

# Winterizing a Pool – Inground Pools In Severe Climates (Snowbelt)

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*Brought to you by the APSP Recreational Water Quality Committee*

## I. INTRODUCTION

In many areas of the United States (and Canada), the advent of fall brings an end to the swimming season as temperatures drop. The swimming pool industry for years has faced the challenge of dealing with freezing temperatures that can damage equipment, interior finishes, plumbing, tile, and structures. The focus of this bulletin is to look at the key elements that go into closing down an in-ground pool such that you minimize and prevent both physical and chemical damage to components of the pool.

All equipment should be serviced in accordance with the manufacturer's instructions. This bulletin contains general guidelines.

## II. SUMMARY OF TREATMENTS AND PROCEDURES

### Water Treatment

As a starting point, most winterizing processes recommend balancing the pool water to APSP standards. (See table below.) Consideration should be given to the fact that as the water temperature decreases the Langelier Saturation Index (LSI) will decrease (water will become more corrosive). This balancing process should take place 3-7 days prior to closing the pool. These levels should be adjusted and then rechecked using proper testing equipment.

Parameter	Min	Max	Ideal Range
pH	7.2	7.8	7.4-7.6
Total Alkalinity, ppm	60	180	80-120
Calcium hardness, ppm	150	1000	200-400
LSI	-0.3	+0.5	0.0 to +0.5

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At initial closing, it may be preferable to balance the water in a positive range allowing for the fact that as the temperature drops the LSI will drift downward.

For chlorine and bromine pools, the pool water should be shocked using a chlorine product to remove residual swimmer waste, kill bacteria and algae, and remove other organic contaminants from the water. Additional oxidation may be performed with a non-chlorine oxidizer. The chlorine and other oxidizer residuals should be allowed to decline prior to adding additional closing chemicals such as algaecides and sequestering agents that may be degraded by high levels of oxidizer.

For PHMB (biguanide) sanitized pools, the pool water should be oxidized with hydrogen peroxide.

The use of an EPA registered algaecide is recommended due to the lack of winter filtration and the use of certain types of covers which may allow sunlight and fine organic debris and contaminants to enter the pool's water.

Balancing the water is the first step in preventing staining to interior finishes; however, the use of an appropriate stain preventative is recommended in many regions of the United States due to the length of time the pool is shut down. Many commercially available winterizing kits will often contain sequestering or chelating agents. Always check with the individual manufacturer of the winterizing kit as to the best practice for use during the pool closing process.

Clean the pool. This should include a thorough brushing of all the surfaces, including, but not limited to walls, coves, and floor. Skim the pool's surface and remove any floating leaves and other organic debris. Vacuum the pool.

After taking care of the water treatment, the following procedures should be performed. The topics here are not listed in the order that they should be performed. The order will vary depending on the location and type of equipment used.

#### **Filtration Equipment, Pumps, Heaters, and Chemical Feeders & Controllers**

Clean the filter. Backwash several times if a sand or DE type filter. If a cartridge filter, then remove and clean the cartridge(s), allow them to dry and then store for the winter in a warm dry indoor location. DE grids can also be cleaned, removed, and stored indoors. Empty all chemical feeders (please see precautions below). Drain your pump, filter, heater, and chlorinating equipment. Place the drain plugs in the hair and lint (pump) basket, so that you can find them in the spring.

Using an appropriate method, purge any remaining water from the pump, heater, heat pumps, chemical feeder and other wetted equipment. Care must be taken to use the proper procedures and equipment (e.g. wet/dry shop vacuum, low pressure air

compressor, etc.) since pool equipment and lines cannot take excessive pressure and overpressure could present a safety hazard. This process should only be performed by an appropriately trained professional familiar with the potential hazards associated with pressurized air.

Make sure the electrical power to any heaters or heat pumps is disconnected and the circuit breakers are in the “off” position. Turn off the pilot flame, main gas valve and gas supply to the gas heater. Drain any water from the heat exchanger in accordance with the manufacturer’s directions.

