Varies	6' 0" (1.82 m)	28' 9" (8.76 m)
2	6' 0" (1.82 m)	7' 6" (2.29 m)	5' 0" (1.52 m)	2' 9" (838 mm)	12' 0" (3.66 m)	15' 0" (4.57 m)	12' 0" (3.66 m)	8' 0" (2.44 m)	1' 6" (457 mm)	7' 0" (2.13 m)	7' 6" (2.29 m)	Varies	6' 0" (1.82 m)	28' 9" (8.76 m)
3	6' 10" (2.08 m)	8' 0" (2.44 m)	5' 0" (1.52 m)	2' 9" (838 mm)	12' 0" (3.66 m)	15' 0" (4.57 m)	12' 0" (3.66 m)	8' 0" (2.44 m)	2' 0" (610 mm)	7' 6" (2.29 m)	9' 0" (2.74 m)	Varies	6' 0" (1.82 m)	31' 3" (9.53 m)
4	7' 8" (2.34 m)	8' 6" (2.59 m)	5' 0" (1.52 m)	2' 9" (838 mm)	15' 0" (4.57 m)	18' 0" (5.49 m)	15' 0" (4.57 m)	9' 0" (2.74 m)	2' 6" (762 mm)	8' 0" (2.44 m)	10' 6" (3.20 m)	Varies	6' 0" (1.82 m)	33' 9" (10.3 m)
5	8' 6" (2.59 m)	9' 0" (2.74 m)	5' 0" (1.52 m)	2' 9" (838 mm)	15' 0" (4.57 m)	18' 0" (5.49 m)	15' 0" (4.57 m)	9' 0" (2.74 m)	3' 0" (914 mm)	9' 0" (2.74 m)	12' 0" (3.66 m)	Varies	6' 0" (1.82 m)	36' 9" (11.2 m)

NOTES

1. Minimum length between points CD may vary based upon water depth at point D and the slope between points C and D.
2. Drawings are not to scale.
3. Negative construction tolerances (see section para 5.1.15.1.1.1) shall not be applied to any of the dimensions shown in the Minimum Diving Water Envelopes given in Table 1.
4. Pool types designate minimum water envelope sizes as specified by the diving board manufacturers.

Figure 4 Offset ledges**Figure 5 Shallow end Diving envelope depths****5.45.1.4 Offset Ledges**

5.4.15.1.4.1 Offset ledges shall be a maximum of 8 in. (203 mm) wide.

5.4.1.15.1.4.1.1 Offset ledges located less than 42 in. (1.07 m) below waterline shall be proportionately less than 8 in. (203 mm) wide and fall within 11° from plumb, measured from the top of the waterline (see Figure 4).

5.5.1.5 Floor slopes. Floor slopes shall be reasonably uniform and comply with paras. sections 5.5.15.1.5.1 through 5.5.35.1.5.3.

5.5.15.1.5.1 The slope of the floor from the shallow end wall towards the deep area shall not exceed a 1:7 incline to the point of the first slope change. if any (D-E) as shown in Figure 5.

5.5.25.1.5.2 Changes in slope between shallow and deep areas shall be at a minimum water depth of 2 ft 9 in. (838 mm) and be at least 6 ft (1.83 m) from the shallow end, except as specified in section para. 6.3.

~~5.5.35.1.5.3~~ The slope of the floor shall not exceed a 1:3 incline under the lengths (B–D) of the Minimum Diving Water Envelope (see Figure 53).

~~5.65.1.6~~ **Shallow end water depths.** The shallow area of the pool, 5 ft (1.52 m) or less in water depth, shall not be restricted in minimum depth. Water depth in the shallow area shall be a minimum of 2 ft 9 in. (838 mm), except for those locations specified in para. 6.3 “Shallow End Detail for Beach and Sloping Entries.”

~~5.75.1.7~~ Manufactured diving equipment for in-ground swimming pools (diving board/stand combination, manufactured platform, or field fabricated).

~~5.7.15.1.7.1~~ When manufactured or field fabricated diving equipment is installed, it shall conform to the specifications set forth in sections paras. 5.75.1.7–5.95.1.9. It shall be located in the deep area of the pool to provide the minimum dimensions as shown in section para. 5.85.1.8 and shall be installed in accordance with manufacturer’s instructions.

~~5.7.1.15.1.7.1.1~~ Manufactured or field fabricated diving equipment shall be located directly above Point A. Diving equipment shall not be installed on Type O pools (see Table 1).

~~5.7.1.25.1.7.1.2~~ Maximum elevation of a diving board above the water shall be in accordance with manufacturer’s installation instructions. Raised decking may be installed around the diving board up to level with the top of the board.

~~5.7.25.1.7.2~~ Manufactured diving equipment installation and use instructions shall be provided by the diving equipment manufacturer and shall specify the minimum water dimensions required for each diving board and diving stand combination. They shall refer to the diving envelope type of their choice by dimensionally relating their products to Point A on the diving envelopes as shown in Figure 3, Table 1, and sections paras. 5.8.15.1.8.1–5.8.35.1.8.3.

~~5.7.2.15.1.7.2.1~~ [Editors Note: This section number was omitted in current version]

~~5.7.2.25.1.7.2.2~~ Diving equipment shall be permanently labeled and affixed to the diving equipment or jump boards and include, but not be limited to the following:

- manufacturer’s diving equipment name and address.
- date of manufacture.
- minimum diving envelope.
- maximum weight limitations.

~~5.7.2.35.1.7.2.3~~ Diving equipment shall have slip-resisting tread surfaces.

~~5.85.1.8~~ Figure 3 diagrams show dimension points referred to in Table 1.

~~5.8.15.1.8.1~~ **Point A:** Point A is the point from which all other forward dimensions of width, length, and depth are then established for the Minimum Diving Water Envelope. If the tip of the diving board or diving platform overhang is located at a distance of WA or greater from the deep end wall and the water depth at that location is equal to or greater than the water depth requirement at Point A (see Table 1), then the point on the water surface directly below the center of the tip of the diving board or diving platform shall be identified as Point A.

~~5.8.1.15.1.8.1.1~~ [Editor's Note: This section number was omitted in current version.]

~~5.8.1.25.1.8.1.2~~ **Location of Point A:** The Minimum Diving Water Envelope dimensions for pools with manufactured diving equipment shall be taken from Point A as shown in Figure 3. Point A shall be defined as the point on the water surface where the water depth is required at Point A and is provided at a distance of WA as shown in Table 1 from the deep end wall. The center of the tip of the diving board, platforms, manufactured or field fabricated shall be located directly above Point A.

~~5.8.1.35.1.8.1.3~~ Point A as shown in Figure 3 and Table 1 shall be the reference point of origin for all dimensions defining the minimum diving envelope.

~~5.8.25.1.8.2~~ Type O pools (where diving is prohibited) shall not be limited in width, length, or water depth except as specifically provided for in this standard.

~~5.8.35.1.8.3~~ **Location of equipment and pool features in the Minimum Diving Water Envelope.** If the pool is designed for use with diving equipment, all steps, pool stairs, ladders, underwater benches, offset ledges, special features, and other accessory items or any parts thereof, these features shall be located outside the Minimum Diving Envelope (see Figure 6).

~~5.95.1.9~~ **Stationary diving platform(s) and diving rock(s).** Stationary diving platform(s) and diving rock(s) designed for diving and built on site field fabricated shall be allowed to be flush with the wall and located in the diving area of the pool. Point A shall be in front of the wall at the platform or diving rock centerline. Diving rocks or platforms are prohibited on Pool Type O.

~~5.105.1.10~~ Stationary diving platform(s) and diving rock(s)

~~5.10.15.1.10.1~~ Stationary diving platform(s) and diving rock(s) shall not be permitted on Pool Type O.

~~5.10.25.1.10.2~~ The maximum height of the stationary diving platform or diving rock above the waterline shall be as follows:

Pool Type I 42 in. (1.07 m)

Pool Type II 42 in. (1.07 m)

Pool Type III 50 in. (1.27 m)

Pool Type IV 60 in. (1.52 m)

Pool Type V 69 in. (1.75 m).

~~5.10.35.1.10.3~~ The diving equipment manufacturer shall specify minimum headroom above water.

