

Installation Manual



WARNINGS TO INSTALLER

A safety package should be provided with the pool. Its contents should be reviewed with the pool owner. The package should include a pool safety sign, "NO DIVING" decals and placement instructions, the National Spa and Pool Institute Minimum Standards for Residential Swimming Pools, and safety booklets such as: *The Sensible Way to Enjoy Your Inground Swimming Pool*, *Greg Louganis on Diving*, and *Children Aren't Waterproof*. You may obtain a safety package by contacting:

Customer Service
33 Wade Road
Latham, NY 12110
(518) 786-1200

The installer should place all warnings according to the manufacturer's instructions prior to use of this pool.

NOTICE: It is **NOT** recommended to use diving and/or sliding equipment on residential pools. Such equipment, its installation, and use is the responsibility of the pool owner.

These pools are designed for private, residential use only. If this is not a private, residential pool, you should contact your local building department and the National Spa & Pool Institute for standards relevant to its use, since they may be quite different.

National Spa & Pool Institute
211 Eisenhower Avenue
Alexandria, Virginia 22314

For Pool Regulations and Standards refer to your Installation Manual-NSPI Standards for Residential Swimming Pools.



WARNINGS TO POOL OWNER

Imperial manufactures component steel parts for swimming pools. Before using your pool, **the dealer and/or installer** should provide you with a safety package which should include a pool safety sign, "NO DIVING" decals and placement instructions, the National Spa and Pool Institute Minimum Standards for Residential Swimming Pools, and the following pool safety booklets:

1. *The Sensible Way to Enjoy Your Inground Swimming Pool.*
2. *Greg Louganis on Diving - Knowing How to Dive Can Be Worth More Than Gold. It Can Be Worth Your Life.*
3. *Children Aren't Waterproof.*

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SWIMMING & DIVING SAFETY

Imperial does not recommend the use of diving and/or sliding equipment on residential pools. If you choose to dive, a thorough familiarity with the pool bottom, awareness of depths, and understanding of the principles of head-first entry into the water are critical factors in safe diving.

CONSIDERATIONS PRIOR TO INSTALLATION

This manual describes many of the best techniques available for installation of your pool. First read this manual through completely. Then, select the techniques that best suit your installation preference.

1 • BUILDING PERMITS Check the local building codes, if any, and regulations governing residential pools. In many communities no regulations exist. However, building permits are generally required.

2 • POOL LOCATION Select the best location for your pool. Stake out and study it carefully before the excavation begins. Take into consideration the addition of walks and patios. Note the possible access to dressing facilities. Take care to locate the pool in a sunny location. Keep in mind that trees obstruct the warming rays of the sun and litter the pool with leaves and debris.

Consider the site carefully since your pool will be a permanent installation.

Avoid placing the pool in low areas and near severe slopes. High water tables or seepage will make it difficult to form the deep end of the pool.

Grading should be such that surface drainage, rain water, and pool splash run away from the pool (approximately 2" in a 4' slope). Be careful to locate the pool so that the site does not fall directly over sewer lines, septic systems, buried pipe or wiring, and does not lie beneath telephone or electric lines. 10' off electrical lines is usually required. If you are unsure of the locations of all wires and pipes, call your local utilities for assistance. This call will insure against an unfortunate and expensive accident.

When deciding where to place the filter, bear in mind that the filter operates better if it is close to the skimmer. Place it a maximum of 20' from the skimmer and a maximum of 2' higher than the pool. Any higher than 2' impairs the efficiency of the pump. The filter can be hidden behind some bushes or put in a small attractive house covering it. If the filter is covered, be sure there is adequate ventilation for maximum efficiency of the pump and motor. The skimmer will function more efficiently if it is facing the prevailing wind.

3 • ENGAGE EXCAVATING CONTRACTOR The pool excavation is generally accomplished with the use of a backhoe. Engage an excavating contractor well in advance of the time you intend to start the pool. He will want to be sure of accessibility to the location and will want to schedule his equipment on the site to your convenience.

4 • ENGAGE ELECTRICAL CONTRACTOR An electrician is required to provide the electrical hookup from your main power source to the motor on the filter. He may also be required to provide a ground for the pool and accessories. If your pool has a light, he will also make the necessary connections to a power source. Check the local building codes governing residential pools.

5 • FENCING In most areas, building codes specify that a pool must be enclosed with some type of fencing. Check the local building requirements for residential pools.

SUGGESTED TOOLS FOR INSTALLATION

100' Extension Cord	Broom	Large Water Pump Pliers
Socket Set or Adjustable Wrench	200' of 2" Wide Duct Tape	Heavy Duty Vacuum Cleaner
100' or 50' Tape Measure	Pipe--1 1/2" x 80# Minimum Poly Pipe or PVC & Fittings	Shovel (Pointed Long Handle)
Roll of String	6' Rule	Rake
40--3/8" x 1" Rebar	Electric Drill with Attachments for Self Tapping Screws	Hose with Spray Nozzle
Regular & Phillips Screwdriver		Steel Trowel and Wood Float
Transit	Knife	Plastic Pipe Sealant
Pick	Hack Saw (Fine Tooth)	Plumb Bob
Tamper	9/16" Open-End Wrench	4-8" Water Tubes

POOL LAYOUT

Establish the pool location, bearing in mind that the top should be at least 6" above the highest terrain around the pool area (20' radius). This height dimension (**Bench Mark) should be marked near the construction site (side of house, tree, etc.).

Use a transit to determine this dimension (benchmark). The transit should be set 10' to 15' from the pool site with an unobstructed view of the entire site. Remember, there must be access for excavation equipment and room around the excavation for soil to be piled. Refer to the installation drawings for all dimensions.

For rectangular pools, position a stake in each of the four corners. Check for equal diagonal measurements to insure that the layout is square. For special shape pools, refer to the installation drawings.

Connect string to these stakes and outline the ground (under the string) with chalk or white spray paint. The next step is to mark dimensions on the "Reference Pole." (To make a reference pole, take two pieces of wood, 2" x 3" x 8' long and nail them together lengthwise, with an overlap of approximately two feet.)

MARKING REFERENCE POLE

1. Rest the bottom of the pole on your "benchmark". Holding the pole vertical, have another person sight the level cross hair (in the transit) on the "Reference Pole" and label this point "Top of Pool".
2. Next, lay the pole down and measure from the label (top of pool) up 44 1/2" for concrete receptor coping. Mark this shallow end depth. (Standard panel height is 42").
3. Measure up beyond the point labeled "Top of Pool", the deep end depth depending on the style of pool being installed (refer to installation drawings.) Make a mark at this measured point and label this point "deep end depth".

NOTE: Problem to consider--If, in laying out your pool, you find an elevation such as a hill located in close proximity to where the pool will be installed, you should have the excavator dig back approximately 6' from the pool, into the existing hill or elevation. A retaining wall should then be built to hold the soil back, and a drain should be installed, to divert run-off away from the pool.

**Bench Mark - The bench mark is the final height of the pool deck, usually 2 1/2" (when using standard coping) above the finish height of the top of the pool wall/bead receiver for the liner. (The bench mark may change due to deck forms or coping bricks).

SUGGESTED WATER PROBLEM PROCEDURE

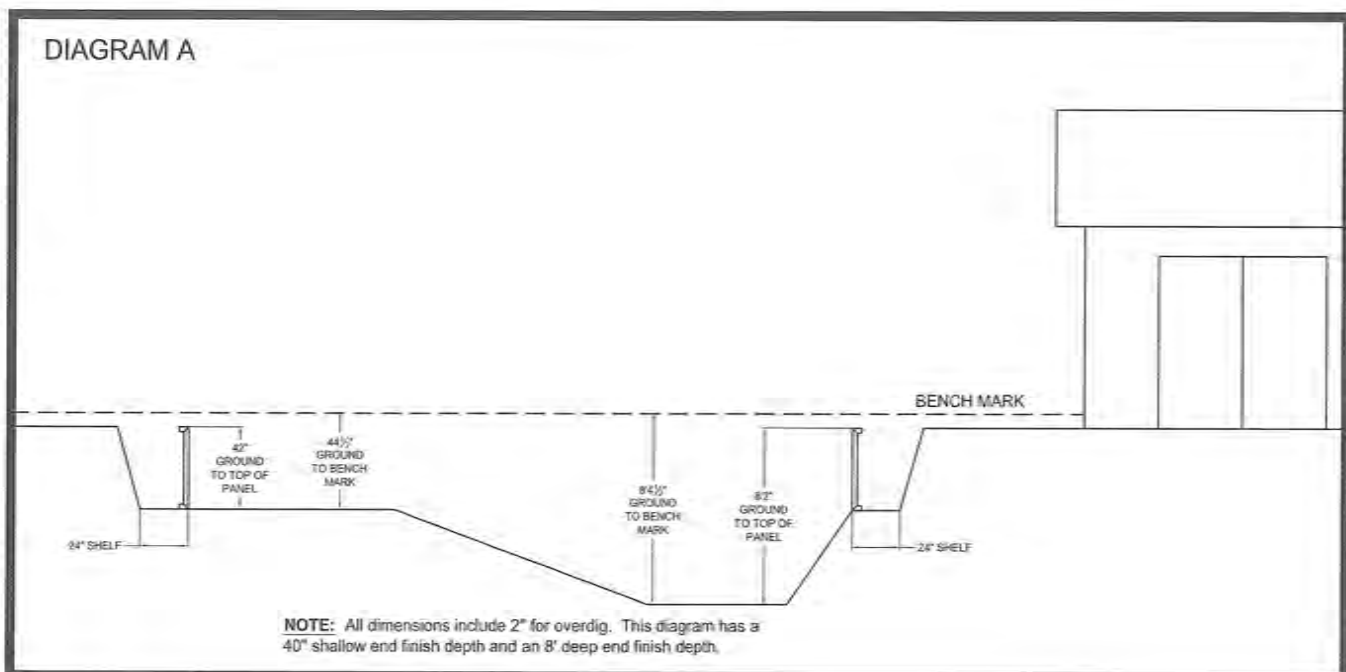
When water is encountered in the ground during excavation of the pool, the following procedure will enable you to divert this water temporarily and keep the area dry during construction. Once the installation is complete, ground water will not disturb the pool because the internal hydrostatic pressure of the pool water is greater than that of the water beneath the pool. It is also advisable to install a hard bottom instead of a sand bottom, thereby eliminating the possibility of a wash-out of the pool base.

1. Over-dig hopper bottom one to two feet and place #2 crushed stone four to six yards depending on size of pool and severity of water problem.)
2. If water is erupting from other areas such as the slopes or breakover, over dig these areas and place stone so that the water will drain to the hopper bottom. (Note: Be sure to dig enough to allow for the addition of two inches of pool base.)
3. Next, get enough length of pipe (1 1/2" diameter), so that you will be able to imbed one end into the stone in the hopper, while imbedding and running the rest of the pipe up the slope and under the panels to ground level. *Note: Be sure the pipe end is located at the bottom of the stone bed.* Install a 1 1/2" foot valve at the end of the pipe to be inserted into the stone. This will provide a screen and check valve.
4. Connect the pipe to a low head electric pump and leave the discharge line slightly elevated, so as not to lose prime. Turn it on and *leave it running until the pool is finished and is filled with water.* Cap off the line and leave it for future use in liner replacement.

POOL EXCAVATION

Note: Remember that the pool will be dug 2 feet larger on all sides than its original dimensions. This allows room for erecting panels and placement of A-frames. Instruct your backhoe operator to excavate the width of his bucket (approximately 24") on the outside of the pool layout, to accommodate for this area. You may also outline this area with spray paint.

Explain to the backhoe operator that the 24" shelf is located 44 1/2" below the bench mark (42" -height of the steel panels plus 2 1/2" -height of the receptor coping. **Refer to Diagram A.**



INITIAL EXCAVATION

Excavation can be accomplished by digging the entire shape of the pool to its shallow bottom depth from outside the pool. It also can be accomplished by starting at one end and working from the inside out. Either method is acceptable, **providing the digging is done accurately.**

Using the reference pole, dig an area down to the mark labeled "shallow bottom depth". Haul away excess soil.

FINAL POOL LAYOUT AND EXCAVATION

Re-stake the pool shape using rebar, moving in 24" from the excavation.

Attach mason line to rebar. With the reference pole, check the corners next to the steel stakes and have someone sight through the transit to the mark labeled "shallow bottom depth". Check every 4' around the mason line with the reference pole to be sure that the mark on the pole meets the cross hairs on the transit. This area must be completely level. **If the area is too low, always work from undisturbed ground and raise area with the use of the patio blocks.**

FORMATION OF THE POOL BOTTOM

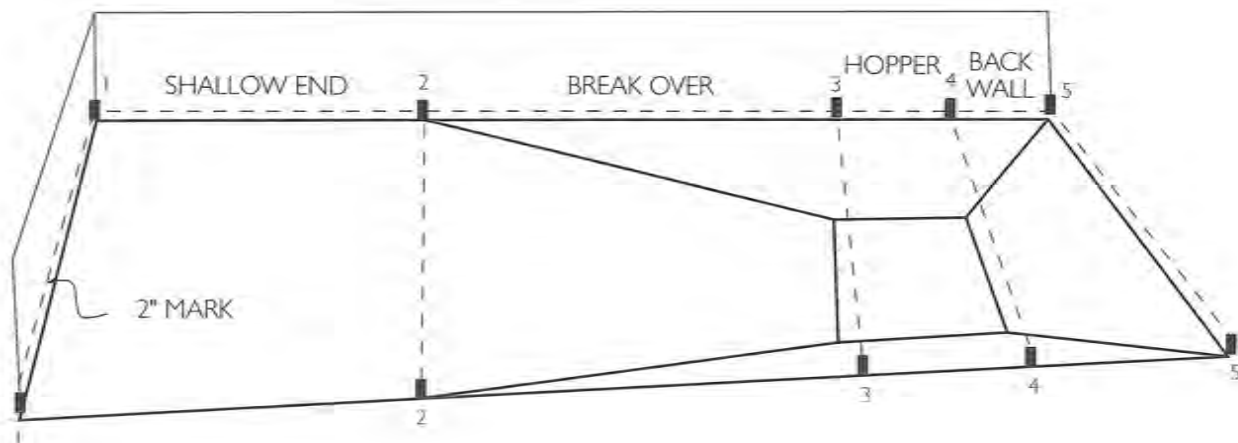
Refer to the installation drawings for your particular pool measurements. Place a line 2" from the bottom of each panel. This 2" mark represents the finished height of the pool bottom.

Using this format and the diagram below, insert the appropriate dimensions from your installation drawings.

