A Force to Reckon With

The Importance of Suction Outlet Cover Efficiency

Ron Schroader
Aquatic Safety Consultant

As pool industry professionals, we must understand the safety related equipment and products that we are advocating and installing.

We cannot expect every anti-entrapment type suction outlet cover to protect every sump, cut-off pipe or equalizer line equally. In the same manner, we cannot expect every SVRS to protect various flooded suction/suction lift scenarios in the same fashion.

It is very important that we, as industry professionals, understand the term differential hold-down force. Without it, systems can be retrofitted incorrectly and remain subject to entrapment hazards.

What is hold-down force?

Hold-down force is vacuum pressure differential created by an increase in resistance on the suction side of the pump. This could happen if a cover were missing off a dual drain system and a sump was to become blocked. There is an allowable 15 pound maximum on a standard 8 inch diameter sump when one of the two sumps is blocked. Anything more can pose a danger.

Discussing the danger

We must understand that even dual drains can create a hazard if not properly outfitted with certified anti-entrapment covers.

If one cover becomes detached or broken, and the sump underneath becomes occluded by a bather, the remaining covered sump would then be operating at full flow. The cover's small open area could create a significant pressure drop, resulting in a hazardous dynamic hold-down force on the uncovered sump.

For example, consider a dual drain system with 8 inch sumps and a sealing area of 40 square inches each. If one cover is missing and a bather blocks its flow, the other drain will take the pump's entire flow. If the cover produces a pressure drop of 2 psi when operating at full flow of 100 gpm, the resulting dynamic hold-down force on the open sump would be in excess of 80 pounds. This could be enough force to entrap a young bather.

This dynamic hold-down force is even more alarming with dual 12 by 12 inch sumps. An old cover with a larger flow rate could be replaced with a newly certified cover that has a much smaller open surface area. There again, in a dual drain scenario, if one cover becomes broken or missing, the differential hold-down force could be dangerous.

A pressure differential can create problems in single drain systems as well. The pressure drop across a replacement cover with a lower open surface area could cause the system vacuum levels to increase, causing a previously installed SVRS, gravity feed collector tank, or certified safety vacuum limiting system (SVLS) not to operate as intended.

Sizing up solutions

For 8 inch dual drain suction outlets, pools should be outfitted with larger diameter connector pipes (2.5 to 3 inches) and properly sized suction plumbing to pumps. Installation of 90 and 45 degree elbow type fittings should be minimized and avoided whenever possible.

If you are retrofitting new covers onto a drain, it may be difficult to determine the exact cover to achieve 15 lbs. or less of differential hold-down force. A technician may not even know what configuration is underneath the drains.

However, techs should know that the larger the pump is, the more open surface area is needed by the drain covers for a lower vacuum level.

If considering pipe size and open area on a drain covers were common practice, then our pools and spas would not harbor deadly dynamic hold-down forces. As an industry, we must begin to understand all the factors critical to suction entrapment avoidance. Building pools and spas suction safe is a simple, cost effective construction technique.

New technologies are becoming available every day. Your opportunity, along with the potential for financial gain, makes a proactive approach to suction entrapment avoidance a win-win proposition.