Figure 6 Top view examples of accessory equipment and pool features prohibited in the minimum diving envelope

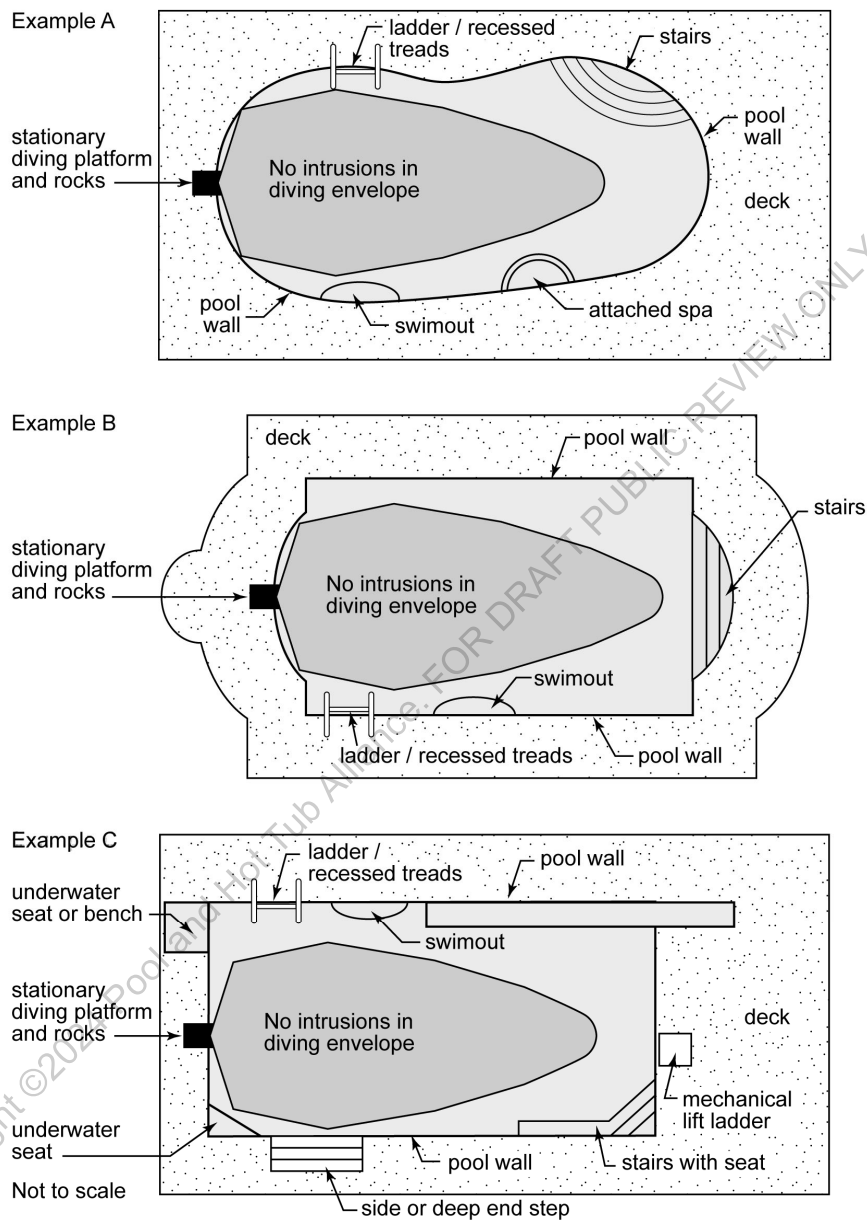
Updates to Figure 6

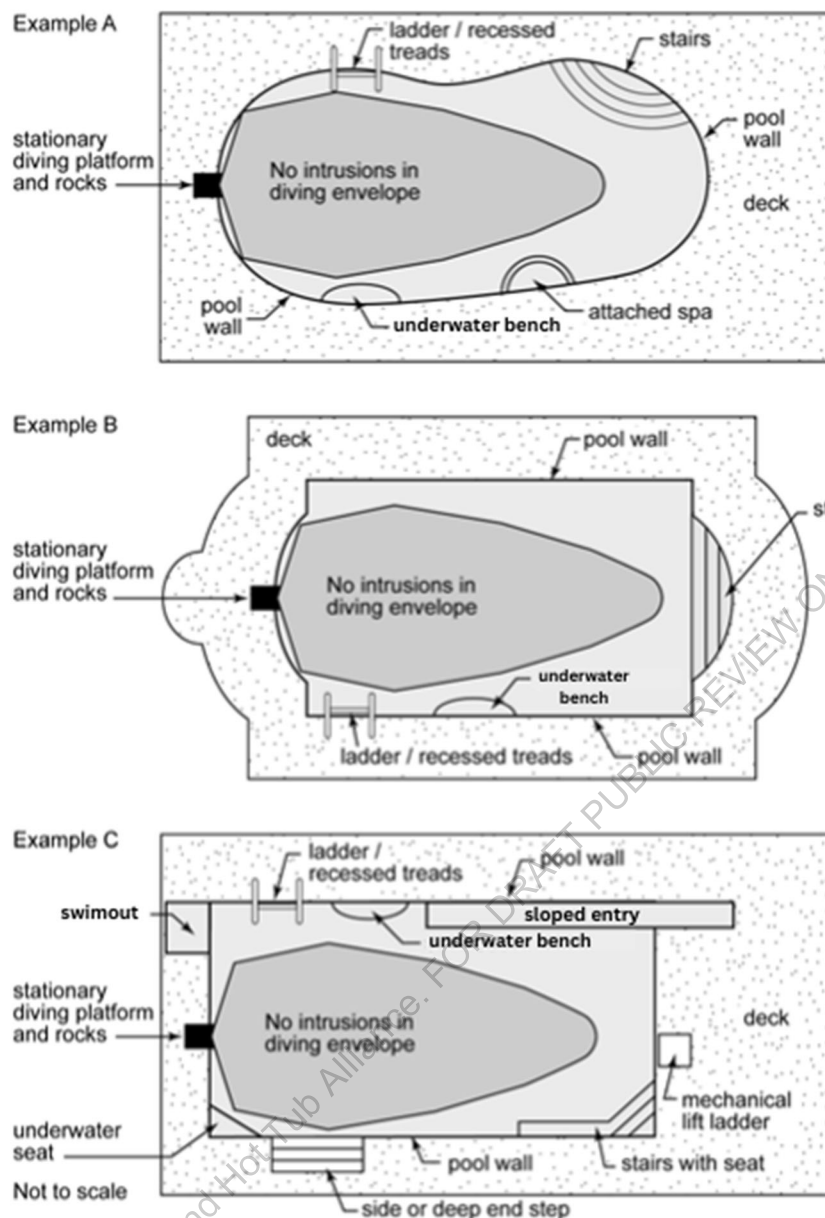
Replace the term “swimout” in Example A, B, and C with “underwater bench”.

Replace the term “underwater seat or bench” in Example C with “swimout”.

Add the term “sloped entry” in Example C.

Current Figure 6



Revised Figure 6**5.11.15.1.11 Swimming pool slides**

5.11.15.1.11.1 Slides, where installed, shall be installed in accordance with the manufacturer's specifications and comply with the U.S. Consumer Product Safety Commission (CPSC) Standard for Swimming Pool Slides as published in the Code of Federal Regulations, 16 CFR Ch. II, Part 1207.

5.11.25.1.11.2 Slides constructed on-site are not covered by this standard.

NOTE: For consumer safety information, warnings, and education programs, see Appendices F, G, H, and K.

5.2 Non-Diving (Type O) Pools dimensions and tolerances

5.2.1 Construction tolerances. There shall be construction tolerances allowed on dimensional designs. The length and width shall be limited to a tolerance of plus or minus 3 in. (± 76 mm). All other dimensions except the location of the design waterline shall be limited to a tolerance of ± 2 in. (± 51 mm), unless otherwise specified by the design engineer. The construction tolerance for the location of the design waterline shall be in accordance with the following:

- Waterline on a tiled surface: $\pm 1/4$ in. (6.35 mm).
- Waterline on surfaces other than a tiled surface: $\pm 1/2$ in. (12.7 mm).

5.2.2 Perimeter shape: No limits are specified for shapes of pools. Consideration shall be given to circulation and safety to the user.

5.2.3 Wall requirements: Walls in the pool shall not slope greater than 11° (5:1 slope ratio) to a transition point of the floor (see Figure 1).