Length of shallow end pins 1 to 2
Length of hopper pins 3 to 4
Width of hopper side walls A
Length of breakover pins 2 to 3
Length of back wall pins 4 to 5
Depth of hopper minus steel wall B

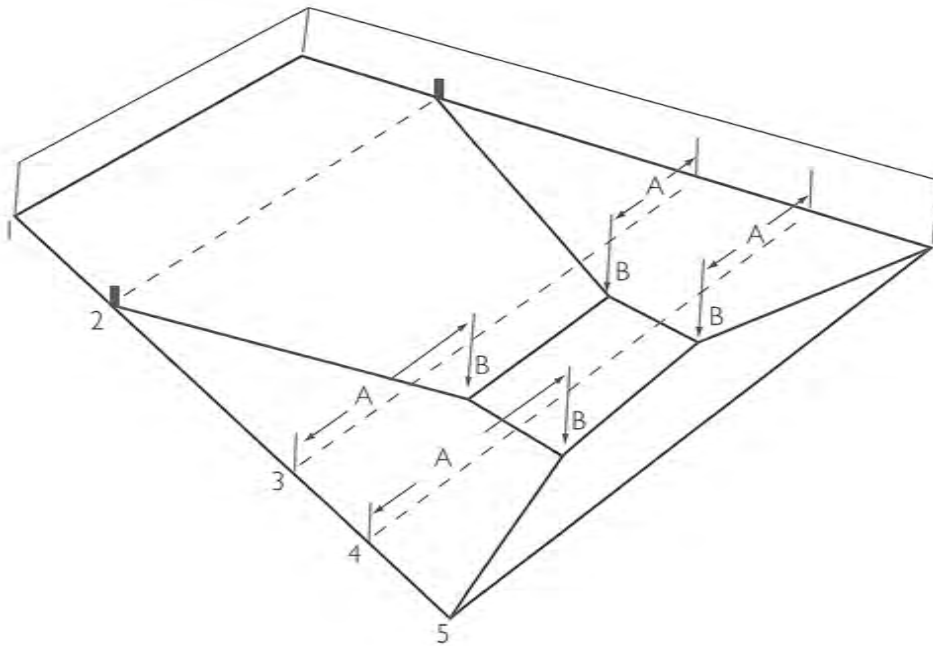
Measure along side wall (at the 2" line). Install pins 2,3,4, and 5.

Tie 3 strings across at pins 2, 3 and 4.

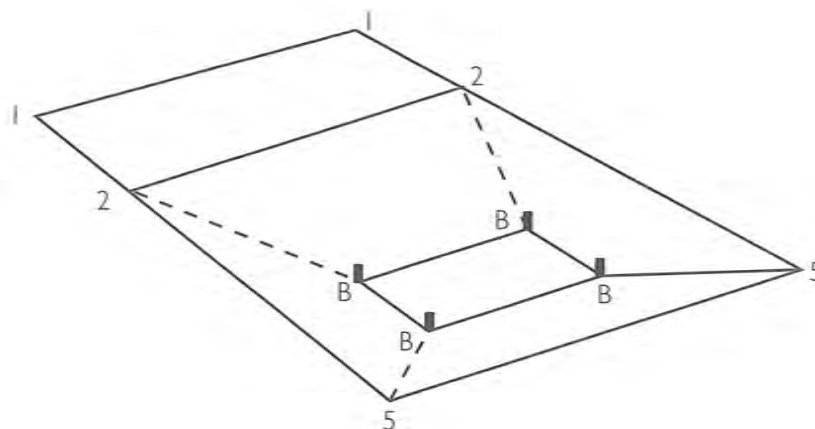


The Patio Pools (20 x 20 - 26 x 26) have an expandable liner, rather than a fitted liner. This means that the liner will stretch into either a constant depth or a shallow end with slant bottom. Because of this flexibility, it is not imperative to form the deep end as pictured in the installation drawing. You may bowl out the deep end slopes, rather than adhere to the installation drawing configuration. Remember to use water tubes to hold the shallow end of the liner into position when filling the pool with water.

On strings 3 and 4 measure in from side wall (Width of hopper side A). Drop a plum line down (Depth of hopper less steel side wall B).



Place 4 pins at B's. Tie one string from B to pin 5 and one string from pin 2 to B. Repeat on opposite side.



Remember--The rough grade is 2" below the string. Make sure the rough grade is free and clear from any sharp objects.

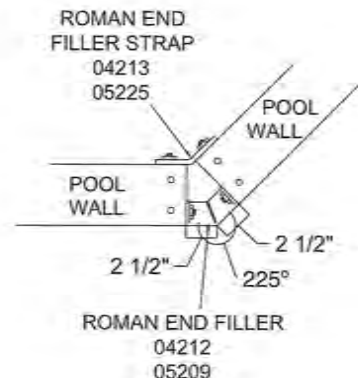
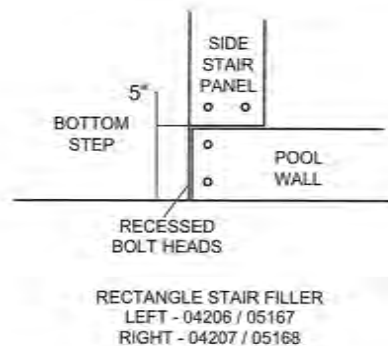
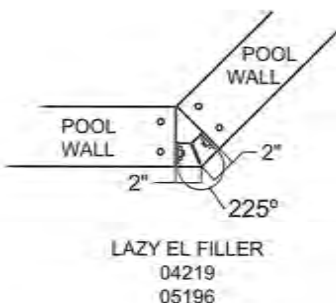
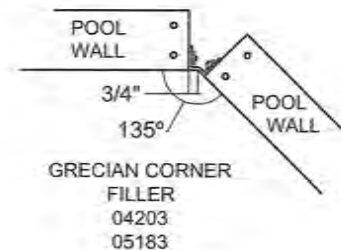
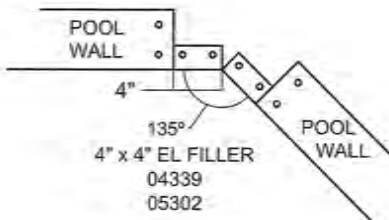
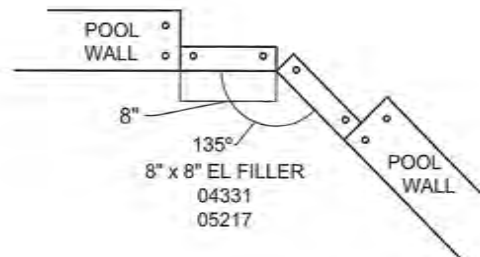
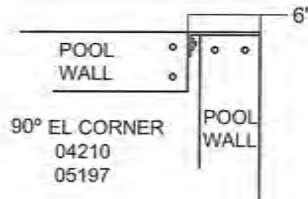
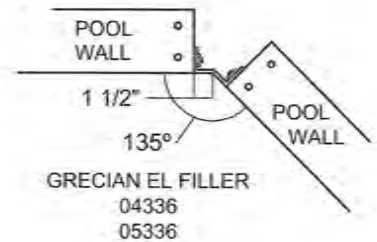
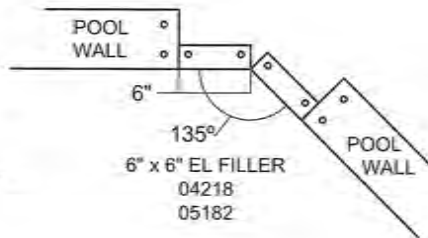
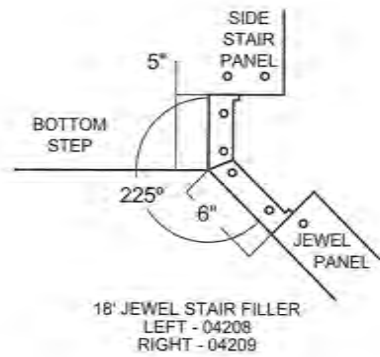
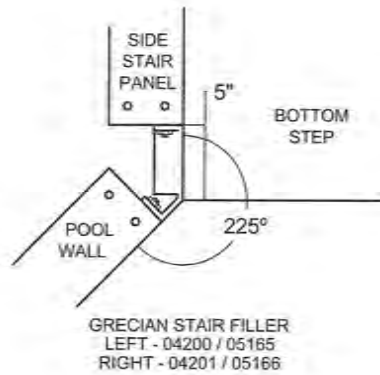
TYPICAL CORNER LAYOUTS

ERECTION OF POOL WALLS AND PANEL LOCATION

Before erecting the steel walls, locate the position of the skimmer, return, and light panels, where applicable. Place the skimmer(s) facing the prevailing winds. Then locate the return panels to provide complete water flow around the pool.

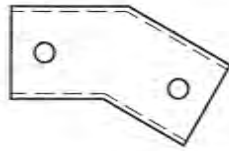
When you have determined the location of the special panels, lay them on the ground near their respective locations. Refer to the installation drawings for the proper panel placement for the particular pool being installed. See Figure 1 for line drawing of 8' panel with attached A-frame. Start at the deep end corner and attach the appropriate corner filler between two panels using the 3/8" x 3/4" hex bolts and nuts. See Figure 2 for the different corner fillers required for the particular pool being installed.

Continue bolting the rest of the panels together, forming the pool walls. Leave out the nuts and bolts at the top and bottom of the panel. This will be used for A-frame attachment.

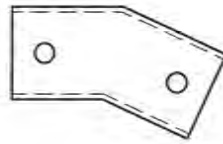


BOLTING THE WALLS TOGETHER ON THE JEWEL

The Jewel Pool has six panels which have been notched at the factory. Attach a blue cap on the bottom and top of each notched panel with two 3/8" x 1" Hex bolts and nuts. Start at the hopper end and bolt three pre-formed panels together using blue caps, top and bottom. Now, with the three pre-formed panels in place, add the gold cap. Continue down both sides. There are no caps for joining straight panels together. Use regular panel holes. Continue the same procedure at the shallow end. Vise grips can be used to bring the panel ends closer together, making it easier to bolt panels together. White caps are used to form the angle of the panel, going into the right or left stair fillers.



BLUE CAP



WHITE CAP



GOLD CAP

STEP PLACEMENT

Set step unit between two panels. Adjust height of step by aligning top of coping with top of step (figure #1) **(see caution)** and plumb by checking front face of step unit with adjoining panels.

NOTE: Saratoga Steps are universal in height to most coping designs (Bullnose, Flat, etc.) in the pool industry. To insure this, the Saratoga step comes complete with 4 styrofoam blocks if needed. These blocks will fill any void between the coping and step nosing that may appear when lowering the step. (Some cutting of the styrofoam may be required for a perfect fit.) (See figure #2)

Lock step unit in place with vice grip pliers.

Using holes in panel as a template, drill holes through flange into step and bolt in place with an A-frame brace on each side of step unit.

Pour concrete bond beam around pool and step unit. Slope bond beam away from step to ensure proper drainage.

Backfill behind steps at least 2' before liner installation. Backfilling should be done with sand (NEVER CLAY), and thoroughly compacted in layers. When finishing pool base in front of step unit, taper it up, and make a slight cove. This will help to relieve any excessive pressure on pool liner.

FIGURE 1

A small piece of coping can be used as a measuring guide when placed on top of the panel aligning liner track of coping with top of liner gasket on step.

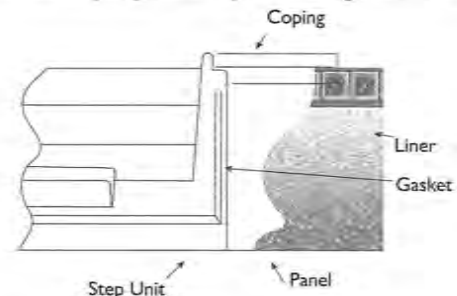


FIGURE 2

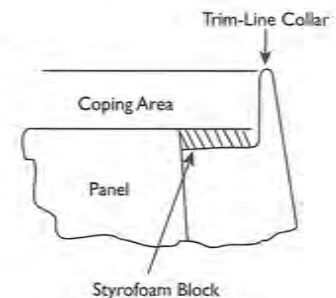
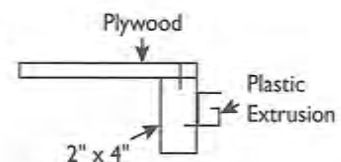


FIGURE 3



CAUTION

For correct result (photo B), when bolting panel to step, adjust step height to meet top of coping (photo A). Failure to do so will result in an incorrect installation (photo C).

CORRECT



photo A

CORRECT



photo B

INCORRECT

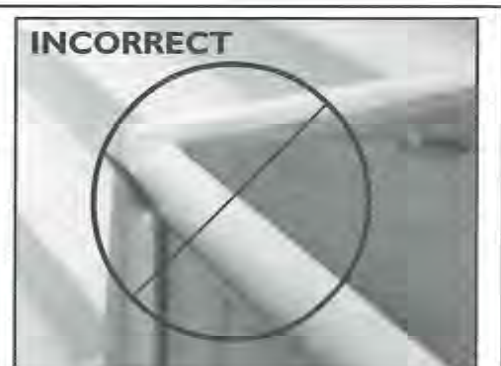
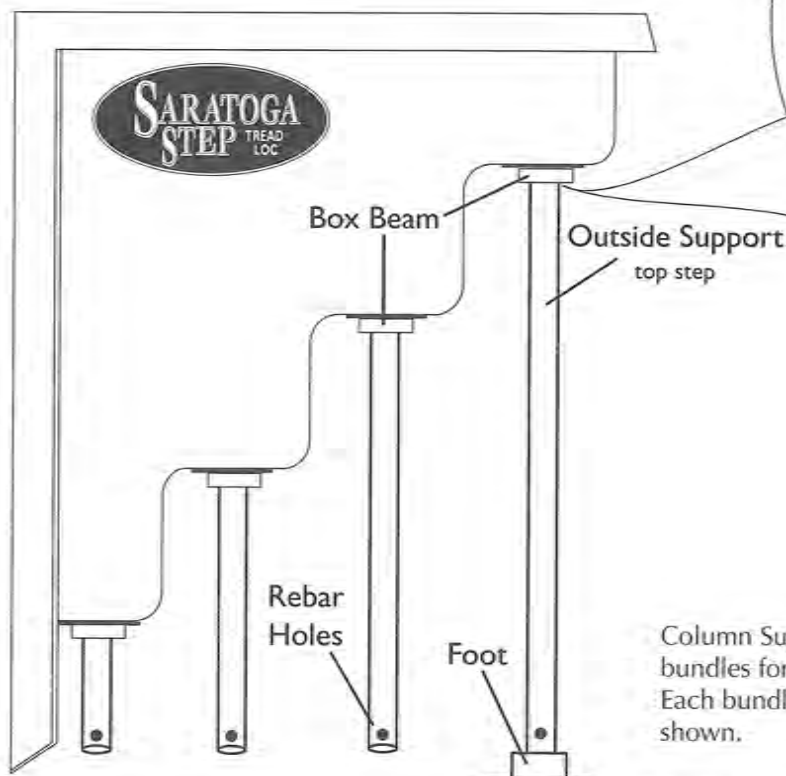


photo C

TREAD-LOC ASSEMBLY INSTRUCTIONS

TREAD-LOC ASSEMBLY



Note: The outside supports (long) require feet. This allows only the feet to rest on ground until concrete is poured for ease of leveling.

Note: If it is necessary to remove a support, simply rotate the support until the re-bar holes are perpendicular to the box beam channel and pull the support directly out.

Re-bar not included.

Column Supports are provided in bundles (3 bundles for 8' units and 2 bundles for smaller units). Each bundle contains supports for one row as shown.

Beginning with the long support, depress the snap ring with your thumb and forefinger and insert the support into the receptacle hole on box beam. Rotate the support until the rebar holes are parallel to the box beam channel. Repeat this process for each column in descending order.

Please Note: Outside supports for the top step also have snap rings for bottom to accommodate the foot. All other supports have snap rings on top only and re-bar holes on the bottom.

