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Position Statement #3

Hydraulic Performance for Pools, Spas, and Water Features

Introduction

GENESIS provides an international forum for continuing education and the establishment of higher standards in watershape design, engineering, and construction. In pursuit of this goal, GENESIS hereby publishes this Position Statement regarding hydraulic performance.

This Position Statement was assembled with input from leading professionals in the pool and spa industry, including individuals that are not members of GENESIS. The contributors share a common goal of improving safety, reducing energy consumption, raising the current standards, and building better quality projects. The positions are not biased toward specific manufacturers or products.

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Format

There are two columns. The first column clearly and concisely states our position. The second column provides commentary and justification for the corresponding position statement.

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Position Statement	Commentary
3.1 Automatic Fill Device	
3.1.1 An automatic fill device shall be installed.	Low water conditions may create safety hazards including increased risk of suction entrapment on skimmer equalizers, shallow diving envelopes, and potential damage to equipment.
	The connection to the fill device “shall be protected by an air gap or a reduced pressure principle backflow preventer” (RPBP).
3.2 Overflow Line	
3.2.1 An overflow line should be installed.	Without an overflow line, if the water level reaches the rim of the pool or surge basin’ the water may flood decks, damage landscaping, damage nearby structures, etc.
3.2.2 Overflow lines should discharge to the storm drain for outdoor pools and the sanitary sewer via an air gap for indoor pools; however, local codes may have specific requirements and the authorities having jurisdiction shall be consulted.	The chlorine and pH levels of pools are supposed to be maintained at the same levels as drinking water or lawn irrigation so, in theory, there should be no harm to surface discharge of pool water, especially pool water diluted by rain water.
	However, local rules will govern. For indoor pools, an overflow connection to the sanitary sewer via an air gap is appropriate in most situations.
	When wastewater is discharged to the sanitary sewer, there shall be an air gap connection to a minimum 3-inch sewer line. This applies to equipment maintenance drains, filter backwash lines, etc. It is up to the local authorities having jurisdiction as to whether precipitation overflowing a pool is considered wastewater.

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3.3 Flexible PVC Hose/Tubing	
3.3.1 Flexible PVC hose or tubing shall not be used. Flexible PVC has a lower tolerance for UV radiation and will discolor and harden (become less flexible.) Flexible PVC pipe should never be dead-headed, that is, exposed to pressure with no relief even for short periods of time. Flexible PVC, when water is not moving, picks up PVC tastes. Flexible PVC is not rated for potable drinking water.	Flexible PVC hose is easily kinked if the minimum bend radius is exceeded. Even if not kinked, any deflection of the circular cross section decreases the area and increases the velocity in that section – excessive velocities increase headloss and wear the pipe prematurely. Although most flexible PVC hose has a somewhat smooth interior surface, they typically have bumps from the corrugated structure and this increases headloss. The wall thickness is typically more than equivalent rigid PVC pipe so headloss is also increased over comparable pipe sizes. Vacuum pressures have collapsed flexible PVC hose and it is also easily crushed by tree roots. Water-hammer has been demonstrated to cause flexible PVC failures at solvent-welded joints. Termites and other pests have damaged flexible PVC hose.
3.4 Surge Basins	
3.4.1 Surge Basins for vanishing edge and slot-edge systems shall be filtered.	Water-in-transit systems serve as skimming systems even when dedicated skimmers are included on a separate filtration system. Without a filter on the surge basin, collected debris is returned to the main vessel, creating unsanitary and cloudy water conditions and maintenance problems.

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3.5 Filters	
3.5.1 Cartridge filters shall be limited to 0.375 gpm per square foot of filter surface area.	This has been a commercial limit for many jurisdictions. Anything higher risks damage to the cartridges and results in excessive headloss.
3.5.2 Sand filters shall be limited to 15 gpm per square foot of horizontal surface area. We recommend that sand filters be limited to 12 gpm per square foot of horizontal surface area. Sand filters should be backwashed at 15 to 18 gpm per square foot of horizontal surface area in order to suspend the media and release trapped debris.	It is common to see sand filters in the pool industry rated for 20 gpm per square foot. This unit flow rate will result in channeling of the media – especially with the typical short-profile filters common in the industry.
3.6 Skimmers	
3.6.1 Skimmers shall not be operated above the manufacturer's recommended flow rate. For common 8" wide floating weir skimmers, this is usually about 75 gpm.	High flow rates in the skimmer can result in vortexing and air entrainment that is problematic for the pump.
3.6.2 Skimmer equalizers shall not be required. When installed, they shall be installed in split pairs separated by 3-feet clear. Skimmer equalizers are prohibited in new construction (ISPSC). However, some jurisdictions may still require.	Skimmer equalizers are used to prevent pump damage when the skimmer runs dry due to low water level or blockage by debris. The low water level issue is easily solved with automatic fill devices that are standard on all new pools. Skimmer blockage by leaves or other debris is a valid concern in some environments but not all. Many pools (e.g., indoor or those without problematic vegetation) may never have blocked skimmers, so there is no justification for the equalizers. Even if a pump ran dry, the resulting damage and expense would be insignificant compared to the risk of suction entrapment on the equalizers. When equalizers are installed, they should be installed in split pairs separated by 3-feet clear or on different planes in conformance with all the standards pertaining to regular split suction outlet pairs. This is because a float valve in the skimmer will effectively turn the equalizer into a suction outlet.