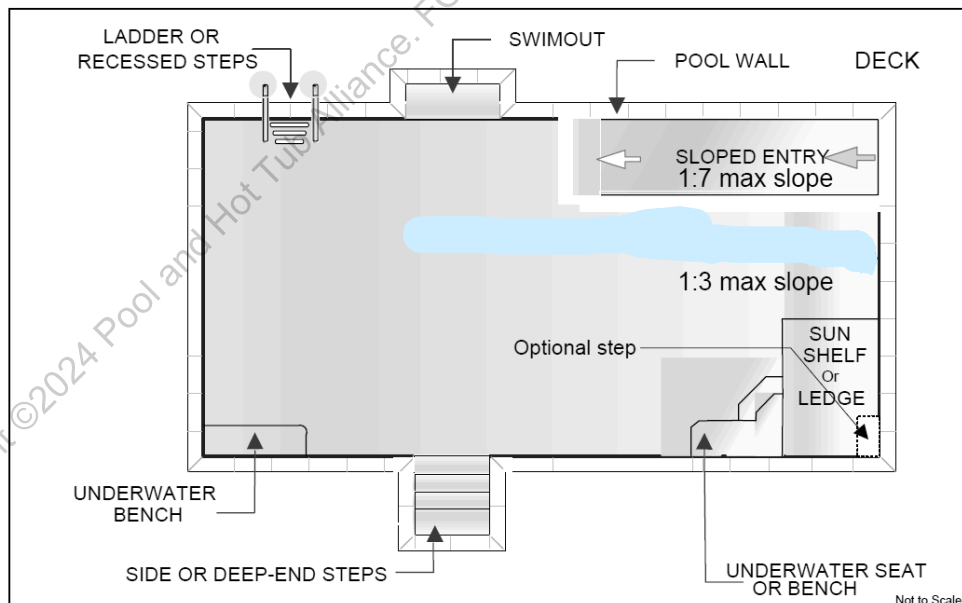
5.2.4 Offset ledges: Offset ledges shall be a maximum of 8 in. (203 mm) wide. Offset ledges located less than 42 in. (1.07 m) below waterline shall be proportionately less than 8 in. (203 mm) wide and fall within 11° from plumb, measured from the top of the waterline.

5.2.5 Floor slopes: Floor slopes shall be reasonably uniform. The slope of the floor non-entry and exit shall not exceed a 1:3 incline. Entry and exit slope shall conform to section 6.3 "Shallow end detail for beach and sloping entries".

5.2.6 Shallow end water depths: The shallow area of the pool, 5 ft (1.52 m) or less in water depth, shall not be restricted in minimum depth.

Figure 10

Non Diving pool Type O



6 Entry/Exit

6.1 Entry/exit. All pools shall have a means of entry/exit in the shallow area(s) if water depth exceeds 24 in. (61.0 cm) at the shallowest point. The means of entry/exit shall be located on the shallow side of any first slope change. If a vanishing edge catch basin has a water depth, in excess of 24 in. when the edge system is off, a means of egress shall be provided.

6.1.1 A secondary means of entry/exit shall be provided in the deep area of the pool if the water depth exceeds 5 ft (152.4 cm).

EXCEPTION: In pools where a deep end egress may present a potential hazard, handholds may be substituted for a means of egress.

6.1.2 Entries/exits shall consist of one (1), or a combination of, the following: steps, stairs, ladders, treads, ramps, beach entries, underwater seats, benches, swimouts, sun shelves, mechanical lifts, and other designs or products that provide the minimum utility as specified in this standard.

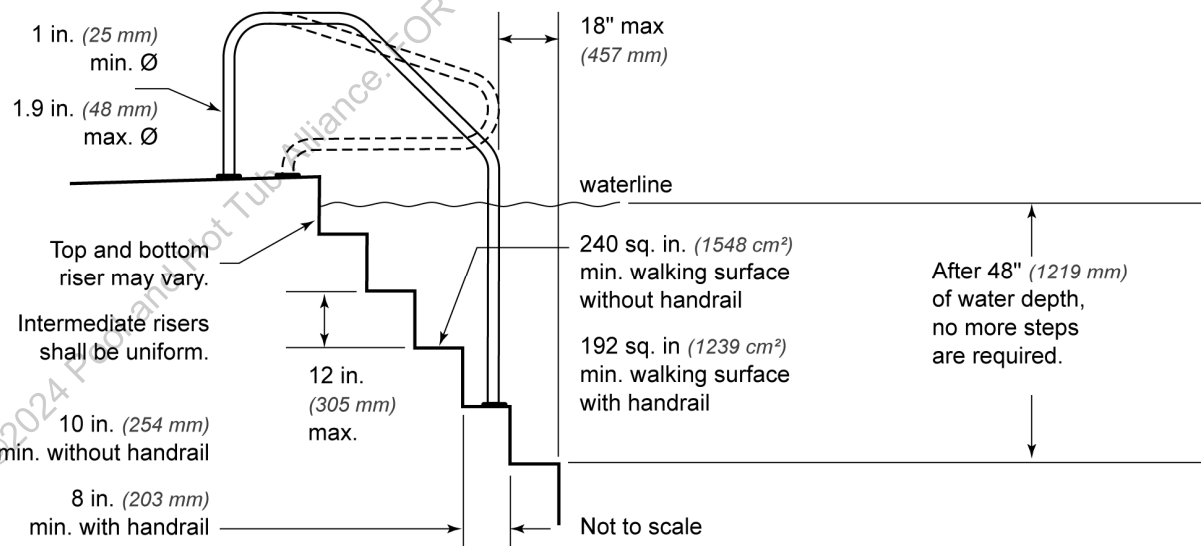
6.1.3 Pools over 30 ft (914 cm) wide at the deep end shall provide entries/exits on both sides of the deep area of the pool.

6.1.4 Entries, exits, pool stairs, ladders, underwater benches, special features, and other accessories shall be located outside the minimum diving envelope when the pool is designed for diving (see Figure 6).

6.1.5 All treads shall have slip resisting surfaces.

6.2 Pool stairs. The design and construction of stairs into the shallow end and recessed pool stairs shall conform to sections paras. 6.2 through 6.3 (see Figure 7).

Figure 7 Pool stairs – side view



- 6.2.1** Treads shall have a minimum unobstructed horizontal depth of 10 in. (254 mm) measured from inner edge of coping, and a minimum unobstructed walking surface of 240 square in. (1548 cm²).
- 6.2.1.1** When stairs are equipped with a handrail, treads shall have a minimum unobstructed horizontal depth of 8 in. (203 mm), and a minimum unobstructed walking surface of 192 square in. (1239 cm²).
- 6.2.1.1.1** On shallow end stairs, the bottom riser height is allowed to vary to the floor. The bottom riser shall not exceed 12 in. (305 mm) to the floor for the width of the walking surface.
- 6.2.2** All risers shall have a maximum uniform height of 12 in. (305 mm) with a tolerance of +/- 1/2 in. (71 mm), except the top riser, which may vary but shall not exceed 12 in. (305 mm).
- 6.2.2.1** The vertical distance from the pool coping, deck, or step surface to the uppermost tread shall be a maximum of 12 in. (305 mm).
- 6.2.2.2** Steps are required in the first 48 in. (1219 mm) of water depth. In water depths exceeding 48 in. (1219 mm), no additional steps are required.
- 6.2.2.3** If the bottom riser does not have a single point that is 12 in. (305 mm) or less to the floor, another riser shall be added. The last riser shall exceed 12 in. (305 mm) if the water depth is over 48 in. (1.22 m) at that point.
- 6.3 Shallow end detail for beach and sloping entries**
- 6.3.1** Sloping entries used as a pool entrance shall not exceed a 1:7 incline (14-percent slope) and be uniform. The top of the slope of the entry floor shall be at a uniform elevation. (see Figure 6 C).
- 6.3.2** Sloping entries are permitted to be used in conjunction with steps and benches.
- 6.3.2.1** When benches are used in conjunction with sloping entries, the vertical riser distance shall not exceed 12 in. (30.5 cm). For steps used in conjunction with sloping entries, all requirements of section para. 6.2 shall apply.
- 6.3.3** Architectural features such as sheet-falls or spillways not used for entry are not required to comply with the 1:7 incline.
- 6.3.4** Beach and sloping entry surfaces shall be of slip resisting materials.
- 6.4 Handrails.** If handrails are used, they shall conform to sections paras. 6.4.1 through 6.4.4.
- 6.4.1** Handrails shall be of corrosion resisting materials.
- 6.4.2** Handrails shall be installed so they cannot be removed without the use of tools.
- 6.4.3** The leading edge of handrails/handholds facilitating stairs and pool entry/exit shall not exceed 18 in. (457 mm) back from the vertical face of the bottom riser (see Figure 7).
- 6.4.4** The outside diameter of handrails shall be a minimum of 1 in. (254 mm) and not exceed 1.9 in. (48 mm) (see Figure 7).
- 6.5 Pool ladder design and construction.** Design and construction of ladders shall conform to sections paras. 6.5.1 through 6.5.7.
- 6.5.1** All steps and ladders shall be located outside the Minimum Diving Envelope (see Figure 7).
- 6.5.2** All ladder and staircase treads shall have slip resisting surfaces.
- 6.5.3** Ladders shall provide two (2) handholds or two (2) handrails.