Repeat this process for each row of column supports until all supports are in place.

Place the support feet on the bottom of the long outside supports for the top step.

FOR POOLS WITH STEEL WALK-IN-STAIRS, INSTALL AS PER INSTRUCTIONS BELOW:

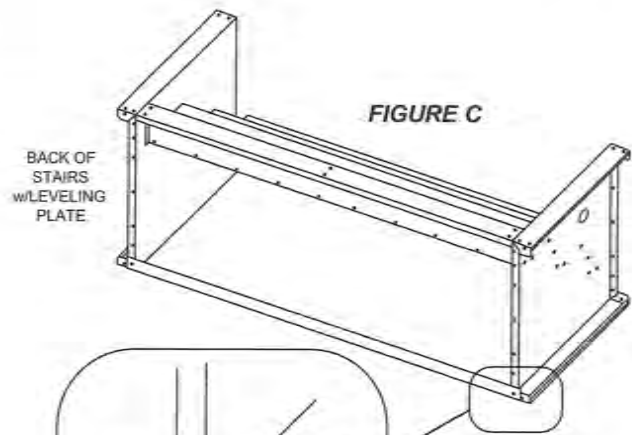
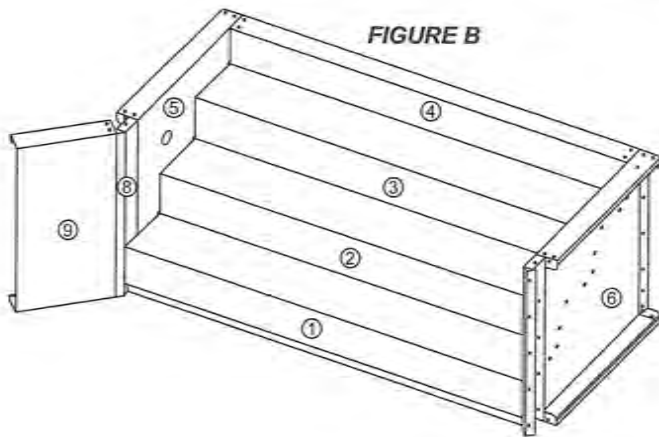
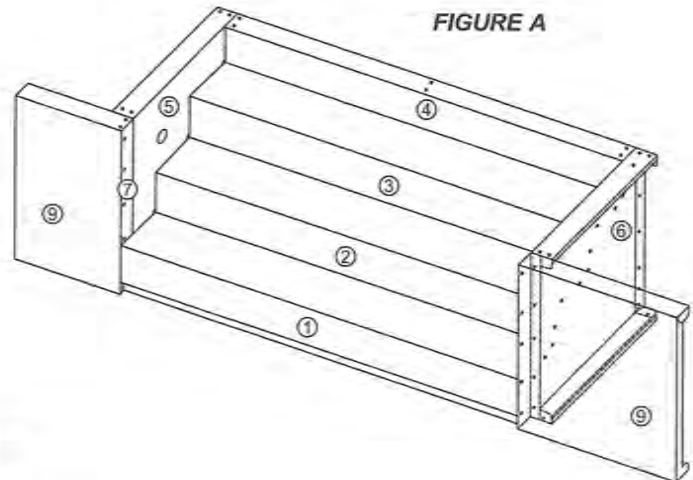
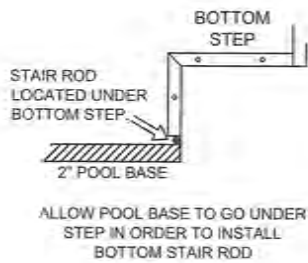
Step 1 On 1000 Rectangle series pools with stairs, install left and right stair fillers to the pool panels, with 1/4" x 3/4" flat head carriage bolts and nuts. (Figure A) On 700 Grecian and Jewel series use 3/8" x 3/4" hex bolts and nuts. (Figure B)

Step 2 Bolt right and left stair panel to right and left stair filler.

Step 3 Place bottom step into position with the help of drift pins, and bolts to right and left stair panels. Continue process until stairs are assembled.

Step 4 Install back of stair leveling plate. (Figure C)

Note: There are four (4) 3/8" diameter stair rods which will be used later for installing liner.



STAIR PARTS LIST

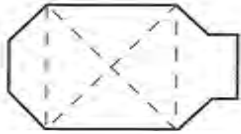
1. Bottom Stair
2. Center Stair
3. Center Stair
4. Top Stair
5. Right Stair Return Panel
6. Left Stair Panel
7. Rectangle Stair Filler
8. Grecian Stair Filler
9. Pool Side Panels

LEVELING PLATE IS LOCATED UNDER THE STAIR PANELS.

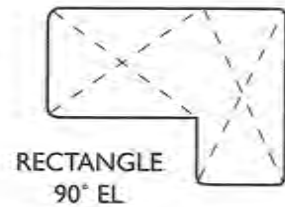
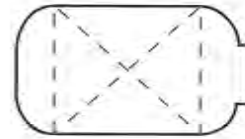
SQUARING THE POOL

With panels completely assembled, square your pool by measuring diagonals until each is equal.* Check with current Pool Specifications booklet for diagonal measurements.

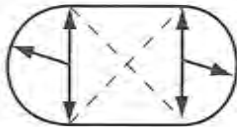
GRECIAN



RECTANGLE



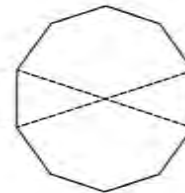
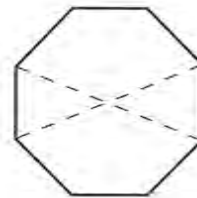
JEWEL & OVAL



On Jewel and Oval shaped pools - The straight walls are to be parallel with each other. Diagonal measurements should be equal. Recheck the radius on both ends after attaining equal diagonals.

*Be sure to square the 4' x 8' walk-in-stairs.

PATIO



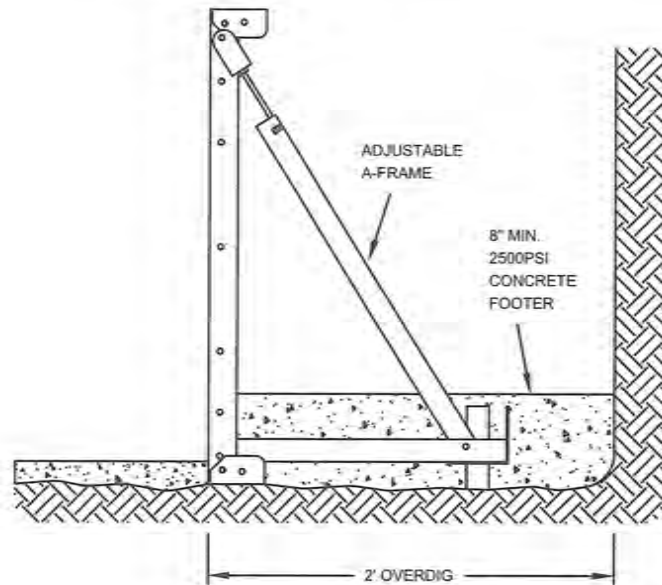
LEVELING THE POOL

With the use of a transit, place the reference pole on the top of the panels and take a reading at each corner (include the walk-in-stairs). Determine the highest elevation. Raise the pool corners to this elevation with the aid of a patio block. **Do not raise the panels by the addition of soil under the panels.** Continue to check for level at each panel joint and adjust accordingly.

The entire pool including the walk-in-stairs must be level.

A-FRAME INSTALLATION

Assemble A-Frame as pictured below, and attach at straight plane panel joints with 3/8" x 1" hex bolts and nuts.



Check for plumb of panels by stretching a string the length of the pool near the bottom of panels. Bring the bottom of the panels in or out to rest against the string. (Refer to the finished pool width on the installation drawings.) Anchor the bottom of all panels with 3/8" rebar.

Next, repeat the process along the top of the panels and adjust panels to rest against the string with the aid of the A-frames. Anchor A-frames with stakes.

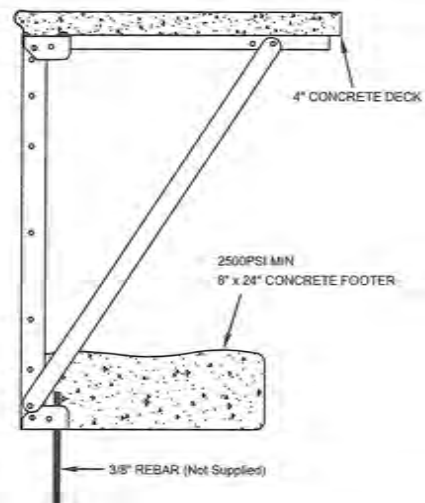
Follow the same procedure for the width of the pool.

INSTALLATION OF DECK SUPPORT SYSTEM (Optional)

One method of providing additional support for the concrete deck around the pool is the use of a deck support system.

This system of support is located every four feet around the pool perimeter.

NOTE: When installing Deck Support, Panels are not Reversible. Be sure Panels are in the Upright Position for Deck Support attachment.



MAIN DRAIN INSTALLATION (Optional)

Locate the position of main drain in the center of the hopper bottom. Begin by digging a hole approximately 18" in diameter and 24" deep. (Now take the main drain assembly and install the collector pipe and plug or hydrostatic relief valve with plastic pipe sealant.) Optional when high water table exists.

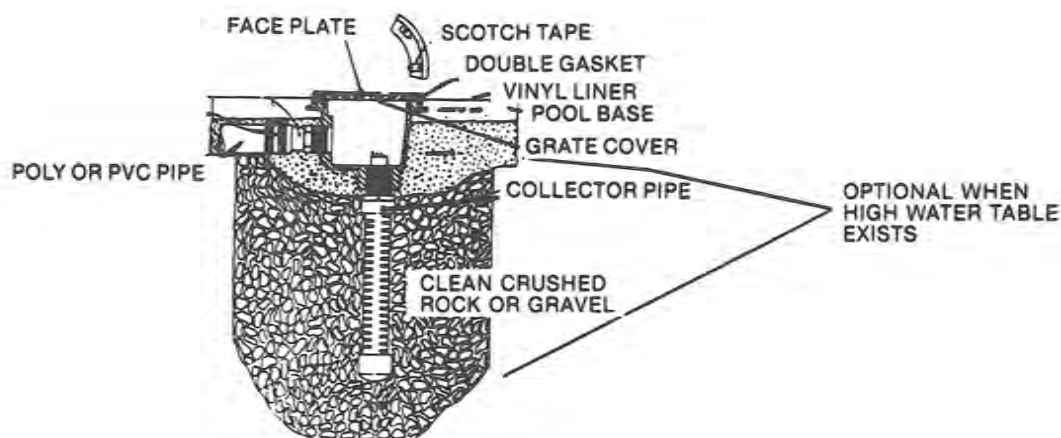
Cover all the screw holes in the face of the drain body with thin scotch tape to keep dirt out of the holes. By using thin tape, you will be able to complete the installation without removing the tape.

Fill the hole with crushed stone as shown in the diagram. Level the top surface of the drain body at the proper elevation of the finished base on the hopper bottom. Now install PVC pipe to the side fitting. Make certain the pipe lies flat and is properly trenched below the surface of the finished bottom until it is outside of the pool wall.

Fill the top of the hole with concrete, leveling the top of concrete to an elevation 2" below the surface of the main drain. This will allow for the proper thickness of the pool base.

Affix one gasket to the main drain with non-hardening gasket adhesive or duct tape.

The main drain is now ready for liner installation. The remaining face ring, cork gasket and cover can be installed after there is approximately 12" of water over the main drain upon filling the pool with water.



POURING CONCRETE COLLAR

A concrete collar must be poured around entire pool in 2' work area, approximately 8" deep. Make sure all panels are staked securely with rebar and that they do not move when pouring collar. A 2500 PSI mix of concrete or stronger is recommended.

While concrete is available, it is a good time to pour a pad for the filter system (4' x 4' or 4' x 8' if pool has a heater).

TAPING POOL INTERIOR

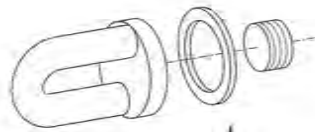
In order to secure an air tight fit when the liner is being set with an industrial vac, all interior seams where the steel walls are joined together should be taped with duct tape.

SAFETY ROPE INSTALLATION

A safety line with buoys is to be permanently attached 1' 0" to the shallow side of the point of first slope change.

Holes for eye hook must be drilled before liner is installed.

Coping mount hook is also available. (Refer to manufacturers' directions.)



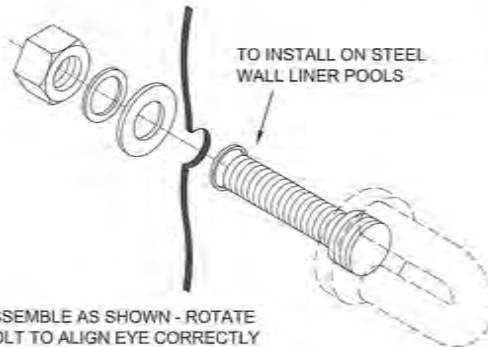
LINER POOLS:

AFTER LINER IS HUNG, CUT AROUND BOLT HEAD. PLACE LARGE WASHER ONTO HEAD AND THREAD EYE ON. IF EYE IS NOT ALIGNED, LOOSEN NUT AND ROTATE BOLT INTO CORRECT POSITION. TIGHTEN BOLT AND EYE.

