



Engineering Sciences Section – 2010

C27 Exploding Pool Filters That Can Kill

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After attending this presentation, attendees will understand design failures that are present in certain pool filters and their potential for injury. Attendees also will learn of the legal issues involved in presenting such cases.

This presentation will impact the forensic science community by providing insight into a forensic engineering evaluation of swimming pool filters. The major legal issues and case workup will be discussed, as well as, the engineering obligation to notify the Consumer Product Safety Commission of the problems.

During the course of accident evaluation of pool filter failures, it was determined that design flaws existed that did not provide safety protection during routine servicing of the filter. The Consumer Products Safety Commission has had 18 serious injuries and 4 deaths reported. All the injuries have involved the kettle-style filters and the incidents occurred when the persons doing the maintenance had finished cleaning the cartridges inside the filter, put the top back on, and started the pump. For various reasons, the compressible air was not vented, and the band that clamps the top of the filter to the bottom was not tightened properly or failed to clamp. When this occurred, the compressed air forced the top to fly off, resulting in death or serious injury to the person it struck. If the air had been vented, then an incomplete seal of the top to the bottom would only have resulted in a water leak. The failure of pool filters is associated with the following conditions:

- Failure of automatic air venting valves.
- Short and wide kettle-style filters.
- Failure in the case where the top and bottom flanges are held in place by adhesives.
- Body clamp failure due to design or failure to tighten.
- Placing essential controls too close to the pool filter. Automatic venting valves operate through the means of a float that

closes off the vent when the water in the filter rises to the top. If the float is pushed up by the rapid flow of air and becomes stuck to the top of the valve, then it fails to vent the air. Unfortunately, it is not possible to pre-determine if the valve is functioning properly and air has been released.

The short, wide filters are dangerous because as the diameter increases, the area increases as the square of the diameter, and the force on the lid increases accordingly. The safest design is tall, narrow filters.

Adhesive failures are due to quality control where the adhesive is not applied uniformly or the adhesive breaks down due to thermal fatigue and mechanical stress.

The body clamps must be robust so that aggressive tightening does not cause failure. Some designs lack such ruggedness. The clamp tightening mechanism relies on the individual to determine when the clamp is adequately tight. Under-tightening and over-tightening can easily occur. The safest pool filters use bolts to hold the top in place rather than clamps.

The location of switches and timers in close proximity to the pool filter puts the operator at risk and is a factor in causing most of the injuries.

Pool Filters, Explosions, Clamp