- 6.5.4** There shall be a minimum clearance of 3 in. (76 mm) and a maximum of ~~6~~ 4 in. (~~152~~102 mm) between the pool wall and the ladder.
- 6.5.5** The clear distance between ladder handrails shall be a minimum of 17 in. (432 mm) and a maximum of 24 in. (610 mm).
- 6.5.6** There shall be a uniform vertical distance between ladder treads, with a 7 in. (178 mm) minimum and a 12 in. (305 mm) maximum.
- 6.5.7** Ladder treads shall have a minimum horizontal uniform depth of 2 in. (51 mm).
- 6.6 Recessed treads.** The design and construction of recessed treads in the pool wall shall conform to ~~sections paras.~~ 6.6.1 through 6.6.6.
- 6.6.1** All recessed treads shall have slip resisting surfaces.
- 6.6.2** Recessed treads at the centerline shall have a minimum uniform vertical spacing of 7 in. (178 mm) and a maximum of 12 in. (305 mm).
- 6.6.3** The vertical distance between the pool coping edge, deck, or step surface and the uppermost recessed tread shall be a maximum of 12 in. (305 mm).
- 6.6.4** Recessed treads shall have a minimum depth of 5 in. (127 mm) and a minimum width of 12 in. (305 mm).
- 6.6.5** Recessed treads shall drain into the pool.
- 6.6.6** Recessed treads shall be provided with a handrail, grabrail, or handhold on each side of the treads.
- 6.7 Underwater seats, benches, and swimouts.** The design and construction of underwater seats, benches, and swimouts shall conform to ~~sections paras.~~ 6.7.1 through 6.7.3 (see Figure 6).
- 6.7.1** Underwater seats, benches, and swimouts, when provided, shall be a maximum of 20 in. (508 mm) below the waterline.
- 6.7.2** Underwater seats, benches, and swimouts shall be permitted in the deep area of the pool. They shall be located outside of the required Minimum Diving Envelope if the pool is designed for use with diving equipment (see Figure 6).
- 6.7.3** Underwater seats, benches, or swimouts are permitted to be part of the stairs, recessed treads, beach entries, ramps, or other special features.
- 6.8 Underwater shelves**
- 6.8.1** Underwater shelves may be placed in any area of the pool but shall be outside of the diving envelope of diving pools.
- 6.8.2** They may be of any size, shape, or design.
- 6.8.3** They shall have no minimum depth, and a maximum depth of 4 ft (1219 mm).
- 6.8.4** Walls connecting shelves to floor must meet the requirements of ~~section para.~~ 5-35.1.3.
- 6.8.5** Examples of underwater shelves include, but are not limited to: bridges, tanning shelves, grottoes, seats, benches, in-pool tables, bar stools, etc.

7 Decks

- 7.1 General requirements.** There is no requirement to provide decking around residential inground swimming pools.
- 7.1.1** Deck(s), when provided, shall be designed and installed in accordance with local construction practices and applicable building codes for the decking type and the site condition.

- 7.1.2** All deck surfaces, when provided, shall be of slip resisting materials, including, but not limited to, special deck features such as markers and brand insignias.
- 7.1.3** Deck(s), when provided, shall be installed to protect the coping tile and its mortar bed from damage as a result of deck movement.
- 7.1.4** Deck(s), when provided, shall be edged, radiused, or otherwise relieved to eliminate sharp corners.

7.2 Drainage

- 7.2.1** Deck(s) shall be sloped to effectively drain away from the pool or towards the deck drains. When site conditions require, deck drains are allowed to be placed at the back side of the pool structure or coping.

EXCEPTION: Wet deck areas.

- 7.2.2** Level areas for diving equipment installations are permitted.

- 7.2.2.1** A minimum slope for decking of 1/8 inch per linear foot (1:96) shall be provided, except for wood decking.

- 7.2.3** Site drainage shall direct all perimeter deck drainage, general site, and roof drainage away from the pool area.

EXCEPTION: First 4 ft. (1.22 m) of decking immediately surrounding perimeter flow pools.

- 7.2.4** Backwash water that depends on surface drainage for removal must be diverted away from the adjacent deck area.

7.3 Concrete decks

- 7.3.1** Work for the concrete deck(s) shall be performed in accordance with the local construction practices and the recommendations of the latest published edition of the American Concrete Institute (ACI) standard 302.1R-04, Guide for Concrete Floor and Slab Construction.

- 7.3.2** Typical slopes for the immediate pool decking (the area from the water's edge to the point of first drainage) are:

1. 1/8 inch per 1 foot (1:96) shall be provided for textured, hand finished concrete decks;
2. 1/4 inch per 1 foot (1:48) for exposed aggregate concrete decks;
3. 1/2 inch per foot (1:24) for indoor/outdoor carpeted concrete decks, unless an alternative drainage method is provided.

- 7.3.3** Expansion or control joints shall be provided to help control cracks due to expansion, contraction, and movement of the slab.

7.4 Wooden decks

See Appendix I for suggested wooden deck materials.

- 7.4.1** There is no minimum slope requirement for wooden decks. The maximum slope for wooden decks shall be 1/4 inch per foot (1:48).

- 7.4.2** Expansion gaps shall be required between deck boards and shall be consistent with good construction practices with respect to the type of wood used.

7.5 Stone, brick, brick pavers, concrete pavers, and tile decks

- 7.5.1** Installation of these types of decks shall follow local accepted construction practices. Drainage slope requirements shall be in accordance with the drainage requirements of sections paras 7.2 through 7.2.4.

7.6 Deck steps

7.6.1 Step risers for the deck shall be uniform and have a minimum height of 3 ¾ in. (95 mm) and a maximum height of 7½ in. (191 mm). The minimum tread depth shall be 10 in. (254 mm).

8 Materials for Construction and Finishes

8.1 Surfaces. The surfaces within the pool intended to provide footing for bathers shall have a slip resisting surface. The roughness or irregularity of such surfaces shall not cause injury or be an abrasion hazard during normal use.

8.1.1 The interior surfaces of the pool shall be watertight.

~~NOTE: Specific information regarding recommended application procedures for pool/spa interior finishes on shotcrete/concrete and/or gunite pools can be found in the latest published edition of the Technical Manual by the National Plasterers Council (NPC), 2811 Tamiami Trail, Suite P, Port Charlotte, FL 33952, 941-766-0634.~~

8.2 **Finishes (paint).** All paints and finishes shall be in compliance with the ~~latest published edition of U.S. Code of Federal Regulations (CFR) 1303.4 et Seq. (2011).~~

8.3 **Cementitious Finish.** The cementitious surface shall be in compliance with APSP-12.

9 Circulation System Components and Related Equipment

9.1 **Compliance.** Circulation systems, components, and equipment shall comply with ~~the latest published editions of ANSI/NSF 50 Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities, and the ANSI/ most current published edition of APSP/PHTA-7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.~~

9.1.1 **Location.** ~~When used, a circulation system consisting of pumps, piping, return inlets, outlets, filters, and other necessary equipment shall be provided for the circulation of water throughout the pool and~~ Equipment shall be located so as to prevent their it from being used as a means of access to the pool by young children.

9.1.2 **Temperature.** In climates subject to freezing temperature, the appurtenances, piping, filter system, pump and motor, and other components shall be designed and constructed to protect them from damage due to freezing.

9.1.3 **Turnover and water clarity.** Depending on the size (volume) of the pool, the pool filtration flow rate shall not be greater than the rate needed to turn over the pool water volume in six hours using the equation below or 36 gpm, whichever is greater. Maximum Filtration Flow Rate (gpm, Lpm = pool volume (gallons, liters) / 360. NOTE: These are maximum flow rates. Lower filtration flow rates and longer filtration times are encouraged and will result in added energy savings. ~~The equipment shall be sized to provide a turnover of the pool water at least once every twelve (12) hours. The system shall be designed to give the proper turnover rate based on the manufacturer's specified maximum flow rate of the filter, in clean media condition of the filter. Water clarity shall be maintained.~~

(Clarity is a function of proper filtration and maintenance of proper chemical operational parameters.; for recommendations, see Appendix A.) When standing at the pool's edge at the deep end, the deepest portion of the pool floor shall be visible.