COPING MOUNT HOOK

TEK SCREW

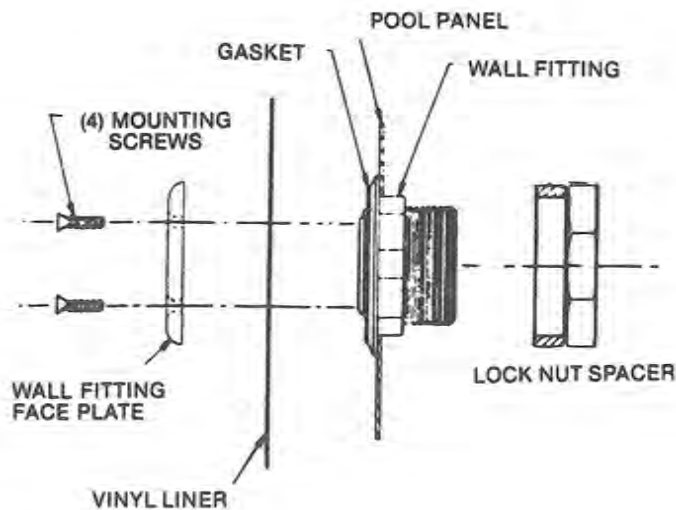
LINER SNAPS IN THIS GROOVE



ASSEMBLE AS SHOWN - ROTATE BOLT TO ALIGN EYE CORRECTLY

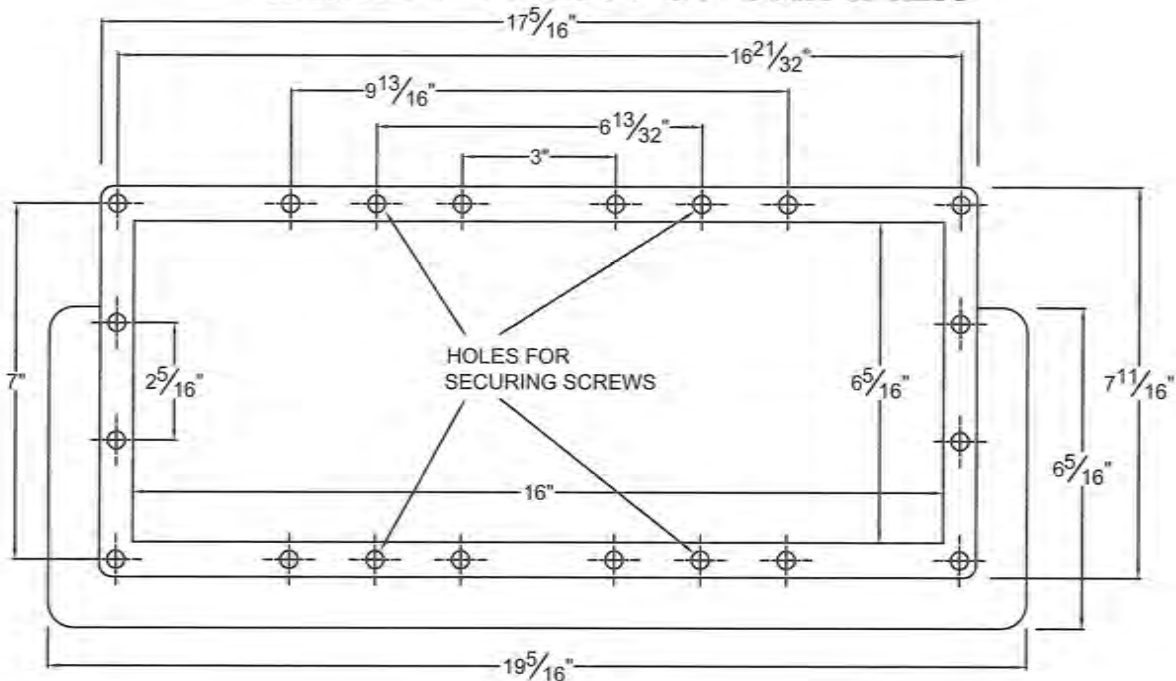
INSTALLATION OF RETURN FITTINGS

Install wall fitting through hole in return panel and secure lock nut with pipe wrench. CAUTION: do not over-tighten fitting. Retain faceplate and screws for installation after pool is filled with water (refer to diagram below).



WALL FITTING ASSEMBLY

INSTALLATION OF SKIMMER



1. Insert skimmer into panel cut out from the rear, and butt the mounting flange against the rear of the panel, making face of skimmer flush with inside of the pool. Secure skimmer to wall at top and bottom with four (4) securing tabs and four (4) securing screws.
2. Place gasket on skimmer face, making sure holes in gasket align with holes in skimmer face. Be sure gasket tab cut out fits evenly over securing tabs. (A very light application of adhesive cement will assist in holding gasket in place.)
3. Install vinyl liner.
4. Align second gasket and faceplate and fasten tightly to skimmer face with sixteen (16) 1" screws. Pierce liner through faceplate holes one at a time prior to inserting screws.
5. Cut out vinyl liner along inside edges of faceplate.

NOTE: There are numerous types of skimmers available. (Refer to skimmer manufacturers installation instructions.)

INSTALLATION OF LIGHTS (Optional)

NOTE: There are numerous types of lights available. Refer to light manufacturers installation instructions for your type of light.

Install PVC or copper line from niche to junction box before back filling walls completely. Be sure to compact the soil under the line from the light niche to the junction box. Check electrical code for proper location of electrical junction box.

Underwater lighting fixtures and fixture housings must be installed under provisions of the Local Electrical Code. Always consult a licensed electrician.

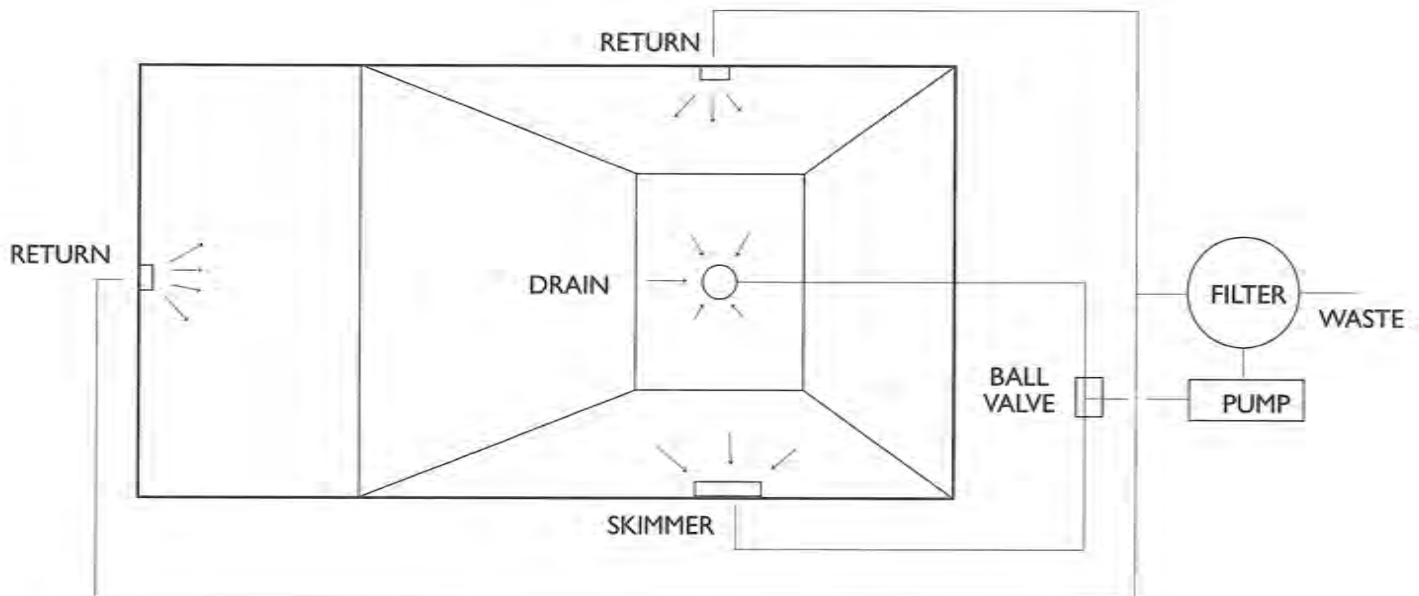
Twelve volt fixtures must be installed with an approved transformer; 110 volt fixtures must be installed with an approved ground. 110 volt fixtures require additional safeguards (such as differential circuit protectors or ground detectors). GFI protectors are highly recommended.

INSTALLATION OF POOL PLUMBING LINES

Apply a suitable plastic pipe sealant to the male adapter threads and hand tighten into fittings. Then tighten securely by rotating one full turn. Connect 1 1/2" PVC pipe (rigid or flex) to fitting with proper primer and glue. Run length of pipe to location of filter area. Cap and mark each line for future reference.

Rigid PVC pipe or flexible PVC pipe is a popular alternative. When using PVC pipe, be sure to use the proper glue as per manufacturer's instructions.

NOTE: Many installers prefer to imbed the plumbing in the concrete collar. Others prefer to lay the pipe on compacted soil around the pool. Either method is acceptable.



MATERIAL SELECTION FOR FINISHED POOL BASE

In forming your finished pool base, it is very important to make the right selection of base material conducive to your ground conditions, and also to the capabilities of your finishing crew. Below is a list of acceptable material used for the pool bottom. Select the one that is best for you.

MASON OR YELLOW SAND This type of sand is fine enough to provide a firm base for the liner. It must be tamped thoroughly, before troweling, to insure firmness. By spray misting water from a hose nozzle, it will compact and make it easier to trowel. Spray misting should be done periodically to keep the sand moist until the liner is installed. The disadvantage of sand as a pool base is that it will show depressions and indentations from usage. It also is not recommended in areas of high water tables.

FINE MASON SAND AND PORTLAND CEMENT A mixture of sand and cement provides a hard surface for the pool bottom eliminating the depressions found in bottoms with mason sand only. It is an acceptable base for the liner in unstable ground conditions (clay or high water table). It should be mixed thoroughly in a cement mixer at a ratio of 5 parts of mason sand to 1 part of Portland cement. You have the option of adding water to the sand and cement while it is mixing or applying a fine spray of water from a hose to the dry mixture after it has been placed in the pool. Periodic spraying of water should be applied to the pool base while troweling to keep it moist until the liner is installed. (Note--this mixture can also be ordered from a ready-mix company in order to eliminate hand mixing.)

CONCRETE A pool base consisting of a 4,000 lb mix (small stone, Portland cement and water) will provide a permanent bottom for your pool. There are, however, some factors that should be considered prior to selecting a concrete bottom. First, it is imperative that you have professional masons available to do the troweling. This type of mix sets up rather quickly and must be done correctly the first time. It is necessary to have a finish smooth enough so as not to harm the liner. Once the bottom has been finished, it is recommended that the entire area be checked for smoothness. Any sharp areas must be eliminated and then the whole bottom should be washed thoroughly before installing the liner. Of course, a main drain with a hydrostatic relief valve should be installed as part of this bottom.

VERMICULITE Another type of hard bottom material is referred to as Concrete pool base aggregate. This material provides a nonabrasive surface for the liner while providing a hard surface resisting the formation of pockets or foot prints. Mixed with water and Portland in a paddle type mixer, it should be applied according to the manufacturer's instructions. Because of its characteristics, it is recommended as an acceptable base in unstable ground conditions (clay, high water table). This type of base would be more expensive than the sand and cement mix.

CAUTION: When troweling vermiculite, do not try to attain a smooth surface. Too smooth a surface will cause the liner to slide.

TROWELING OF POOL BASE

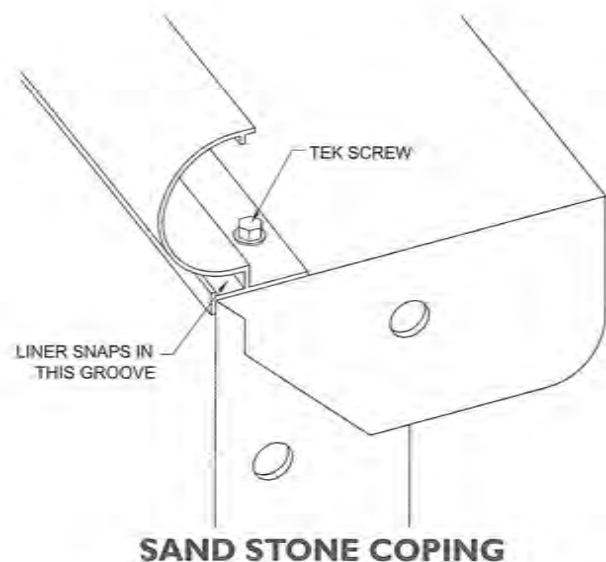
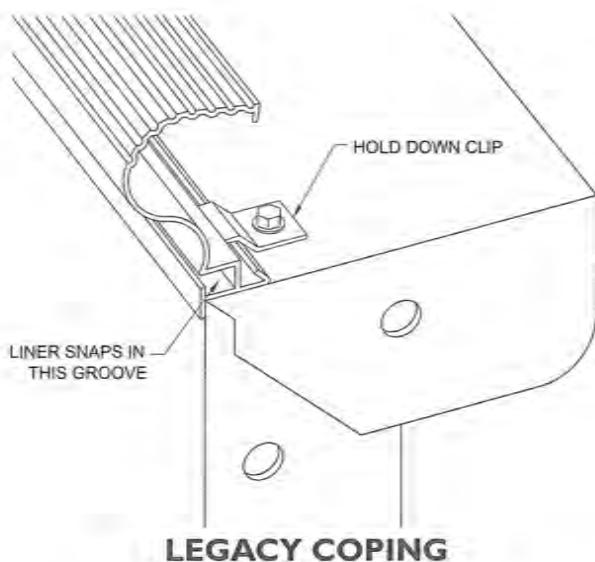
Start in the hopper end and place the pool base of your choice on the slopes, in preparation to troweling up to the 2" mark on the panel bottom.

Once the slopes have been troweled, proceed to the shallow end and continue troweling.

Next, trowel the breakover, working to the bottom of the hopper. Finish troweling the bottom of the hopper and exit the pool.

INSTALLATION OF COPING

All Legacy coping is pre-mitered or cut to fit for the Jewel Series and the True Oval, as well as, all 1000 Series, and the walk-in-stairs area on all steel stair pools. On Grecian Series pools some coping has to be mitered at an angle of 22 1/2°. As much as a 3/8" opening is acceptable as the cast aluminum cap will cover all mitered joints. All straight connections have a snap-on aluminum cap. The coping is affixed to the steel wall with an aluminum dove tail clip which slides into the track on the coping and bolted to the wall with a 3/8" bolt and nut. There are three mounting clips per 8' wall section. All Royal coping corners are pre-fabricated. A 3/8" opening is also acceptable as a cap will cover all joints. This coping is affixed to the steel wall with Tek Screws every 12".



INSTALLATION OF WALL FOAM

After taping the pool interior seams, wall foam may be applied to the steel wall, providing a cushion for the liner (just as padding provides a luxurious backing for carpeting). The wall foam comes in a roll 125' long, 42" wide and 1/8 of an inch thick.

It can be adhered to the steel with the use of a spray adhesive.

Start out by inserting a broom handle in the center of the roll. One person will guide the roll by leaning over the top of the wall, while another person inside the pool sprays the steel with the adhesive. Each person can then smooth the foam on the steel panel. Apply the adhesive per panel by spraying top, bottom and both sides of the panel first. Then spray an X in the center of the panel.

Place duct tape on all foam seams.

LINER INSTALLATION

Be sure to check all coping joints for sharp corners. Cover any existing sharp areas with duct tape so as not to tear the liner during installation.

Locate your industrial vacuum at the skimmer and insert the hose into the skimmer throat and out the front down to within 3" of the pool base. Tape around the hose to secure an airtight fit.

Unfold the liner at the deep end. Four people are needed for liner installation.

While two installers hold the liner on the coping at the deep end, two installers should begin to walk the liner to the shallow end.

As they reach the shallow end, the installers holding the liner on the deep end should walk towards the shallow end in order for the liner to be secured in the shallow end first.

Each of the four (4) corners of the liner are marked with an arrow on the back of the liner.

Place the liner into the extrusion, making sure the corners in the shallow end are in position.

Continue to place the liner into the extrusion working towards the deep end until the deep end corners are in place.

Be sure the bottom corners in the shallow end of the liner are flush against the wall.

The entire shallow end of the liner can be held in position against the wall with the aid of 8' water tubes.

LINER REPLACEMENT

1. Remove step unit faceplates and check gaskets. Notice the pre-drilled faceplates will have larger 3/8" holes at each end and in the middle. These larger holes will align themselves with pre-set dowels through the gasket and into the dead end block.