Make sure the circuit breakers are in the “off” position. In severe snow areas, the motors should be removed from the pump housing and stored indoors in a dry location. If a motor is left outdoors, make sure it has a weatherproof protective cover.

If the pool has an electrolytic chlorine generator, make sure there is no standing water in the cell. Remove the cell and store indoors.

If the pool utilizes Automated Controllers and Chemical Feed Equipment, be sure the electrical power to the controller is disconnected. Remove any sensors from the flow cells then, clean and store them in accordance with the manufacturer’s instructions. Empty the flow cells then, clean and allow them to dry before storage.

If peristaltic pumps are used, remove any feed and injection tubes then clean and allow to dry before storage. Store any chemicals in accordance with state and local codes.

Automatic controllers that are installed outdoors should be removed and store indoors or protected from the extreme effects of winter.

Many pump, filter, and heater equipment manufacturers have specific instructions for safeguarding their equipment. Always check with the respective manufacturer if you have any questions.

## **Plumbing**

The main damage to plumbing lines occurs from the freezing of water in these lines. By using an air compressor or the discharge side of a shop vacuum, you should purge the water by blowing air through the lines until bubbles appear inside the pool. This includes all return lines, suction lines (skimmer and main drain) and lines to water features, solar heating, pool cleaners, and slides. Again, caution is advised on the use of pressurized air.

On return lines, you will want to remove the wall fittings and insert tapered expandable plugs once the lines are clear of water. Tighten in place. In some locations, severe freezing water may dictate the use of straight pressure plugs.

Suction outlet (main drain) lines should have air blown through them until bubbles appear in the pool then plug the pipe topside or close the valve to the suction outlet. The idea is that you will create an “air lock” in the line preventing water from re-entering the lines.

Skimmer lines must be purged with air and then once bubbles appear screw in a threaded expansion plug into the skimmer. These devices will prevent freezing water from expanding and cracking the skimmer. Use an appropriate (e.g. PTFE) plumbing tape on the threaded fitting to insure a water-tight seal.

Many feel that with the majority of the water removed from the plumbing lines by purging with air, the use of a swimming pool antifreeze added to the lines is not necessary. If a winterizing antifreeze is used, then a solution of 1 part propylene glycol to 2 parts water can be used or other anti-freeze intended for swimming pool use (see precautions below). This solution should protect any residual water from freezing down to 10°F/-12°C.

### **Lowering the Water Level**

The issue of draining water from the pool and the amount is often based on regional differences and the type of cover (solid or mesh) used on the pool. Issues such as the amount of rain, snow, and snow melt will often influence the amount of water drained. It is always prudent to consult with your winter cover manufacturer as to the proper amount of water to be drained to avoid damaging the cover. In addition, one must take into consideration the fact that freezing pool surface water can damage waterline tiles, prematurely dry out vinyl liners, and expose plaster surfaces to the atmosphere which can create cracking and defined water line indications on the surface. In the APSP’s Service Tech Manual, 4<sup>th</sup> Edition, guidelines are given for different types of pools and the suggested drain down levels which are as follows:

1. Vinyl Lined: 1 inch (25 mm) below skimmer mouth or tile line, whichever is lower.
2. Plaster finishes with solid material cover: 1-6 inches (25-152 mm) below the skimmer mouth or tile line, whichever is lower.
3. Painted or Natural Finish with solid material cover: 6 inches (152 mm) below skimmer mouth.
4. With No Cover or Mesh Cover: 18-24 inches (457-610 mm) below skimmer mouth.
5. With Automatic Cover: water should be no lower than the bottom of the skimmer mouth.

Many service professionals feel that the less water drained from the pool, the less damage you will create to liners, plaster, and other cementitious finishes from prolonged

atmosphere exposure. Higher water levels also mean less stress on covers. However, water levels should not be allowed to rise above the tile line of the pool to prevent damage to those surfaces during the winter.