9.1.4 Installation and access accessibility. Circulation system components which require replacement or servicing shall be provided with access accessible for inspection, repair, or replacement, and shall be installed according to the manufacturer's instructions. Circulation equipment shall be properly installed to prevent damage from settlement and to minimize the potential for the accumulation of debris and moisture.

9.1.5 Pressure test. Circulation system piping, other than that integrally included in the manufacture of the pool, shall be subject to an induced static hydraulic pressure test (sealed system) at 15 25 pounds per square inch (15 25 psi, 103.4 172.3 kPa) for 30 15 minutes. The test shall be performed before the deck work is started; the pressure maintained until the deck is poured or installed. Tests on piping systems constructed of plastic piping shall not use compressed air for the test.

9.2 Water velocity. The water velocity in the pool piping shall not exceed 8 ft (2438 mm) per second for both suction and pressure piping, and shall comply with the latest published edition of ANSI/APSP 7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins and the latest published edition of A112.19.8 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs. PHTA-7 and APSP-16 or its recognized successor standard.

9.2.1 Flow rates through submerged grates shall comply with the latest published editions of ANSI/APSP 7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins, and the latest published edition of A112.19.8 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs. PHTA-7 and APSP-16 or its recognized successor standard.

9.3 Piping and fittings. The circulation system piping and fittings shall be considered process piping, made of material compatible with the user use and able to withstand operating pressures of 1.5 times the design working pressure.

9.3.1 Plastic pipe and fittings used in circulation systems shall be nontoxic and shall be able to withstand the design operating pressures and conditions of the pool or spa. Plastic pipe shall be listed and labeled as complying with NSF 14. Circulation system piping shall be listed and labeled as complying with one of the standards in Table 2, CIRCULATION SYSTEM PIPE MATERIAL STANDARD.

TABLE 2
CIRCULATION SYSTEM PIPE MATERIAL STANDARD

MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D2846; CSA B137.6
Copper or copper-alloy tubing	ASTM B88; ASTM B447

Polyvinyl chloride (PVC) hose	ASTM D1785; ASTM D2241; ASTM D2672; CSA B137.3
Polyvinyl chloride (PVC) plastic pipe	ASTM D1785; CSA B137.3
Stainless steel pipe, Types 304, 304L, 316, 316L	ASTM A312

9.3.2 Fittings.

Fittings used in circulation systems shall be *listed* and *labeled* as complying with one of the standards in Table 3 CIRCULATION SYSTEM FITTINGS

EXCEPTIONS:

- Suction outlet fitting assemblies and manufacturer-provided components certified in accordance with APSP 16.
- Skimmers and manufacturer-provided components.
- Gutter overflow grates and fittings installed above or outside of the overflow point of the pool or spa.

TABLE 3
CIRCULATION SYSTEM FITTINGS

<u>MATERIAL</u>	<u>STANDARD</u>
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6
Copper or copper-alloy tubing	ASME B16.15
Polyvinyl chloride (PVC) plastic pipe	ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3
Stainless steel pipe, Types 304, 304L, 316, 316L	ASTM A182; ASTM A403

9.3.19.3.3 The suction piping shall not collapse when there is a complete shutoff of flow on the suction side of the pump.

9.3.29.3.4 Equipment shall be designed and fabricated to drain the pool water from the equipment and exposed face piping, by the removal of the drain plugs and manipulating valves, or by other methods.

Refer to manufacturer's instructions for specific information on draining the system.

9.3.39.3.5 Valves installed in or under any deck(s) shall be provided with an adequately sized access cover and valve pit to facilitate operation and servicing.

9.4 Filters

9.4.1 Filters. Swimming pool filters shall be tested and listed by a nationally recognized testing laboratory and shall comply with latest published edition of ANSI/NSF 50 Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities.

9.4.2 Filters installed in swimming pools shall be capable of providing water clarity as noted in section para- 9.1.3.

9.4.3 All filter elements, media, and other components that require servicing shall provide access ~~be accessible~~ for inspection, removal, and repair, and be installed in accordance with the filter manufacturer's instructions.

9.5 Prevention of accumulated air pressure. Pressure type filters shall provide an automatic internal or a manual external means to prevent accumulated air pressure inside the tank. Filter tanks composed of upper and lower tank lids that are held in place by a perimeter clamp shall provide a slow and safe release of air pressure before the clamp disengages the lids.

9.5.1 Any separation tank used in conjunction with any filter tank shall have, as a part of its design, an air release, lid, or manual means which provides a slow and safe release of pressure as it is opened.

~~**9.6 Piping.** Piping furnished with the filter shall be made of suitable material capable of withstanding 1.5 times the rated maximum working pressure of the pump.~~

~~**9.7 Filter components.** Filter components that require servicing shall be accessible for inspection and repair in accordance with manufacturer's instructions.~~

~~**9.8.6 Pressure or vacuum gauge.** A pressure or vacuum gauge or other means of indicating system conditions shall be provided in the circulation system in an easily readable location.~~

~~**9.9.7 Time clock/related devices.** Time clocks and/or other devices are permitted to be used to set the operating period of the circulation system and its components. The circulation system shall be capable of supporting water clarity and water chemistry requirements. (see Appendix A)~~

~~**9.9.19.7.1** When appurtenant devices such as chemical/disinfectant feeders, heaters, and other devices that depend on circulation pump flow are used, they shall be permanently interlocked into the timing system to prevent operation when the circulation pump is off-wired into the time clock (when applicable), see manufacturer's specifications.~~

9.10.8 Pumps

~~**9.10.19.8.1** Swimming pool pumps shall be tested and listed by a nationally recognized testing laboratory and shall comply with the latest published edition of ANSI/NSF 50 Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs.~~

~~Pumps rated five (5) horsepower or less shall comply with the latest published edition of ANSI/UL 1081 Standard for Swimming Pool Pumps, Filters, and Chlorinators.~~

~~**9.10.29.8.2** A pump and motor shall be provided for the circulation of the pool water for the conditions of flow as required by PHTA-7 and PHTA-15. Performance of all pumps shall meet or exceed the conditions of flow required for filtering and cleaning (if applicable) the filters against the total dynamic head developed by the complete system.~~

~~9.10.39.8.3~~ **9.8.3** Pressure filter systems with a cleanable strainer or screen shall be provided between the pool and circulation pump(s) to remove solids, debris, hair, and lint. A cleanable strainer, skimmer basket, or screen shall be provided for pools and spas, upstream or as an integral part of circulation pumps, to remove solids, debris, hair, and lint on pressure filter systems.

~~9.10.49.8.4~~ **9.8.4** Access to the pump(s) and motor(s) shall be provided for inspection and service.

~~9.10.59.8.5~~ **9.8.5** Pump(s) and component parts shall be installed to provide access so as not to be hazardous to the operator or maintenance personnel.

~~9.10.69.8.6~~ **9.8.6** Where a mechanical pump seal is provided, components of the seal shall be corrosion resisting and capable of operating under conditions normally encountered in pool operation.

~~9.10.79.8.7~~ **9.8.7** All motors shall have an open drip-proof enclosure (ODP) or a Totally Enclosed Fan Cooled (TEFC) rating as defined by the latest published edition of ANSI/NEMA MG 1-2009, Motors and generators or comply with the latest published edition and be constructed electrically and mechanically to perform satisfactorily and safely under the conditions of load and environment normally encountered in swimming pool installations.

~~9.10.89.8.8~~ **9.8.8** Motor(s) shall be capable of operating the pump under full load with a voltage variation of $\pm 10\%$ from the nameplate rating. If the maximum service factor of the motor is exceeded (at full voltage), the manufacturer shall indicate this on the pump curve.

~~9.10.99.8.9~~ **9.8.9** All motors shall have thermal or current overload protection.

~~9.10.109.8.10~~ **9.8.10** When the pump is below the waterline, valves shall be permanently connected in the suction and discharge lines.

~~9.119.9~~ **9.9** Surface skimmer systems

~~9.11.19.9.1~~ **9.9.1** A surface skimming system or a perimeter an edge overflow system shall be provided, designed, and constructed to skim the pool surface.

~~9.11.1.19.9.1.1~~ **9.9.1.1** Surface skimming devices shall be tested by a national recognized testing laboratory and comply with the latest published edition of ANSI/NSF 50 Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities.