2. Before installing Liner, take a 4'x8' sheet of plywood and nail a 2"x4"x8' to plywood and screw a piece of extrusion to the 2"x4". Plywood conforms to step design. (See Figure 3)

3. Lay jig on top of step unit and tape around edge for a good seal for vacuum. (See Figure 4)

4. Install liner in normal manner, fitting liner at step area into the plastic extrusion.

5. Fill pool until water is approximately 4"-6" up on the front of the step unit.

6. Starting with bottom horizontal faceplate in hand and with liner in place, find dowels with your finger and place corresponding 3/8" hole over this protrusion. Start in the center first then proceed to left or right side dowels. This will automatically line up all the rest of the pre-drilled screw holes.

7. Fasten screws in place starting with holes next to dowels, top and bottom or left and right to center. **NOTE:** At the miter joints, screws are TOE NAILED INWARD toward bottom faceplate. This will INSURE a TIGHT MITERED JOINT on completion.

8. Once all screws are in place, hand tighten. (DO NOT OVERTIGHTEN - **This can strip the backer plate.**)

9. Once faceplate is installed, snap cover plate in place. Then slice liner in middle of step to relax material. Cut liner around *inside* of step faceplate. Remove liner from step. (Save liner section for possible patching material.)

10. Finish by placing vinyl cap over top of faceplate at coping.

FIGURE 4

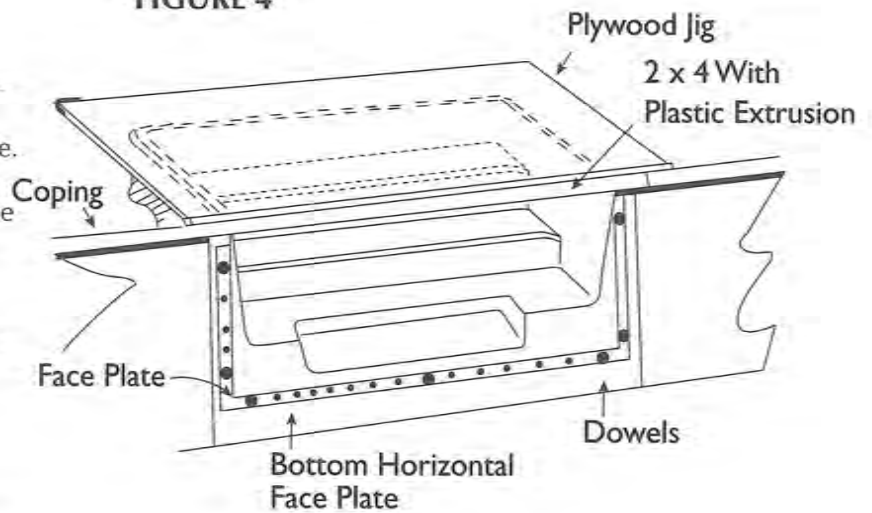
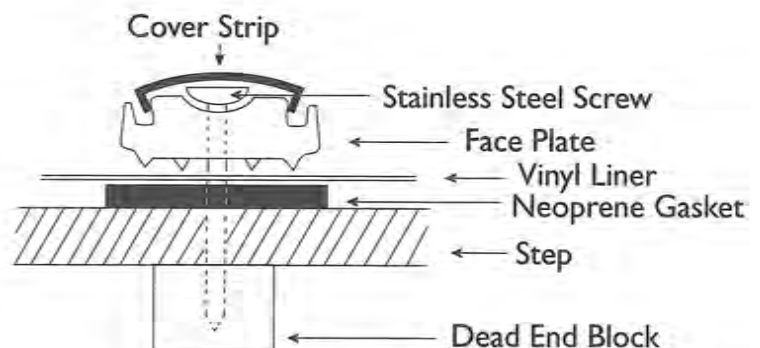
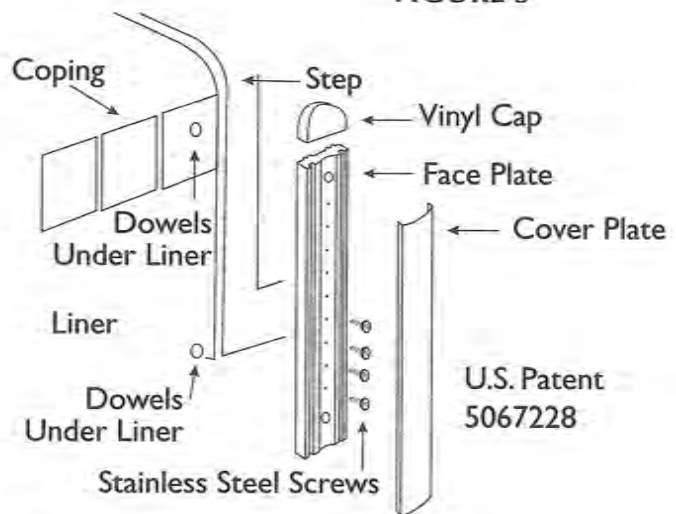


FIGURE 5



INSTALLATION OF LINER WITH STEEL WALK-IN-STAIRS

Follow the same procedure as previously discussed. Upon reaching the shallow end with the liner, insert all four (4) 3/8" diameter steel rods into the sleeves in the back of the liner. Be sure that the steel stairs are clean.

Start at the bottom stair and insert the bottom stair rod in the holes on the sides of the stairs. Install nuts hand tight. Continue the process until all four (4) stair rods have been installed.

Starting in each corner of the stairs, reverse the liner beading and push the beading into the extrusion. Continue around the perimeter of the stairs into the shallow end corners.

Secure all stair rods.

Even off the shallow end of the liner and continue to install the liner along the sides to the hopper corners. Make sure the corners of the liner are aligned with the corners of the hopper end (There is an arrow on the back of the liner).

FINAL POSITIONING OF THE LINER

Turn the vacuum on and pull out any liner wrinkles and adjust the liner to match the pool bottom. Wrinkles can be removed by reaching over the wall and pulling on the liner sidewall material.

Once the liner is positioned properly and wrinkles have been removed, refer to main drain installation instructions regarding faceplate attachment, fill the pool with water, leaving the vacuum running until the water reaches the shallow end.

Turn the vacuum off. Check position of the liner in the shallow end. Adjust if necessary and then continue filling the pool to within the indicator mark on the skimmer.

INSTALLATION OF FACEPLATES

Important Note: Do not install skimmer, return or light faceplates until the water is well over the fittings.

Place faceplates into position, feeling around until all holes line up. With a pointed tool, penetrate the liner where each hole is and affix the faceplates with appropriate self tapping screws provided.

After the faceplates are secured, cut out the opening with a razor blade.

FINAL BACKFILLING PROCESS

Because a concrete collar has been poured completely around the steel walls, final backfilling can be completed after the pool has been filled with water.

INSTALLATION OF LADDERS AND HANDRAILS

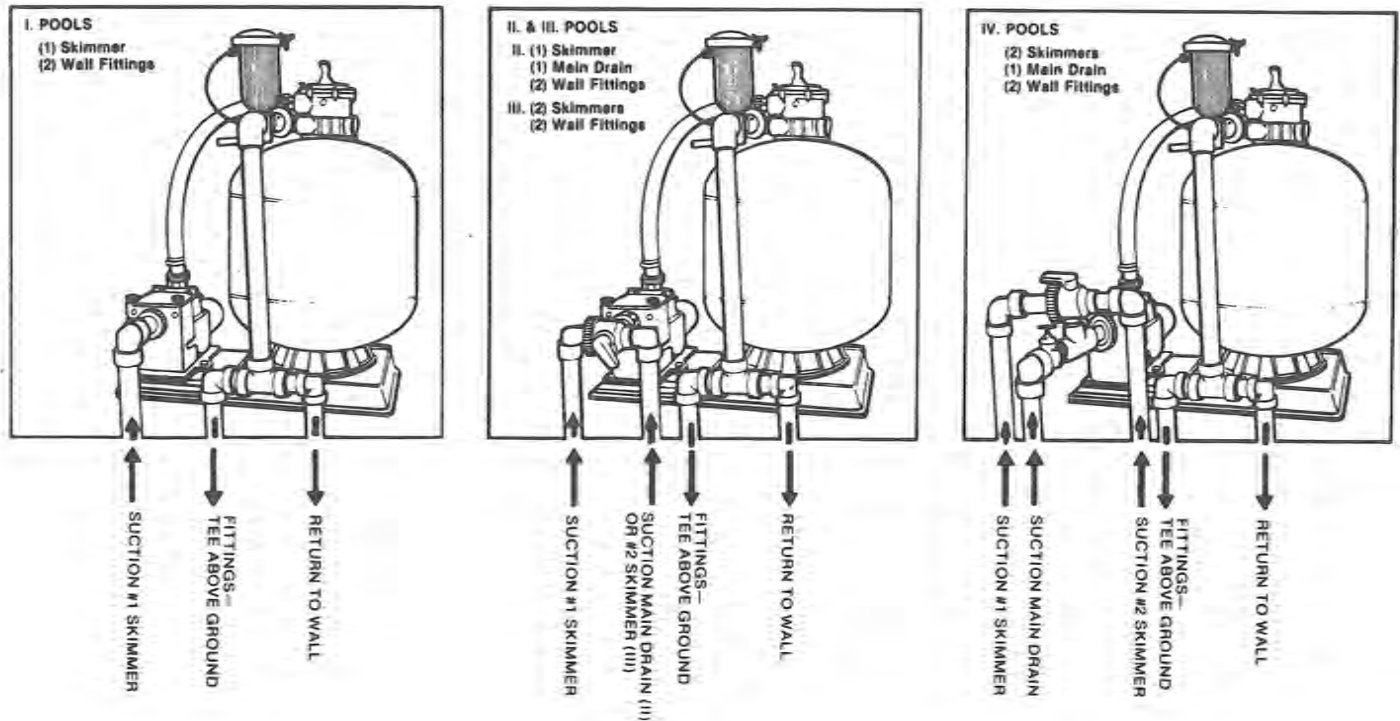
Ladder Installation

- Assemble ladder and secure sockets to ladder.
- Adjust sockets with blocks or shims so sockets are flush with level of deck (make sure ladders are grounded to local ordinances).
- When ladder and sockets are in position, pour deck around them and be sure not to move ladder until deck is dry.
- Handrails are recommended with all stair pools.
- Use same procedure as in ladder installation.

INSTALLATION OF FILTRATION SYSTEMS

Location of the filter should not exceed a distance of 20' from the skimmer for efficient operation. It should also not exceed 2' above the top of the pool. Be sure that filter and pump are placed on a concrete pad. A 4' x 8' pad is recommended in order to accommodate future installation of a pool heater.

Follow one of the following diagrams for your pool plumbing and be sure to pressure test each line before backfilling.



INSTALLATION OF HEATER AND AUTOMATIC CHLORINATOR

The installation of heaters should conform to all local and state codes. Pool heaters are available in electric, natural gas, LP gas and oil. Both indoor and outdoor models are available. Heaters should be mounted next to the filter and connected according to the manufacturer's recommended instructions. When installing heater, auto chlorinator, etc. refer to the manufacturers instructions. Refer to the instructions provided by the manufacturer for proper installation procedures.

INSTALLATION OF THE CONCRETE DECK

The final process in completing the pool installation is the concrete deck. Our main concern in pouring the deck is the area around the pool that has just been backfilled. The backfill will obviously settle in time, but cannot be relied on as a firm base for our concrete deck right now. Steps must be taken to provide support for the concrete deck on this freshly backfilled area. With the concrete receptor coping and top flange of its steel walls, some concrete support is provided since the front of the deck will be resting on and imbedded into this flange and into the receptor coping. Also some support will be provided by the virgin soil under the back of the deck area. Thickness of the concrete deck should be at least 4-6". Pitch away from the pool as 1/4" per foot minimum for good drainage. A brush finish on the surface of the concrete is recommended over a smooth finish in order to provide a non-slip surface.

Select one of the following procedures:

STEP 1

COMPACTING THE BACKFILL--If the pool is backfilled with sand, it can easily be compacted by hand or with a pneumatic tamper (be careful not to damage pool walls with tamper). After the soil has been compacted, locate 3/8" rebar (the width of deck) every two feet around the pool. A hole should be drilled into the top of the flange and the rebar should then be placed into the hole and bent down to lie on the compacted soil. (Additional rebar can be positioned every 2' running parallel around the pool for further support if desired) or 6 x 6 x 10 wire mesh is also a good choice.

STEP 2

PIER SUPPORT--In the event that compacting the soil is not practical or desirable, another procedure is recommended. It is the use of pier support in the backfill area. Pier supports can be implemented by: (1) placing cement blocks from the virgin ground around the pool up to the desired deck level. Blocks should be positioned every 3'- 4' around the pool walls. This should be done before backfilling or by: (2) after backfilling, use a post hole digger, to dig a hole down to the virgin soil. Do this every 3' - 4' around the pool walls and then fill holes up with cement. Continue to place rebar around the pool as in Step 1 or by: (3) using a steel deck support system. This should be installed onto the steel walls before the concrete collar is poured. After backfilling is completed, continue to place rebar around the pool as in Step 1. Expansion joints or scoring of the concrete is also recommended every 6' - 8' and at the corners, to help prevent surface cracks from forming. Note: Be sure to place an extension collar in the skimmer in order to raise the cover up to the deck level.

NOTE: Placement of mounts for ladders and handrails should be completed before deck is poured. See Manufacturer's instructions for details.

ANSI/NSPI FORWARD

(This Foreword is not part of the American National Standard ANSI/NSPI-5 2003)

This standard is a revision of ANSI/NSPI-5 1995, Standard for Residential Inground Swimming Pools, which was first approved by the American National Standards Institute on April 25, 1995 as an American National Standard. This standard was approved December 16, 2002. The effective date is October 1, 2003. The effective date is established by the National Spa and Pool Institute and not by the American National Standards Institute.

The objective of this standard is to provide recommended minimum guidelines for the design, equipment, installation, and use of residential inground swimming pools. It is also intended to assist local jurisdictions and other regulatory bodies, where necessary, in the development and promulgation of criteria for residential inground swimming pools.

The design requirements and construction practices in this standard are based upon sound engineering principles, research and field experience which, when applied properly, contribute to the delivery and installation of a safe product.

The words "safe" and "safety" are not absolutes. While the goal of this standard is to design and construct a safe enjoyable product, it is recognized that risk factors cannot, as a practical matter, be reduced to zero in any human activity. This standard does not replace the need for good judgment and personal responsibility. In permitting use of the pool by others, owners must consider the skill, attitude, training and experience of the expected user.

As with any product, the specific recommendations for installation and use provided by the manufacturer should be carefully observed.

This standard was prepared by the NSPI-5 Residential Inground Swimming Pool Standards Writing Committee of the National Spa and Pool Institute (NSPI) in accordance with American National Standards Institute (ANSI) Procedures for the Development and Coordination of American National Standards utilizing the ANSI-accredited canvass method. Consensus approval was achieved by ballot of the NSPI-5 canvass list.

The consensus committee that approved this standard was balanced to ensure that individuals from competent and concerned interests have had an opportunity to participate. The proposed standard was made available for public review and comment, which provides an opportunity for additional input from industry, academia, regulatory agencies, and the public at large.

The following organizations, recognized as having an interest in the standardization of residential inground swimming pools, were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

ANSI/NSPI-5-2003 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 inches (62 cm) in water depth and having a volume over 3,250 gallons (12,303L).