## **Covers**

Prior to installing winter covers, ladders, diving boards, and handrails should be removed, cleaned and then stored in a dry place. In Chapter 10-3 of the APSP's Service Tech Manual, 4<sup>th</sup> Edition, the four main types of winterizing covers are discussed:

1. **Solid Lightweight Fabric Cover:** Constructed of a solid film or sheet of synthetic fabric, held down by water tubes, sandbags, or ropes and anchors.
2. **Spring-loaded ASTM Mesh Safety Cover:** Made of mesh fabric, usually anchored to the pool deck.
3. **Spring-loaded ASTM Solid Safety Cover:** Made from reinforced vinyl fabric, usually anchored to the pool deck.
4. **Automatic and Manual Safety Covers with Tracks:** Made of solid fabric; available in standard and custom sizes.

All covers, regardless of type, have advantages and disadvantages. The type of cover and the level of the water in the pool must be closely examined over the winter season to prevent problems.

To avoid a safety hazard, solid covers should have automatic cover pumps which remove water from rain or melted snow (see Precautions below).

On all covers, leaves and other organic debris must be periodically removed to prevent plugging the cover pump or damaging the cover.

Tracked solid covers must be monitored for accumulation of water, snow, and ice. Excess weight from these items can damage the track system, possibly damaging the concrete, coping or pool wall.

With all winterizing covers, the long term durability and longevity of the cover is dependent on proper water balance, proper water levels under the cover, regular maintenance and cleaning.

## Precautions

As with all chemical application to pool water, proper safety considerations must be followed. Do not mix chemicals. Follow manufacturer's directions for the proper use of chemicals including the correct time to add winterizing chemicals to avoid damaging surfaces, covers, and equipment.

When cleaning out chemical feeders, exercise caution and wear the proper safety equipment such as gloves and safety goggles. Check with manufacturer regarding disposal of chemicals from feeders.

Properly shut down and clean filters. It is not recommended to clean DE grids and cartridge filters with muriatic acid solutions and then store them for the winter. The acidic residual may stay in the grids or cartridges and degrade them while in storage. After any acid rinse, rinse thoroughly with water to remove any acid residue and allow to dry completely before storage.

Avoid overfilling water tubes that are used to anchor some types of covers to avoid splitting the tubes during freezes. Do not use masonry blocks, bricks, or concrete stepping pads to hold down covers as they could fall in the pool and damage the interior finish of the pool.

Never use ethylene glycol based (common automotive) antifreeze in winterizing pool equipment and plumbing lines. Always use a pool formula antifreeze or a propylene glycol based product. Antifreeze should be used sparingly to avoid problems when opening the pool in the spring.

**WARNING:** *All solid safety covers must meet ASTM F1346-91 (2010), "Standard performance specification for safety covers and labeling requirements for swimming pools, spas and hot tubs" and have an automatic means of preventing water accumulation on top of the cover whenever the pool is covered. For example, this may be accomplished with a drain panel or a pump. Rain water on the cover is a drowning hazard for children. Consumers must be made aware of the necessity of preventing water accumulation on top of the cover.*

Only cover a pool when the water analysis indicates the chemical parameters are within the cover manufacturer's recommended ranges.

After adding winterizing chemicals, follow label instructions for the disposal of any remaining chemicals.

### III. GENERAL DESCRIPTION

The techniques and methods in closing down an in-ground pool for the winter vary from region to region. Local climate conditions and customs often dictate the type, amount and timing of maintenance and services that are performed on an individual pool. Even with regional differences which are often dictated by the severity of the winter season, most winterizing procedures share several common features that can be used to protect pools regardless of the type of interior finish and structure. Winterizing or closing should occur before the first hard freeze.

### IV. CONCLUSION

The degree of complexity associated with winterizing an in-ground pool is dependent on many factors. From an environmental or climatic perspective, the expected temperature range, the amount of precipitation and the depth of the frost line will all dictate what actions and processes must be done to avoid damaging the tile, interior surfaces, plumbing, equipment, and structures. One should consult with the various chemical manufacturers, pool manufacturer or builder, equipment manufacturers, and cover manufacturers for the correct procedures and processes to use in a geographic region.

### V. REFERENCES

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