~~9.11.29.9.2~~ **9.9.2** Skimming devices shall be designed and installed so as not to constitute a hazard to the user.

~~9.11.39.9.3~~ **9.9.3** Where automatic surface skimmers are used as the sole overflow system, at least one (1) surface skimmer shall be provided for each 800 square ft (74 m²) or fraction thereof of the water surface area. When skimmers are used, they shall be located to optimize skimming action over the surface of the pool.

~~9.129.10~~ **10** Inlets and outlets

~~9.12.19.10.1~~ **10.1** **Entrapment avoidance.** The submerged suction piping and fittings shall comply with the latest published edition of ANSI/APSP PHTA-7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.

~~9.12.29.10.2~~ **10.2** **Testing and certification.** Submerged outlet(s) (other than skimmers), when used, shall be sized and installed in accordance with the latest published editions of ANSI/APSP-7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins, and the

~~latest published edition of A112.19.8 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs, PHTA-7 and APSP-16 or its recognized successor standard.~~

~~**9.12.3 Water velocity.** Water velocity through submerged grates shall comply with the latest published editions of ANSI/APSP-7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins, and the latest published edition of A112.19.8 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs, or its recognized successor standard.~~

~~**9.12.49.10.3 Performance.** Inlets and outlet(s) shall be provided and arranged to produce a uniform circulation of water and maintain the distribution of sanitizer residual throughout the pool.~~

~~**9.12.59.10.4 Number of inlets.** The number of return inlets shall be based on a minimum of one (1) return inlet per 300 square ft (27.9 m²) of pool water surface area or fraction thereof. Return inlet fittings shall be of sufficient size or quantity to allow for a full turnover rate of the circulation system in accordance with the manufacturer's specifications for return inlets.~~

~~**9.12.69.10.5** Inlets and outlets from the circulation system shall be designed so as not to constitute a hazard to the user.~~

~~**9.12.79.10.6 IMPORTANT SAFETY CONSIDERATION:** To avoid serious injury or death, close the pool or spa to bathers if any outlet cover/grate is missing, broken, or inoperative. There is no backup for a missing or damaged outlet cover/grates for all five (5) entrapment hazards:~~

- hair entrapment
- limb entrapment
- body entrapment
- mechanical entrapment
- evisceration (See Appendix K.)

~~**9.12.89.10.7** When provided, vacuum cleaner fitting(s) shall be located in an accessible position(s) at least 6 in. (152 mm) and no greater than 18 in. (457 mm) below the waterline or as an attachment to the skimmer(s). They shall be installed in accordance with the latest published edition of PHTA-7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.~~

~~**9.139.11 Heaters**~~

~~**9.13.19.11.1 IMPORTANT SAFETY CONSIDERATION:** Fossil fuel swimming pool heaters produce poisonous carbon monoxide gas as a by-product of combustion. Proper venting of exhaust gases and correct sizing of gas meters, gas supply piping, make-up air intakes, etc. is critical in preventing potential carbon monoxide gas poisoning or loss of life.~~

~~**9.13.29.11.2** This Section pertains to appliances using either fossil fuels such as natural gas, propane (LPG), #2 fuel oil, or electric heating equipment for heating pool water.~~

~~**9.13.39.11.3** Heaters shall be tested and shall comply with the requirements of the latest published editions of ANSI Z21.56 Gas fired pool heater, and UL 1261 Electrical Water Heaters for Pool and Tubs. Heat pumps shall comply with the~~

~~latest published edition of ANSI/UL 559 Heat Pumps AHRI 1160 and one of the following: CSA C22.2 No. 236, UL 1995, or UL/CSA 60335-2-40.~~

~~9.13.49.11.4~~ Owner/operator shall routinely check the water to ensure that the temperature does not exceed 104 °F (40 °C). If adjustments are necessary, they shall be performed in accordance with the manufacturer's instructions or by a qualified technician.

~~9.13.59.11.5~~ **Sizing.** For efficient and economical operation, it is important that the heater be properly sized. To determine the proper size, first find the surface area of the swimming pool in square ft (m²). Then select a heater that is properly sized for that surface area from the manufacturer's charts.

~~9.13.69.11.6~~ **Installation.** The heater(s) shall be installed in accordance with all federal, state, and local codes, as well as the manufacturer's recommendations.

~~9.13.79.11.7~~ **Support.** Heaters shall be installed on a surface of sufficient structural strength to support the heater when it is full of water and operating. The heater shall be level after plumbing, gas, and/or electrical connections are completed.

~~9.13.89.11.8~~ **Combustible surfaces.** If the heater requires a non-combustible surface as required by the manufacturer, it shall be placed on concrete or other accepted surface and shall comply with ~~the latest published edition of ANSI Z21.56, or~~ federal, state, and local codes.

~~9.13.99.11.9~~ **Clearances.** When installing a heater, adequate clearances shall be maintained on all sides and over the top of the unit. Clearances shall be in accordance with federal, state, or local codes, and the manufacturer's instructions.

~~9.13.109.11.10~~ **Ventilation**

~~9.13.10.19.11.10.1~~ Indoor pool area shall have its own dedicated ventilation equipment.

~~9.13.10.29.11.10.2~~ All pools and their related components that are installed in an indoor environment shall comply with ~~the latest published edition of the~~ ventilation requirements of ANSI/ASHRAE 62.1—~~Ventilation for acceptable indoor air quality, table 6-1, "Minimum Ventilation Rates in Breathing Zone,"~~ (Sports and Entertainment section), and federal, state, or local codes.

~~9.13.119.11.11~~ **Combustion air.** When installing a fossil fuel heater indoors, openings to the room are a necessity. The heater shall be installed in accordance with federal, state, or local codes and the manufacturer's specifications.

IMPORTANT SAFETY CONSIDERATION: Some manufacturers recommend that the heater be turned off prior to stopping the water flow. Mechanisms such as a fireman's switch adapted to the time clock will turn the heater off long enough for it to cool down before the time clock turns off the pump.

NOTE: The fireman's switch does not protect against a manual override or a system shut down by a power failure.

IMPORTANT SAFETY CONSIDERATION: Heaters shall be so located as to prevent their being used as a means of access to the pool by young children.

9.14.12 Heating energy source

9.14.12.1 Natural gas energy supply. The heater gas supply piping shall comply with the manufacturer's specifications and the latest published edition of ANSI/NFPA 54.

IMPORTANT SAFETY CONSIDERATION: A gas cock shall be installed, properly sized, and readily accessible outside the jacket to stop the flow of natural gas to the heater for service or emergency shutdown.

9.14.12.2 Propane energy supply. Whenever a propane (LPG) appliance is installed, special attention shall be given to ensure that the storage tank, supply piping, and regulator shall be adequately sized to ensure operating fuel pressures as specified by the appliance manufacturer. Consult the fuel supply company and ensure that the system is installed in accordance with the latest published edition of NFPA-58 Liquefied Petroleum Gas Code.

IMPORTANT SAFETY CONSIDERATION: Propane gas is heavier than air and can create an extreme hazard of explosion or suffocation if the heater is installed in a pit or enclosed area not in accordance with the latest published edition of NFPA 58 for installing valves and other controls in pits and similar areas.

IMPORTANT SAFETY CONSIDERATION: A gas cock shall be installed, properly sized, and readily accessible outside the jacket, to stop the flow of propane (LPG) at the heater for service or emergency shutdown.

9.14.12.3 Electrical energy supply. Electric heating appliances shall be installed in accordance with the latest published edition of the National Electrical Code NFPA 70® (NEC®), the authority having jurisdiction, and any federal, state, or local codes. In areas where no authority has jurisdiction, the latest published NEC® and any federal, state, or local codes shall apply.

IMPORTANT SAFETY CONSIDERATION: Grounding and Bonding. The requirements for grounding and bonding are particularly important and shall be adhered to. Water flow through the heater and any plumbing installations shall be done in compliance with the manufacturer's specifications and local codes.

10 Water Supply

10.1 Treatment. The water supply shall be of a quality allowing adjustment to meet the water quality standards in Appendix A.

10.2 Backflow. No direct mechanical connection shall be made between the potable water supply and the pool or its appurtenances, unless it is protected against back pressure and back siphoning in a manner approved by the state, local authority, or through an air gap meeting the latest published edition of ANSI/ASME Standard A112.1.2 Air Gaps in Plumbing Systems or other equivalent means approved by the state or local authority.