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

1.3 Variation in designs. This standard permits variations in equipment, materials, and design, including special features such as but not limited to ledges beach entries, waterfalls, fountains, bridges, planters, seats, benches, swimouts, in-pool tables and bar stools, walls over 12 inches (30.5 cm), scuba pools, spas, lap pools, swimspas, spillways, slides, coves, beams, 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, island pools, scuba pools, spas, lap pools and swimspas.

1.4 Important safety consideration. The variations in 1.3 shall consider safety for the intended use and the circulation of the swimming pool water.

1.5 Other standards. This standard does not apply to pools and spas covered by ANSI/NSPI-1 Standard for Public Swimming Pools, ANSI/NSPI-2 Standard for Public Spas, ANSI/NSPI-3 Standard for Permanently Installed Spas, ANSI/NSPI-4 Standard for Aboveground/Onground Residential Swimming Pools, ANSI/NSPI-6 Standard for Residential Portable Spas and Swimspas.

1.6 Workmanship. All work shall be performed in accordance with the 1996 NSPI Workmanship standard or the latest revision.

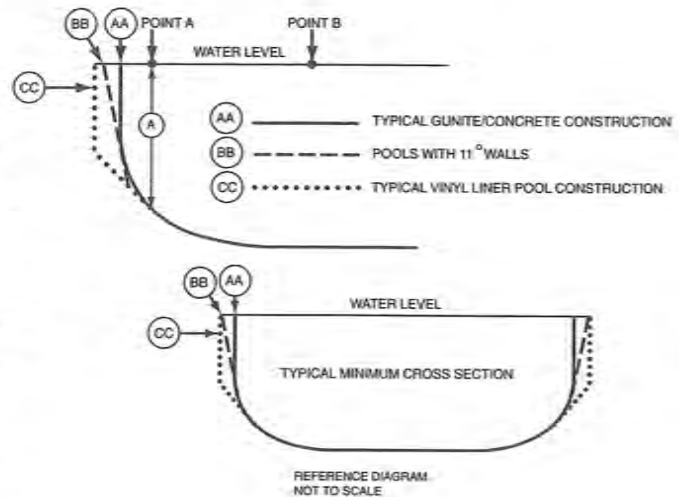


Figure 2 - Typical pool design configurations

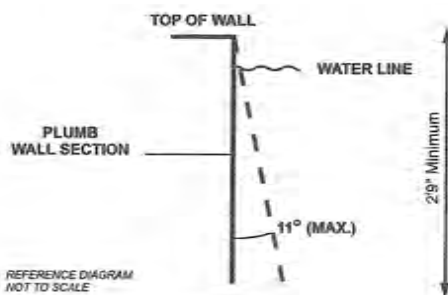


Figure 1 - Maximum allowable wall slope

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 come in contact with the user are arranged, and furnished so 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 of state or local authority. Prior to construction, rehabilitation, or alteration 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 generally accepted structural engineering practices and methods.

4.2 Freezing. In climates subject to freezing temperatures, the poolshell shall be so designed and constructed to protect it from structural damage due to freezing.

5. Pool dimensions and tolerances

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

5.1.1 Construction tolerances. There shall be construction tolerances allowed on dimensional designs. The overall length, width and depth shall be limited to a tolerance of plus or

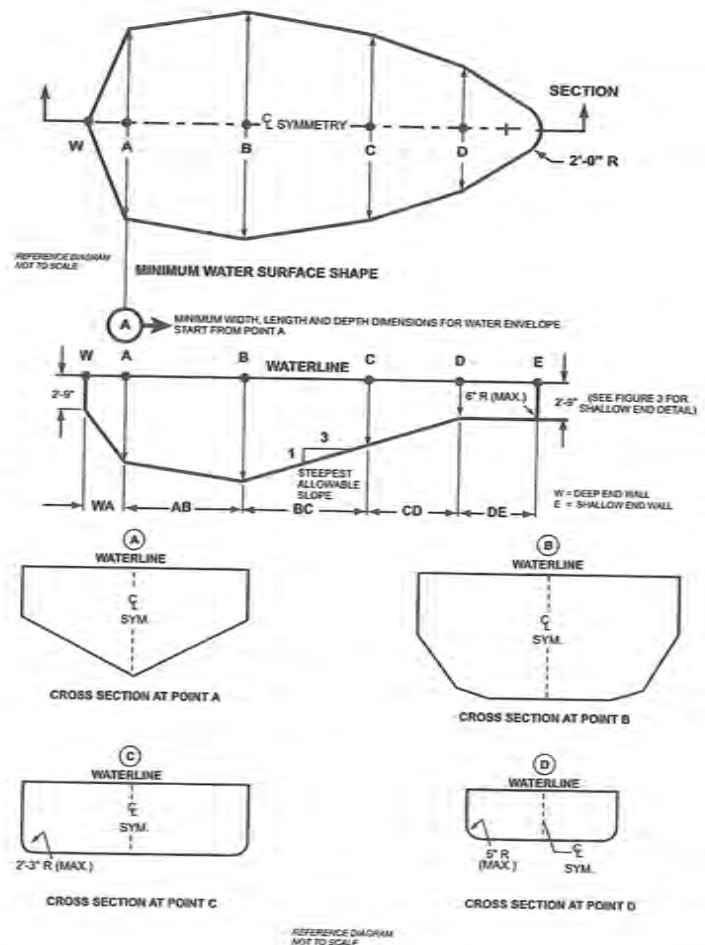


Figure 3 - Minimum water envelope

Table 1 – Minimum water envelope

Pool type	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
O	Manufactured diving equipment is prohibited													
I	6'-0"	7'-6"	5'-0"	2'-9"	10'-0"	12'-0"	10'-0"	8'-0"	1'-6"	7'-0"	7'-6"	Varies	6'-0"	28'-9"
II	6'-0"	7'-6"	5'-0"	2'-9"	12'-0"	15'-0"	12'-0"	8'-0"	1'-6"	7'-0"	7'-6"	Varies	6'-0"	28'-9"
III	6'-10"	8'-0"	5'-0"	2'-9"	12'-0"	15'-0"	12'-0"	8'-0"	2'-0"	7'-6"	9'-0"	Varies	6'-0"	31'-3"
IV	7'-8"	8'-6"	5'-0"	2'-9"	15'-0"	18'-0"	15'-0"	9'-0"	2'-6"	8'-0"	10'-6"	Varies	6'-0"	33'-9"
V	8'-6"	9'-0"	5'-0"	2'-9"	15'-0"	18'-0"	15'-0"	9'-0"	3'-0"	9'-0"	12'-0"	Varies	6'-0"	36'-9"

NOTE:

- *Minimum length between points CD may vary based upon water depth at point D and the slope between points C & D.
- Figure 3 drawings are not to scale. (For pool types, see Glossary.)

minus 3 inches (±7.6 cm). All other dimensions shall be limited to a tolerance of plus or minus 2 inches (±5.1 cm), unless otherwise specified.

5.2 Perimeter shape. No limits are specified for shape of pools except that consideration shall be given to shape from the standpoint of circulation of the swimming pool water and safety to the user.

5.3 Walls - requirements

5.3.1 Walls in the shallow area and deep area of the pool shall not slope greater than 11° (1.5 slope ratio) to a transition point. The transition point shall not be less than 2 feet and 9 inches (83.8 cm) below the waterline. See figure 1.

5.3.3 The walls of Type I pool, when defining the minimum diving water envelope, shall be plumb or outside of Type 1 water geometry. (See figure 3, table 1.)

5.4 Maximum allowable wall slope

5.4.1 Maximum allowable wall slope shall not slope greater than 11° from plumb.

5.5 Offset ledges

5.5.1 Offset ledges shall be a maximum of 8 inches (20.3 cm) wide.

5.5.1.1 Offset ledges, located less than 42 inches (1067 mm) below waterline shall be proportionately less than 8 inches (20.3 cm) wide and fall within 11° from plumb, measured from the top of the waterline. See figure 4.

5.6 Floor slopes. Floor slopes shall be reasonably uniform and comply with 5.6.1 through 5.6.3.

5.6.1 The slope of the floor from the shallow end wall towards the deep area shall not exceed 1 foot in 7 feet (30 cm; 213 cm) to the point of the first slope change as shown in figure 5.

5.6.2 Changes in slope between shallow and deep areas shall be at a minimum water depth of 2 feet 9 inches (83.8 cm) and be at least six feet (182.9 cm) from the shallow end, except as specified in 6.3.

5.6.3 The slope of the floor from the point of the first slope change toward the deep end shall not exceed 1 foot in 3 feet (30 cm; 91 cm).

5.7 Shallow end water depths. Water depth in the shallow area shall be a minimum of 2 feet 9 inches (83.8 cm) except for those locations specified in 6.3 "Shallow End Detail for Beach and Sloping Entries." The water depth at the shallowest point shall not exceed four feet (121.9 cm) as shown in figure 5.

5.8 Manufactured diving equipment for inground swimming pools (diving board/stand combination or manufactured platform)

NOTE — For consumer safety information, warnings and education programs. See appendices D, E, and F.

5.8.1 When manufactured diving equipment is installed, it shall conform to the

specifications set forth in 5.8 through 5.9 and shall be located in the deep area of the pool so as to provide the minimum dimensions as shown in 5.9.

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5.8.1.1 Manufactured diving equipment shall not be installed on Type D pools.

5.8.2 Diving equipment. Diving equipment shall be designed for swimming pool use and shall be installed in accordance with the manufacturer's specifications.

5.8.2.1 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 may refer to the water envelopes type of their choice by dimensionally relating their products to Point A on the water envelopes as shown in figure 3 and table 1, 5.9.1 through 5.9.3.

5.8.2.2 Diving equipment shall be permanently labeled and affixed to the diving equipment or jump boards and shall include but not be limited to:

- manufacturer's name and address;
- date of manufacture;
- minimum water envelope required for each diving board and diving stand combination; and
- maximum weight limitations of the user as specified by the board manufacturer.

5.8.2.3 Diving equipment shall have slip-resisting tread surfaces.

5.9 Figure 3 contains suggested drawing and diagrams for minimum water envelope for swimming pools designated type I - V. Individual pool types are shown in figure 3 and table 1.

5.9.1 Location of point A. Point A shall be defined as a point located on the minimum water envelopes.

5.9.1.1 Point A. Point A is a construction location nearest the deep end wall where the minimum water depth is satisfied.

5.9.1.2 Point A as shown in figure 3 and table 1 shall be the reference point of origin for all dimensions defining the minimum water envelope.

5.9.2 Type D pool (where diving is prohibited) shall not be limited in width, length, or water depth except as specifically provided for in this standard.

5.9.3 Location of equipment and pool features in the minimum water envelope. If the pool is designed for use with diving equipment, steps, pool stairs, ladders, underwater benches, special features and other accessory items shall be located outside the minimum water envelope. (See figure 6)

5.9.4 Typical pool design configurations. Vinyl liner, shotcrete, fiberglass and concrete constructions shall conform to, but are not limited to, the typical pool configurations shown in figure 2.

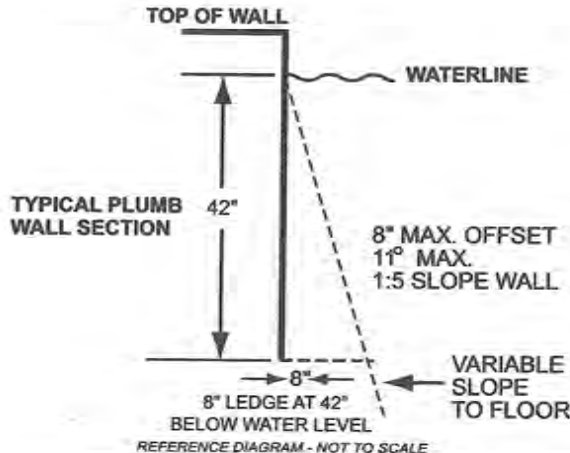


Figure 4 – Offset ledges

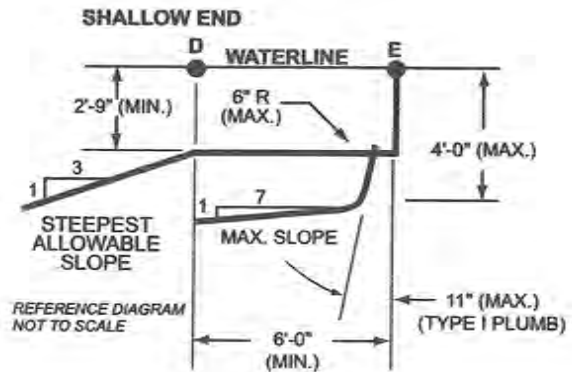


Figure 5 – Shallow end depths

5.10 Stationary diving platform(s) and diving rock(s). Stationary diving platform(s) and diving rock(s) built on site 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.

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

- Pool Type I 42 inches (106.7 cm);
- Pool Type II 42 inches (106.7 cm);
- Pool Type III 50 inches (127.0 cm);
- Pool Type IV 60 inches (152.4 cm) or
- Pool Type V 69 inches (175.3 cm)

5.10.2 Stationary diving platform(s) and diving rock(s) shall not be permitted on Pool Type 0.

5.10.3 The diving equipment manufacturer shall specify minimum headroom above water.

5.11 Swimming pool slides

5.11.1 Slides, where installed, shall be installed in accordance with manufacturer's specifications.

NOTE — For consumer safety information, warning, and education programs, see appendices D, E, and F.

6 Entry/exit

6.1 Entry/exit. All pools shall have a means of entry/exit in the shallow area if water depth exceeds 24 inches (61 cm) at the shallowest point. The means of entry/exit shall be located on the shallow side of the first slope change.

6.1.1 A means of entry/exit shall be provided in the deep area of the pool if the water depth is 5 feet (152.4 cm) or greater.

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, mechanical lifts, and other designs or products that provide the minimum utility as specified in this standard.

6.1.3 Pools over 30 feet (914.4 cm) in width shall provide entries/exits on both sides of the deep area of the pool.

6.1.4 Entries, exits, pool stairs, (as shown in figure 6) ladders, underwater benches, special features and other accessories shall be located outside the minimum water envelope as shown in figure 6 when pool is designed for use with diving equipment.

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 6.2 through 6.3. See figure 7.

6.2.1 Treads shall have a minimum unobstructed horizontal depth of 10 inches (25.4 cm) and a minimum unobstructed surface area of 240 square inches (1548 cm²).

