

## **This report is designed to help aquatic professionals better understand anti-entrapment issues.**

In the first 2 weeks of February 2006, a suction outlet entrapment fact finding mission was conducted in the Northeast and Atlantic Coast States. It became obvious that most pool builders, service company owners, as well as retail outlet operators, have been led astray concerning safety and the new anti-entrapment codes. Over the past 35 years, we (the pool industry) have been led to believe that anti-vortex covers were designed for safety and that these covers afforded protection from entrapment. Nothing could be further from the truth.

In order to clarify, let's go back in time 35 years. Around 1972, more powerful pumps developed for therapeutic jets and the like, employed closed face impellers that could pull the surface air into the suction outlets via a vortex formed by the circulation of the water. In order to keep this entrained air out of the system, the anti-vortex cover was developed. Air entrained into the pump could cause the shaft-seal to run dry and overheat, causing the motor in-turn to overheat and burn-out. **Anti-vortex covers were created to protect pumps and pump motors.**

Anti-entrapment type main drain covers were designed to protect bathers from entrapment hazards. In 1995, the inventor of the Star 100, Harry Newhard, read a story concerning the death of a youngster involving suction entrapment. After researching the main drain market and the available existing drain cover options, he developed a main drain cover with peripheral open area large enough to slow the velocity of the water down and prevent hair entanglement and body entrapment. The large open area of the Star 100 (24 square inches), allows water to safely flow through the cover at 80 gallons a minute (1.2 feet per second cover velocity). This flow rate provides adequate circulation for most residential pools, and eliminates suction hazards and air entrainment. The Star 100 design can be mounted on either horizontally or vertically installed suction outlets.

In 1997 the entrapment of a young girl in New Jersey caught the attention of Professor Ralph Barnett of the Triodyne Corporation. Having direct professional contact with the case surrounding the young girl's death (as a professional witness), Professor Barnett used geometry to solve the entrapment problem. He used a dome shape created from non-connecting elements to devise the Anti-Hair Snare Plus. Utilizing this concept the flow rate was tested safe at 109 gallons per minute. Since the Anti-Hair Snare Plus utilized a design where there were no connecting elements, the safe flow for this cover was rated at a higher cover velocity. Hair cannot become entangled in the elements because they do not connect to each other. Also, the topography of the domed cover, and small 8mm openings, prevent entrapment and evisceration. Because of its unique geometry, the Triodyne cover can only be mounted on horizontally installed suction outlets.

Where one anti-entrapment type cover used a large amount of peripheral open area, the other used specialized geometry to safeguard against evisceration, hair entanglement and body entrapment. **Anti-entrapment covers were created to protect children or swimmers.**

**NOTE:**

**Never allow the gallon per minute flow rate to exceed the manufacturer's recommendation stamped on the cover itself.**

As aquatic professionals, it is critical we recognize two important issues.

1. Round flat grates are obsolete and dangerous. They must be replaced immediately with ANSI/ASME A112.19.8 (2006) certified anti-entrapment type cover(s).
2. Anti-vortex covers were developed to protect pumps, not swimmers. In many cases, anti-vortex covers are not designed to protect against hair entanglement. Also, many anti-vortex covers are made from materials that degrade more rapidly as a result of UV and chemical exposure. This can cause material fatigue, and may result in broken or missing covers. An open main drain sump can be a deadly entrapment scenario. Also, grade 316 stainless steel fasteners or better must be used for proper installation of anti-entrapment covers. Type 304 or 18-8 stainless steel fasteners do not hold up well against chemical attack and should not be used.

It is important we do not confuse dual drains as the total entrapment solution. A dual drain system with a missing anti-entrapment cover can still present an entrapment danger. A child could be entrapped by the dynamic differential pressure related force on the uncovered drain if the dual drain system is not properly designed, or if the flow rate is excessive.

The use of hydrostatically imbalanced vent lines, i.e. deep vent types, can also present an entrapment hazard. In this case, a child could be entrapped by the hydrostatic differential related force at a suction outlet. Where vent lines are permitted for use as an additional method of protection, only hydrostatically balanced vent types should be employed. At this time, vent lines are not considered an accepted anti-entrapment method by the International Code Council (ICC).

ASME/ANSI A112.19.17 certified Safety Vacuum Release Systems (SVRS) are an ICC approved anti-entrapment method. SVRS devices do not prevent hair entanglement or evisceration. The SVRS does protect the swimmer from body entrapment or limb entrapment should the anti-entrapment cover become dislodged, broken or missing. The ICC also permits the use of approved Gravity Drainage Systems or Collector Tank Systems as an anti-entrapment method. These gravity fed systems have been in use for decades. The State of Florida has required the use of collector tank systems for all new commercial pools built since 1985.

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