10.3 Fill spout. A fill spout, if used, shall be located under a diving board, adjacent to a ladder, or otherwise properly shielded so as not to create a hazard.

10.4 Hose use. If a hose is used to fill the pool, the end of the hose shall not be permitted to hang inside the pool basin unless the hose bibb is protected with a backflow prevention device approved by the appropriate state or local authority.

10.5 Water conservation methods and technologies. Water conservation methods and technology shall be in compliance with APSP-13.

11 Wastewater Disposal

11.1 Backwash water. Backwash water is permitted to be discharged into a sanitary sewer through an approved air gap, or into an approved subsurface disposal system, or by other means approved by state or local authority having jurisdiction. When a diatomaceous earth (DE) filter is used, a separation tank is required prior to discharge into a sanitary sewer.

12 EPA-registered Sanitizers and Systems

12.1 Equipment standards. Sanitizing equipment, when installed in residential pools, shall be capable of introducing the quantity of sanitizer necessary to maintain the appropriate levels under all conditions of intended use.

12.2 Chemical feeders.

Where installed, chemical feed systems shall be installed in accordance with the manufacturer's specifications. Chemical feed pumps shall be wired so that they cannot operate unless there is adequate return flow to disperse the chemical throughout the pool or spa as designed.

12.1 Residual. ~~A residual of an EPA-registered sanitizer shall be present at all times and in all areas of the pool. One of the following EPA-registered sanitizer systems shall be used:~~

- ~~• Chlorine~~
- ~~• Bromine~~
- ~~• PHMB, poly(hexamethylene biguanide); or~~
- ~~• Metal-based systems. Not all of these sanitizer systems are approved for all pool uses. Please refer to the EPA label as well as applicable codes and regulations.~~

Chlorine generators are permitted and when used shall have the requirements of an EPA establishment number and meet the requirements in Section 14 (Chemical Feeders), Section 15.1 (Electrical Components) and either para. 12.1.1 or 12.1.2.

12.1.1 Free available chlorine (FAC). A minimum free available chlorine residual of 1.0 ppm shall be maintained at all times and in all areas of the pool. A maximum of 4.0 ppm shall not be exceeded when bathers are present.

NOTE: The U.S. EPA has established a maximum chlorine level of 4.0 ppm for re-entry of swimmers or bathers into pool water.

12.1.2 Bromine (Br). A minimum bromine residual of 1.0 ppm (as Br₂) shall be maintained at all times and in all areas of the pool. A maximum of 8.0 ppm (as Br₂) shall not be exceeded when bathers are present.

Operators shall refer to manufacturer's product label for specific use concentrations since allowable concentrations can vary depending upon which brominating compound is used.

12.1.3 PHMB, Poly(hexamethylene biguanide). The level of PHMB shall be maintained between a minimum of 30 ppm and a maximum of 50 ppm (as product) for pools.

12.1.4 Metal-based systems. Any system used shall incorporate an EPA-registered sanitizer. Follow product manufacturer's EPA-accepted label for use and/or operation requirements.

13 Supplemental Sanitizers Treatment Systems

13.1 Ozone. Ozone shall be used only in conjunction with an EPA-registered sanitizer or chlorine generator that meets the requirements of this standard. When used, supplemental treatment systems shall be installed in accordance with manufacturers' instructions and in accordance with applicable codes.

13.1.1 Ozone concentrations in the air above the pool water shall not exceed Occupational Safety and Health Administration (OSHA) permissible exposure limits found in OSHA Standard 29, CFR 1910.1000 Table Z-1, currently 0.1ppm over an 8 hour Time Weighted Average.

13.2 Ultraviolet light (UV). UV lamps shall be used only in conjunction with an EPA-registered sanitizer or chlorine/ bromine generator that meets the requirements of this standard.

13.1.1 Ozone Systems: Ozone systems shall be installed only in conjunction with an EPA-registered sanitizer means or chlorine generator means that meets the requirements of this standard. (See Appendices A and B).

13.1.2 Ultraviolet light (UV) Systems: UV systems shall be installed only in conjunction with an EPA-registered sanitizer means or chlorine/bromine generator means that meets the requirements of this standard.

13.1.3 Copper/Silver Ion Systems: Copper/silver ion systems shall be installed only in conjunction with an EPA-registered sanitizer means or chlorine/bromine generator means. Copper/silver ion systems shall be EPA-registered for use as disinfectants in a pool.

14 Chemical Feeders and Chlorine Generator Systems

- 14.1** When used, all chemical feeder/generator systems shall be installed ~~maintained, and operated~~ as directed in the manufacturer's instructions. These systems shall be installed so they cannot operate unless there is return flow to properly disperse the chemical throughout the pool as designed. ~~If the device has an independent timer,~~ The pool pump and chemical feed pump or electrolytic chlorine or bromine generator timers shall be interlocked. The protection shall be designed and installed in such a way as to prevent chemical feeding or generation when the circulation pump is off, or when the filter is being backwashed. (See Appendices A and D). A flow sensing switch shall be acceptable.
- 14.2** When used, chemical feeders ~~are used to add sanitizing agent to pool water, these systems~~ shall be capable of introducing a sufficient quantity of an EPA-registered sanitizing agent to maintain the appropriate residual concentrations. ~~(For recommendations, see Appendix A.)~~
- 14.3** When used, chlorine/bromine generators ~~are used, these systems~~ shall be capable of introducing a sufficient quantity of chlorine or bromine to ~~meet the requirements in paras. 12.1.1 or 12.1.2~~ maintain the sanitizer at appropriate levels under all conditions of intended use.
- 14.4** When used, chemical feeders shall be capable of maintaining the pH at levels at all levels of recommended use.

15 Electrical Requirements

- 15.1 Electrical components.** Electrical components installed in and/or adjacent to an inground residential swimming pool shall comply with the requirements of ~~the latest published edition of the National Electrical Code~~ NFPA 70® (NEC®), the jurisdiction having authority, and any federal, state, or local codes. In areas where no authority has jurisdiction, ~~the latest published NEC®~~ and any federal, state, or local codes shall apply.

16 Instructions for the Circulation System, Pressure Filters, and Separation Tanks

- 16.1 Written operation and maintenance instructions.** At completion of construction, written operation and maintenance instructions shall be provided to the homeowner for the circulation system.
- 16.2 Manufacturer labeling for circulation system, pressure filters, and separation tanks.** It is the responsibility of the manufacturer that pressure filters and separation tanks shall have operating instructions permanently installed on the filter or separation tank, including a precautionary statement not to start up the system after maintenance without first opening the air release and properly re-assembling the filter and/or separation tank. The statement shall be visible and noticeable within the area of the air release.

17 Safety Features

17.1 Handholds. Handholds shall be provided around the pool edge in any area where the water depth exceeds ~~42 in. (1066 mm)~~ 4 ft (1219 mm).

17.1.1 Handholds shall be accessible within 4 ft (1219 mm) and not exceed 8 ft (2438 mm) at any two points along the inside of the pool perimeter where the water depth exceeds 4 ft (1.22 m).

Handholds may include, but are not limited to, any one or combination of the following items listed in 17.1.1.1 through ~~17.1.1.5~~ 17.1.1.6.

17.1.1.1 Deck, coping, and ledges located not more than 12 in. (305 mm) above the waterline;

17.1.1.2 Rocks, masonry joints, and tooled joints that allow a handhold within 12 in. (305 mm) of the waterline;

17.1.1.3 Ladders, stairs, and underwater seats or ledges;

17.1.1.4 Secured rope or rail placed within 12 in. (305 mm) above the waterline;

17.1.1.5 Any finish or design that will afford a single handhold within 12 in. (305 mm) of the waterline;

17.1.1.6 Any design that allows holding on with one hand while at the side of the pool.

17.2 Rope and float. ~~In pools where the point of first slope change (see Figure 5, Point D) occurs in water depths less than 4 ft 6 in. (1372 mm), a rope and float assembly shall be installed across the width of the pool generally parallel to, and at a minimum of 1 ft (305 mm) and a maximum of 2 ft (61 cm) on the shallow side of the change in floor slope.~~

~~**17.2.1** The rope anchor devices shall be permanently attached to the pool wall, coping, or deck in a manner which provides for their reinstallation should they be required to be removed for maintenance or repair.~~

~~**17.2.2** Replacement vinyl liners shall be supplied with a notification of the responsibility to reinstall the rope anchor devices and the rope and float assembly following the installation of the liner.~~

17.3 17.2 Pool lighting. The use of artificial pool lighting is at the discretion of the pool owner. When lighting is installed, it shall be installed in accordance with the latest published edition of the National Electrical Code NFPA 70® (NEC®) currently enforced in the jurisdiction having authority and any federal, state, or local codes. In areas where no authority has jurisdiction, the current edition of the NEC® and any federal, state, or local codes shall apply.