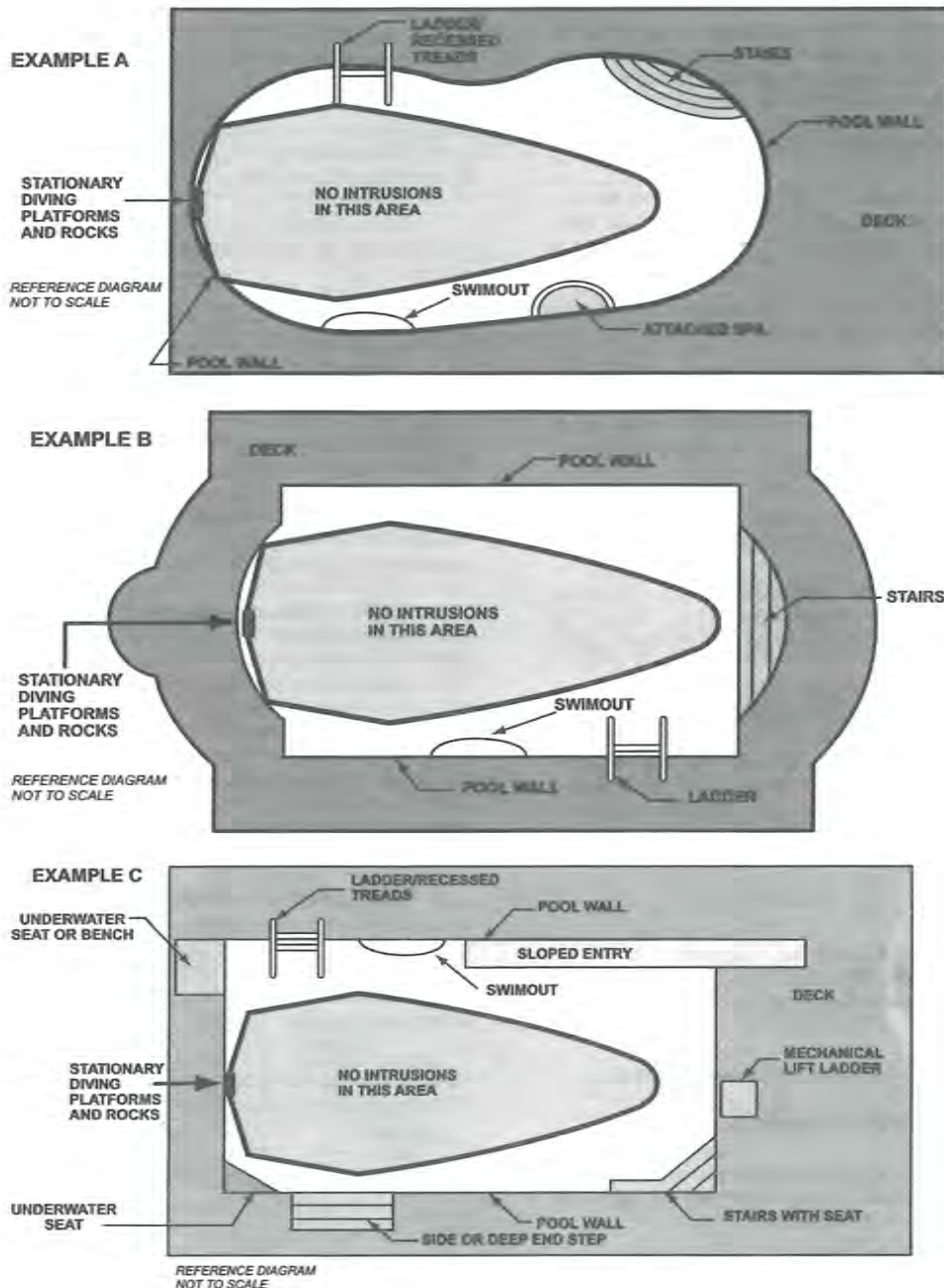


Figure 6 – Top view examples of accessory equipment and pool features prohibited in the water envelope

6.2.1.1 When stairs are equipped with a handrail, treads shall have a minimum unobstructed horizontal depth of 8 inches (20.3 cm) and a minimum unobstructed surface area of 240 square inches (1548 cm²).

6.2.1.1.1 The bottom riser height is allowed to vary to the floor.

6.2.2 All risers at the centerline shall have a maximum uniform height of 12 inches (30.5 cm), except the top or bottom riser, which may vary in height, but shall not exceed 12 inches (30.5 cm).

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 inches (30.5 cm).

6.2.2.2 When stairs are located in water depth over 48 inches (121.9 cm), the lowest tread shall be no less than 48 inches (121.9 cm) below the deck and visually set apart and located outside the wall of the pool.

6.3 Shallow end detail for beach and sloping entries

6.3.1 Sloping entries used, as a pool entrance (see figure 6-C) shall not exceed 1 foot in 7 feet (30 cm:213 cm).

6.3.2 Sloping entries are permitted to be used in conjunction with steps and benches.

6.3.2.1 Where benches are used in conjunction with sloping entries the vertical riser distance shall not exceed 12 inches (30.5 cm). For steps used in conjunction with sloping entries all requirements of 6.2 shall apply.

6.3.2.2 A vertical drop exceeding 12 inches (30.5 cm) inside a sloping entry shall be protected by a handrail.

6.3.3 Architectural features are not required to comply with the 1 foot in 7 feet (30 cm:213 cm) slope unless used as an entrance.

6.3.4 Beach and sloping entries surfaces shall be of slip resisting materials.

6.4 Handrails. If handrails are used, they shall conform to 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 inches (4.57 cm) 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-inch (25.4 cm) and not exceed 1.9 inch (4.83 cm). See Figure 7.

6.5 Pool ladder design and construction. Design and construction of ladders shall conform to 6.5.1 through 6.5.7.

6.5.1 All steps and ladders shall be located outside the minimum diving water 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 clearance of 3 inches (76.2 cm) minimum and six inches (152.4 cm) maximum between the pool wall and the ladder.

6.5.5 The clear distance between ladder handrails shall be 17 inches (432 mm) minimum and 24 inches (61 cm) maximum.

6.5.6 There shall be a vertical uniform distance between ladder treads, with a 7-inch (178 mm) minimum and 12 inch (30.5 cm) maximum.

6.5.7 Ladder treads shall have a minimum horizontal uniform depth of 2 inches (51 mm).

6.6 Recessed treads. The design and construction of recessed treads in the pool wall shall conform to 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 uniform vertical spacing of 7 inches (178 mm) minimum and 12 inches (305 mm) maximum.

6.6.3 The vertical distance between the pool coping edge, deck, or step surface and the uppermost recessed tread shall be 12 inches (305 mm) maximum.

6.6.4 Recessed treads shall have a depth of 5 inches (127 mm) minimum, and width of 12 inches (305 mm) minimum.

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 swimout. The design and construction of underwater seats, benches and swimouts shall conform to 6.7.1 through 6.7.3 (See figure 6A, 6B, and 6C.)

6.7.1 Underwater seats, benches and swimouts, when provided, shall be at 20 inches (508 mm) maximum below the waterline.

6.7.2 Underwater seats, benches and swimouts shall be permitted in the deep area of the pool. They shall be visually set apart and located outside of the required minimum diving water envelope if the pool is designed for use with diving equipment, as shown in figure 6A, 6B, and 6C.

6.7.3 Underwater seats, benches or swimouts are permitted to be part of the stairs, recessed treads, beach entries, or ramps, or other special features.

7. Decks

7.1 General requirements. There is no requirement to provide decking around pools.

7.1.1 Deck(s), when provided, shall be designed and installed in accordance with local construction practices for the decking type and the site condition.

7.1.2 All deck surfaces 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) shall be installed so as to protect the coping tile and its mortar bed from damage as a result of deck movement.

7.1.4 Deck(s) shall be edged, radiused, or otherwise be relieved to eliminate sharp corners.

7.2 Drainage

7.2.1 Deck(s) shall be sloped to effectively drain towards the perimeter areas or deck drains.

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 (3 mm:305 mm) 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.

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 local construction practices and the recommendations of the latest American Concrete Institute (ACI) standard 302.1R-96, *Guide for concrete floor and slab construction* or the latest revision.

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

- 1/8 inch per 1 foot (3 mm:305 mm) shall be provided for textured, hand-finished concrete decks;
- 1/4 inch per 1 foot (6 mm:305 mm) for exposed aggregate concrete decks; and
- 1/2 inch per foot (13 mm:305 mm) 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 Wood decks (See appendix G for suggested wooden deck materials)

7.4.1 There is no minimum slope requirement for wood decks. The maximum slope for wood decks shall be 1/4 inch per foot (6 mm:305 mm).

7.4.2 Gaps shall be required between deck boards 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 7.2 through 7.2.4.

7.6 Deck steps

7.6.1 Steps. Step risers for the deck shall be uniform and have a maximum height of 7-1/2 inches (191 mm). The minimum tread depth shall be 10 inches (254 mm).

8. Materials of construction & finishes

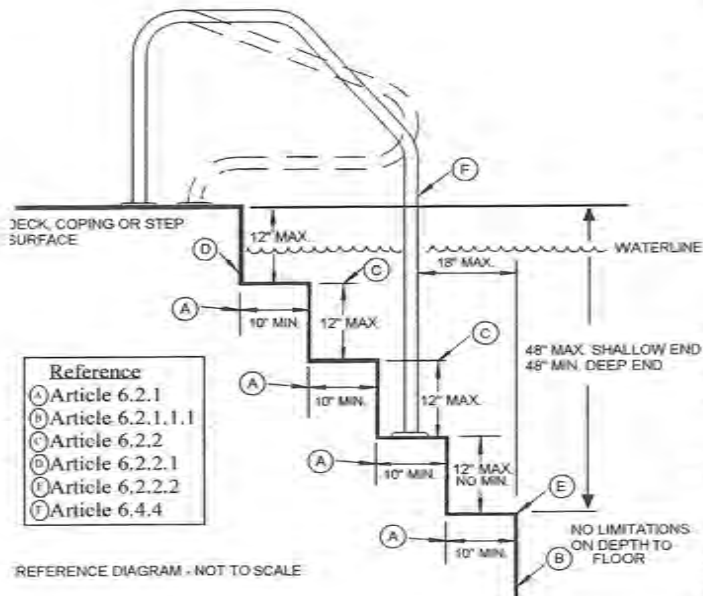
8.1 Surfaces. The surfaces within the pool intended to provide footing for bathers shall be designed of slip-resisting materials. The roughness or irregularity of such surfaces shall not cause injury or be an abrasion hazard during normal use.

8.1.1 The interior surfaces of the pool shall be watertight.

8.2 Finishes (paint). All paints and finishes shall be in compliance with the U.S. Code of Federal Regulations (CFR) 1303.1 et, Seq. (1997).

9. Circulation systems components and related equipment

9.1 Compliance. Circulation systems, components, and equipment shall comply with ANSI/NSF 50, *2000 Circulation system components and related materials for swimming pools, spas/hot tubs or the latest revision.*



REFERENCE DIAGRAM - NOT TO SCALE

Figure 7 - Pool stairs - side view

9.1.1 Location. A circulation system consisting of pumps, piping, return inlets, suction outlets, filters, and other necessary equipment shall be provided for circulation of water throughout the pool and shall be located as to prevent their 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 from damage due to freezing.

9.1.3 Turnover and water clarity. 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 turn over 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 accessibility. Circulation system components, which require replacement or servicing, shall be 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 pounds per square inch (psi) for 30 minutes. The test shall be performed before the deck is poured and the pressure shall be maintained through the deck pour.

9.2 Water velocity. The water velocity in the pool piping shall not exceed 10 feet (304.8 cm) per second for pressure piping and 8 feet (243.8 cm) per second for suction piping, unless summary calculations are provided to show that greater flow is possible with the pump and piping provided. In copper pipe, the velocity shall not exceed 8 feet (243.8 cm) per second for suction and pressure piping. Pool piping shall be sized to permit the rated flows for filtering and cleaning without exceeding the maximum head of the pump.

9.2.1 Flow rates through suction grates shall not exceed 1.5 feet/sec (457 mm/sec) (See 9.1.4.)

9.3 Piping and fittings. The circulation system piping and fittings shall be considered to be process piping, and shall be of material compatible with the user and able to withstand operating at 1-1/2 times the design working pressure.

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

9.3.2 Equipment shall be designed and fabricated to drain the pool water from the equipment, together with exposed face piping, by removal of drain plugs and manipulating valves, or by other methods. Refer to manufacturer's instructions for specific information on draining the system.

9.3.3 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 approved by a nationally recognized testing laboratory to comply with the ANSI/NSF 50 2000 *Circulation system components and related materials for swimming pools, spas/hot tubs or the latest revision.*

9.4.2 Filters installed on swimming pools shall be capable of providing water clarity noted in 9.1.3.

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

9.5 Relieving accumulated air pressure. Pressure-type filters shall provide an automatic internal or a manual external means to relieve 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 an air release, a lid or a manual means which provides a slow and safe release of pressure as it is opened as a part of its design.

9.6 Piping. Piping furnished with the filter shall be of suitable material capable of withstanding one and one-half (1-1/2) 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 and shall be installed according to the manufacturer's instruction.

9.8 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 Time clock/related devices. The circulation system shall be capable of maintaining water clarity and water chemistry requirements. See appendix A. Time clocks and/or other devices are permitted to set the operating period of the circulation system.

9.9.1 When appurtenant devices such as chemical/disinfectant feeders, heaters, and other devices are used and are dependent upon circulation pump flow, they shall be permanently wired into the time clock (when applicable). See manufacturer's specifications.

9.10 Pumps

9.10.1 Swimming pool pumps shall be tested and approved by a nationally recognized testing laboratory to comply with the ANSI/NSF 50 2000 *Circulation system components and related materials for swimming pools, spas/hot tubs or latest revision.* Pumps rated five (5) horsepower or less shall comply with the latest revision of ANSI/UL 1061, 1997 *Standard for swimming pool pumps, filters and chlorinators.*

9.10.2 Horsepower rating. Pump horsepower rating and labeling shall not exceed the brake horsepower of the motor.

9.10.3 A pump and motor shall be provided for circulation of the pool water. 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.

9.10.4 Pressure filter systems with a cleanable strainer or screen shall be provided between the pool and the circulation pump(s) to remove solids, debris, hair and lint.

9.10.5 Access to the pump(s) and motor(s) shall be provided for inspection and service.

9.10.6 Pump(s) and component parts shall be installed to provide access so as

not to be hazardous to the operator or maintenance personnel.

9.10.7 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.

9.10.8 All motors shall have an open drip-proof enclosure (as defined by the latest National Electrical Manufacturers Association (NEMA) STANDARD MG-1998 or the latest revision and be constructed electrically and mechanically to perform satisfactorily and safely under the conditions of load and environment normally encountered in swimming pool installations.

9.10.9 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.

9.10.10 All motors shall have thermal or current overload protection.

9.10.11 When the pump is below the waterline, valves shall be permanently connected in the suction and discharge lines.

9.11 Surface skimmer systems

9.11.1 A surface skimming system or a perimeter overflow system shall be provided and shall be designed and constructed to skim the pool surface.

9.11.1.1 Surface skimming devices shall be tested by a national recognized testing laboratory and comply with ANSI/NSF 50 2000 *Circulation system components and related materials for swimming pools, spas/hot tubs or the latest revision.*

9.11.2 Skimming devices shall be designed and installed so as not to constitute a hazard to the user.

9.11.3 Where automatic surface skimmers are used as the sole overflow system, at least one (1) surface skimmer shall be provided for each 800 square feet (74.32 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.

9.12 Inlets and outlets

9.12.1 Entrapment avoidance. The suction outlet(s) including covers, fittings and hardware shall be designed in accordance with manufacturers specifications to provide protection from body and hair entrapment. (See appendix I, Entrapment avoidance.)

9.12.2 Testing and certification. Suction outlet(s) (other than skimmers) that measure less than 12 inches X 12 inches (144 sq. in.) shall be provided with covers that have been tested by a nationally recognized testing laboratory and comply with ASME/ANSI A112.19.8 M 1987(R 1996) *Suction fittings for use in swimming pools, wading pools, spas, hot tubs, and whirlpool bathtub appliances or the latest revision.*

9.12.3 Outlets per pump. If a single or multiple pump suction system is located below the waterline and any one of the suction outlets becomes blocked, the flow through the remaining suction outlet shall be designed to accommodate 100% of the circulation turnover rate. If located at the waterline, a single suction outlet (such as a skimmer, overflow grate, infinity wall, etc.) shall be permitted, provided it is vented to the atmosphere.

9.12.4 Water velocity. Water velocity through suction grates shall be permitted to exceed 1.5 ft/sec (0.4m/sec) if the grate(s) comply with ASME/ANSI A112.19.8 M 1987 (R 1996) *Suction fittings for use in*

swimming pools, wading pools, spas, hot tubs and whirlpool bathtub appliances or the latest revision.

9.12.5 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.

9.12.6 Number of inlets. The number of return inlet(s) shall be based on a minimum of one (1) return inlet per 300 square feet (27.87 m²) of pool surface area, or fraction thereof. Return inlet fittings shall be of sufficient size or quantity to allow a full turnover rate of the circulation system in accordance with the manufacturer's specifications or return inlets.

9.12.7 Inlets and outlets from the circulation system shall be designed so that they do not constitute a hazard to the user.

9.12.8 Important safety consideration. The pool shall not be operated if any outlet grate is missing, broken, or secured in such a way that it is removable without the use of tools, unless removable still provides the equivalent means of protection.

9.12.9 If a suction outlet system, such as a filtration system booster system, automatic cleaning system, solar system, etc., has a single suction outlet, or multiple suction outlets which are capable of being isolated by valves, each suction outlet shall protect against bather entrapment by any of the following:

— an anti-entrapment cover that meets the ASME/ANSI A112.19.8M-1987 (R1996) *Suction fittings for use in swimming pools and wading pools, spas, hot tubs and whirlpool bathtub appliances or the latest revision;*

— a 12 inch X 12 inch (305 mm X 305 mm) grate or larger, which allows a maximum flow rate not to exceed 1.5 feet per second (fps) (457 per second); or

— by alternate designs or means that produce equivalent protection.

NOTE — See "Guidelines for Addressing Entrapment Hazards with Pools and Spas", U.S. Consumer Product Safety Commission, Publication # 363-009801, (301) 504-0400 or www.cpsc.gov/cpscpub/pubs/363.pdf

9.12.10 Where provided, the vacuum cleaner fittings(s) shall be located in an accessible position(s) at least 6 inches (152 mm) and no greater than 18 inches (457 mm) below the minimum operating water level or as an attachment to the skimmer(s).

9.13 Heaters

9.13.1 Important safety consideration. Fossil Fuel like swimming pool heaters

produce poisonous carbon monoxide gas as a by-product of combustion. Proper venting of exhaust gases and the correct sizing of gas meters, gas supply piping, make-up air intakes, etc. are critical installation considerations in preventing potential carbon monoxide gas poisoning or loss of life.

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

9.13.3 Heaters shall be tested and comply with the requirements of ANSI-Z21.56-1991 *Gas fired pool heaters or latest revision and/or UL 1261 2001 Electrical water heaters for pool and tubs or the latest revision.* Heat pumps shall comply with UL 1995 *Standard for heating and cooling equipment* 1999 or latest revision.

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

9.13.5 Sizing. For efficient and economical operation, it is important that the heater be properly sized. Determine the proper size heater by first determining the area of the swimming

pool in square feet. Then select from the manufacturer's charts the heater that is properly sized for that particular pool.

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

9.13.7 Support. Heaters shall be installed on a surface with 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.

9.13.8 Combustible surfaces. If the heater requires a non-combustible surface as required by the manufacturer, it shall be placed on a cement or other accepted surface per ANSI Z21.56 1991, or the latest revision, or federal, state, and local codes.

9.13.9 Clearances. When installing a heater, adequate clearances shall be maintained on all sides and over the top of the unit. Consult manufacturer's instructions for proper clearances.

9.13.10 Ventilation. The heater shall have adequate ventilation in order to ensure proper operation.

9.13.11 Make-up air. When installing a fossil fuel heater indoors, proper 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.

9.13.12 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 the pump off.

NOTE — The "fireman's switch" does not protect against a manual override or a system shut down in the event of power failure.

9.13.13 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.

9.13.14 Heating energy source

9.13.14.1 Natural gas energy supply. The heater gas supply piping shall comply with manufacturer's specifications and ANSI/NFPA 54-1992, or the latest revision.

9.13.14.1.1 Important safety consideration. A gas cock shall be installed, properly sized and readily accessible outside the jacket, to stop the flow of natural gas at the heater for service or emergency shutdown.

9.13.14.2 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 ANSI Z223.1/NFPA 58 2000 National Fuel gas code or the latest revision.

9.13.14.2.1 Important safety consideration. Propane gas is heavier than air and therefore can create an extreme hazard of explosion or suffocation if the heater is installed in a pit or enclosed area. NFPA 58-2000 or the latest revision contains provisions for installing valves and other controls in pits and similar areas.

9.13.14.2.2 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.

9.13.14.3 Electrical energy supply. Electric heating appliances shall be installed in accordance with the National Electrical Code 1999 (NEC[®]) or the latest revision and any federal, state, or local codes.

9.13.14.3.1 Important safety consideration. Grounding and bonding. The requirements for grounding and bonding are particularly important and shall be adhered to. Heater circulation system water flow through the heater, and any plumbing installations shall be done in compliance with manufacturer's specifications and local codes.

10. Water supply

10.1 Treatment. The water supply shall be of a quality that will allow 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-siphonage in a manner approved by the state or local authority or through an air gap meeting the latest American National Standards Institute 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. Its open end shall have no sharp edges and shall not protrude more than 2 inches (51 mm) beyond the edge of the pool.

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.

11. Waste water 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.

12. Chemical feeders and ozone generators

12.1 Compliance. When chemical feeders are used to add sanitizing agent to pool or spa water, the chemical feeders 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.)

12.1.1 Electrically operated chemical feeders and ozone generators shall be tested and approved by a national recognized testing laboratory.

12.2 Chemical feeders. Manufacturer's specifications shall be used when installing and maintaining chemical feeders.

12.2.1 Chemical feed 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 filter and chemical feed pump timers shall be interlocked.

12.3 Ozone-generating equipment. If used, the installation of ozone-generating equipment shall be limited to low ozone output generating equipment. The installation and use of ozone generating equipment shall conform to manufacturer's specifications. For recommendations, see appendix A and appendix B.

12.3.1 Ozone-generating equipment shall be used in conjunction with an EPA-registered sanitizer and other chemical treatments to meet the chemical operating parameters. For recommendations, see appendix A and appendix B.

12.3.2 Manufacturer's specifications shall be used to determine where and how ozone shall be injected.

13. Electrical requirements

13.1 Electrical components. All electrical components installed in and/or adjacent to an inground residential swimming pool shall comply with the requirements of the National Electrical Code 2002, Article 680, or the latest revision and any state or local code.

14. Instructions for the circulation system, pressure filters, and separation tanks

14.1 Written operation and maintenance instructions. Written operation and maintenance instructions shall be provided to the homeowner for the circulation system.

14.2 Labeling for circulation system pressure filters and separation tanks. Pressure filters and separation tanks shall have operation instructions permanently installed on the filter or separation tank and shall include a precautionary statement not to start-up the system after maintenance without first opening the air release and proper re-assembly of the filter and/or separation tank. The statement shall be visible and noticeable within the area of the air release.

15. Safety features

15.1 Handholds. Handholds shall be provided around pool edge in any area where the water depth exceeds 4 feet (121.9 cm)

15.1.1 Handhold shall be accessible within 4 feet (121.9 cm) not to exceed 8 feet (243.8 cm) at any two points along the inside of the pool perimeter where the water depth exceeds 4 feet (121.9 cm). Handholds may include but not limited to any one or combination of the following items listed in 15.1.1.1 through 15.1.1.5.

15.1.1.1 Deck, coping and ledges located not more than 12 inches (305 mm) above the waterline.

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

15.1.1.3 Ladders, stairs and underwater seats or ledges.

15.1.1.4 Secured rope or rail placed within 12 inches (305 mm) above the waterline.

15.1.1.5 Any finish or design that will afford a single handhold within 12 inches of the water line.

15.2 Rope and float. In pools where the point of first slope change (See figure 2) occurs in water depths less than 4 feet 6 inches (137.2 cm), a rope and float assembly shall be installed across the width of the pool generally parallel to, and at a minimum of 1 foot (305 mm) and a maximum of 2 feet (610 mm) on the shallow side of the change in floor slope.

15.2.1 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.

15.2.2 Replacement vinyl liners shall be supplied with notification of the responsibility to reinstall the replacement of rope anchor devices and the rope and float assembly following the installation of the liner.

15.3 Pool lighting. The use of artificial pool lighting is at the discretion of the pool owner. Lighting, when installed, shall be in accordance with applicable electrical codes in consultation with a qualified electrical professional.

NOTE — For consumer safety information, warnings and education programs, see appendices D, E, and F.

15.4 Pool alarms. Pool alarms, if used shall be in compliance with ASTM F-15.49 on *Pool alarms for swimming pools, spas and hot tubs*.

15.5 Safety covers. When an automatic power/manual safety cover for swimming pool is used as a barrier it shall be in compliance with ASTM 1346-1991 *Emergency standard performance specification for safety covers and labeling requirements*.

15.6 Model child protection/barrier code. If a model child protection/barrier code is used, it shall be in compliance with ANSI/SNPI-8 1996 *Model barrier code* or the latest revision.

Appendix D

RECOMMENDATIONS TO WARN AGAINST SHALLOW WATER DIVING

Recommended methods to warn against shallow water diving may include but not be limited to:

A. Safety Signs

The use of warning signs, as a device to warn against shallow water diving is still an open question before the Human Factors Society and others as to whether or not signage is an effective means that will modify human behavior to prevent accidents.

If warning signs are chosen as a means to warn against shallow water diving, the signage should be in compliance with ANSI Z535 1998 Series of standards for safety signs and colors or the latest revision.

This sign is based upon a study entitled "Design of Swimming Pool Warnings". This sign has been reviewed by the staff of the U.S. Consumer Product Safety Commission and supports its use.

B. Additional Signage Use

The ANSI-Z535 1998 Series of Standards reflects the consensus of various experts on warning sign appearance and content. Signage, which is consistent with the ANSI-Z535 Standards, is permitted to be added to components, equipment, facilities or installations, to provide additional information.

Manufacturers are permitted to either affix additional signage to their products or packaging, or to supply the signage with the product to be affixed at the time of installation.

(This appendix is not part of the American National Standard ANSI/NSPI-5 2003, but is included for information only)

Appendix E

SAFETY CONSIDERATIONS AND WARNING RECOMMENDATIONS

The national Spa and Pool Institute (NSPI) suggests that the builders/installers of swimming pools advise the initial owner/operator of a Residential Pool of the following:

Warning Recommendations: The NSPI suggests the builder/installer advise the pool owner of the risk of drowning, especially for children under the age of five, and the risk of diving into shallow water in one or more of the following ways: **verbally, through publications or signage.** The following are suggested recommendations:

Lifesaving Equipment: The NSPI suggests the builder/installer advise the pool owner



operator that basic lifesaving equipment including one or more of the following items should be on hand at all times:

A light, strong, rigid pole not less than twelve feet (12') long.
A minimum one-fourth inch (6 mm) diameter throwing rope as long as one and one-half (1 1/2) times the maximum width of the pool or fifty feet (15.2 meters), whichever is less, which has been firmly attached to a Coast Guard approved ring buoy having an outside diameter of approximately fifteen inches (38.1 cm), or some other similar flotation device.

Safety Considerations for Pool Owner/Operators: For additional safety information see www.nspi.org.

This standard does not replace good judgment and personal responsibility. In permitting use of the pool by others, owners/operators must consider the skill, attitude, training and experience of the expected user. It is the pool owner/operator's responsibility to learn, understand and enforce these basic safety principles and rules:

- Encourage children to learn how to swim.
- Never allow diving, jumping or sliding into shallow water.
- Adult supervision is always required when children five (5) years or younger are present.
- Encourage parents to learn CPR.
- Encourage children to never swim alone.
- Keep all electrical radios, speakers and other appliances away from the swimming pool.
- Do not allow roughhousing and horseplay.
- Keep deck clean and clear of objects that may create a hazard.
- Keep all breakable objects out of the pool area.
- Alcohol consumption and pool activities do not mix. Never allow anyone to swim, dive or slide under the influence of alcohol or drugs.

Do's and Don'ts for Diving into swimming pools with manufactured diving equipment, diving rocks, and stationary diving platforms:

- **Do** know the shape of the pool bottom and the water depth before you dive or slide headfirst.
- **Do** plan your path to avoid submerged obstacles, surface objects or other swimmers.
- **Do** hold your head up, arms up, and **steer up** with your hands.
- **Do** practice carefully before you dive or slide.
- **Do** test the diving board for its spring before using.
- **Do** remember that when you dive down, you must **steer up**.
- **Do** dive straight ahead - not off the side of the diving board.

- **Don't** drink and dive.
- **Don't** dive or slide headfirst in the shallow part of the pool.
- **Don't** dive across the narrow part of the pool.
- **Don't** run and dive.
- **Don't** dive from any place that is not specifically designed for diving.
- **Don't** engage in horseplay on diving or sliding equipment.
- **Don't** use diving equipment as a trampoline.
- **Don't** do a back dive.
- **Don't** try fancy dives; keep the dives simple.
- **Don't** dive or slide headfirst at or through objects such as inner tubes.
- **Don't** put diving or sliding equipment on a pool that wasn't designed for it.
- **Don't** swim or dive alone.
- **Don't** dive into unfamiliar bodies of water.

Rules for General Use of Swimming Pool Slides.* Under all circumstances you should prohibit:

- Prohibit all headfirst entry from slide.
- Horseplay.
- Any slide entries by non-swimmers into deep water, to protect them from drowning.
- Standing on the top of a slide or outside the guardrails.
- Jumping from a slide.
- Diving from a slide.
- Sliding into areas with submerged obstacles, surface objects or other swimmers.

*Consult safe use instructions of the pool slide manufacturer.

(This appendix is not part of the American National Standard ANSI/NSPI-5 2003, but is included for information only)

Appendix F

SAFETY BROCHURES AND EDUCATION PROGRAMS

Consumer awareness information is available from the following sources:

- "The Sensible Way to Enjoy Your Inground Swimming Pool" . . . Published by the NSPI
- "Children Aren't Waterproof" . . . Published by the NSPI
- "Layers of Protection" . . . Published by the NSPI
- "Pool and Spa Emergency Procedures for Infants and Children" . . . Published by the NSPI
- "Knowing How to Dive" . . . Published by the National Spa and Pool Institute (NSPI)

Copies of the above brochures are available free from the NSPI at 1-800-323-3996. Also go to NSPI's website at www.nspi.org and consult "Consumer Information".

Educational programs and materials (i.e., seminars, workshops, brochures, videos, instructional guides, etc.) are available from NSPI, NSPF, other aquatic safety groups, and by private firms. As a means of communicating useful safety information to pool owners/operators and users, industry members are permitted to provide such information to owners/operators and to request or require owners/operators to sign a statement that they have received, read and will follow the guidelines.

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