~~**17.4 Pool alarms.** If used, pool alarms shall comply with the latest published edition of ASTM F 2208 Standard Safety Specification for Residential Pool Alarms.~~

~~**17.5 Safety covers.** When an automatic power/manual safety cover for a swimming pool is used as a barrier, it shall comply with the latest published edition of ASTM F 1346 Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs.~~

~~**17.6 Model child protection/barrier code.** If a model child protection/barrier code is used, it shall comply with the latest published edition of ANSI/APSP-8 Model Barrier Code.~~

~~NOTE: For consumer safety information, warnings, and education programs, see Appendices F, G, H, and K.~~

18 Barrier Requirements

18.1 General. The provisions of this section shall apply to the design of barriers for restricting entry into areas having pools and spas. Where spas or hot tubs are equipped with a lockable safety cover complying with ASTM F1346 and swimming pools are equipped with a powered safety cover that complies with ASTM F1346, the areas where those spas, hot tubs, or pools are located shall not be required to comply with Sections 18.2 through 18.6 of this standard.

18.1.1 Construction fencing required. The construction sites for in-ground swimming pools and spas shall be provided with construction fencing to surround the site from the time that any excavation occurs up to the time that the permanent barrier is completed. The fencing shall be not less than 4 ft (1219 mm) in height.

18.2 Outdoor swimming pools and spas. Outdoor pools and spas and indoor swimming pools shall be surrounded by a barrier that complies with Sections 18.2.1 through 18.6.

18.2.1 Barrier height and clearances. Barrier heights and clearances shall be in accordance with all of the following: The top of the barrier shall be not less than 48 in. (1219 mm) above grade where measured on the side of the barrier that faces away from the pool or spa. Such height shall exist around the entire perimeter of the barrier and for a distance of 3 ft (914 mm) measured horizontally from the outside of the required barrier. The vertical clearance between grade and the bottom of the barrier shall not exceed 2 in. (51 mm) for grade surfaces that are not solid, such as grass or gravel, where measured on the side of the barrier that faces away from the pool or spa. The vertical clearance between a surface below the barrier to a solid surface, such as concrete, and the bottom of the required barrier shall not exceed 4 in. (102 mm) where measured on the side of the required barrier that faces away from the pool or spa. Where the top of the pool or spa structure is above grade, the barrier shall be installed on grade or shall be mounted on top of the pool or spa structure. Where the barrier is mounted on the top of the pool or spa, the vertical clearance between the top of the pool or spa and the bottom of the barrier shall not exceed 4 in. (102 mm).

18.2.2 Openings. Openings in the barrier shall not allow passage of a 4-inch-diameter (102 mm) sphere.

18.2.3 Solid barrier surfaces. Solid barriers that do not have openings shall not contain indentations or protrusions that form handholds and footholds, except for normal construction tolerances and tooled masonry joints.

18.2.4 Mesh fence as a barrier. Mesh fences, other than chain link fences in accordance with Section 18.2.7, shall be installed in accordance with the manufacturer's instructions and shall comply with the following:

1. The bottom of the mesh fence shall be not more than 1 in. (25 mm) above the deck or installed surface or grade.
2. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not permit the fence to be lifted more than 4 in. (102 mm) from grade or decking.
3. The fence shall be designed and constructed so that it does not allow passage of a 4-inch (102 mm) sphere under any mesh panel. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall be not greater than 4 in. (102 mm) from grade or decking.
4. An attachment device shall attach each barrier section at a height not lower than 45 in. (1143 mm) above grade. Common attachment devices include, but are not limited to, devices that provide the security equal to or greater than that of a hook-and-eye-type latch incorporating a spring-actuated retaining lever such as a safety gate hook.
5. Where a hinged gate is used with a mesh fence, the gate shall comply with Section 18.3.
6. Patio deck sleeves such as vertical post receptacles that are placed inside the patio surface shall be of a nonconductive material.
7. Mesh fences shall not be installed on top of onground residential pools.

18.2.4.1 Setback for mesh fences. The inside of a mesh fence shall be not closer than 20 in. (508 mm) to the nearest edge of the water of a pool or spa.

18.2.5 Closely spaced horizontal members. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 in. (1143 mm), the horizontal members shall be located on the pool or spa side of the fence. Spacing between vertical members shall not exceed 1.75 in. (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 in. (44 mm) in width.

18.2.6 Widely spaced horizontal members. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 in. (1143 mm) or more, spacing between vertical members shall not exceed 4 in. (102 mm). Where there are decorative cutouts within vertical members, the interior width of the cutouts shall not exceed 1.75 in. (44 mm).

18.2.7 Chain link dimensions. The maximum opening formed by a chain link fence shall be not more than 1.75 in. (44 mm). Where the fence is provided with slats fastened at the top and bottom that reduce the openings, such openings shall be not greater than 1.75 in. (44 mm).

18.2.8 Diagonal members. Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be not greater than 1.75 in. (44 mm). The angle of diagonal members shall be not greater than 45 degrees (0.79 rad) from vertical.

18.2.9 Clear zone. Where equipment, including pool equipment such as pumps, filters, and heaters, is on the same lot as a pool or spa and such equipment is located outside of the barrier protecting the pool or spa, such equipment shall be located not less than 36 in. (914 mm) from the outside of the barrier.

18.3 Doors and gates. Doors and gates in barriers shall comply with the requirements of Sections 18.3.1 through 18.3.3 and shall be equipped to accommodate a locking device. Pedestrian access doors and gates shall open outward away from the pool or spa, shall be self-closing, and shall have a self-latching device.

18.3.1 Utility or service doors and gates. Doors and gates not intended for pedestrian use, such as utility or service doors and gates, shall remain locked when not in use.

18.3.2 Double or multiple doors and gates. Double doors and gates or multiple doors and gates shall have not fewer than one leaf secured in place and the adjacent leaf shall be secured with a self-latching device.

18.3.3 Latch release. For doors and gates in barriers, the door and gate latch release mechanisms shall be in accordance with the following:

1. Where door and gate latch release mechanisms are accessed from the outside of the barrier and are not of the self-locking type, such mechanism shall be located above the finished floor or ground surface in accordance with the following:

At residential pools and spas, not less than 54 in. (1372 mm).

2. Where door and gate latch release mechanisms are of the self-locking type, such as where the lock is operated by means of a key, an electronic opener, or the entry of a combination into an integral combination lock, the lock operation control and the latch release mechanism shall be located above the finished floor or ground surface in accordance with the following:

At residential pools and spas, at not greater than 54 in. (1372 mm).

3. At private pools, where the only latch release mechanism of a self-latching device for a gate is located on the pool and spa side of the barrier, the release mechanism shall be located at a point that is at least 3 in. (76 mm) below the top of the gate.

18.3.4 Barriers adjacent to latch release mechanisms. Where a latch release mechanism is located on the inside of a barrier, openings in the door, gate, and barrier within 18 in. (457 mm) of the latch shall not be greater than 1/2 in. (12.7 mm) in any dimension.

18.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the barrier and where doors, gates, or windows provide direct access to the pool or spa through that wall, one of the following shall be required:

1. Operable windows having a sill height of less than 48 in. (1219 mm) above the indoor finished floor, doors, and gates shall have an alarm that produces an audible warning when the window, door, or their screens are opened. The alarm shall be listed and labeled as a water hazard entrance alarm in accordance with UL 2017.
2. A safety cover that is listed and labeled in accordance with ASTM F1346 is installed for the pools and spas.
3. An approved means of protection, such as self-closing doors with self-latching devices, is provided. Such means of protection shall provide a degree of protection that is not less than the protection afforded by Item 1.

18.5 Natural barriers. In the case where the pool or spa area abuts the edge of a lake or other natural body of water, public access is not permitted or allowed along the shoreline, and required barriers extend to and beyond the water's edge not less than 18 in. (457 mm), a barrier is not required between the natural body of water shoreline and the pool or spa.

18.6 Natural topography. Natural topography that prevents direct access to the pool or spa area shall include, but not be limited to, mountains and natural rock formations. A natural barrier approved by the governing body shall be acceptable provided that the degree of protection is not less than the protection afforded by the requirements of Sections 18.2 through 18.4.