



# ***CHIEF'S FILE CABINET***

*Ronny J. Coleman*

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## SPRINKLERS, THE NEXT GENERATION

The single letter “g” is a new scientific term. For example the newest cell phone system may be referred to as “4g”. We have all seen the term used in advertising. What a new number usually means is that the technology you currently possess is likely to be rendered obsolete eventually. The new number could be considered either positive or negative depending upon your perspective on being on the leading edge or not.

But, on the other hand, we sometimes continue to use our existing technology and expand our world by using the new generation for a different application. For example, I know people that have a hard wired house phone, a cell phone, and an ipad that they are using for communications. There are so many ways to get a hold of them that they are impossible to locate.

The concept of “g” for generation did not exist when fire sprinklers were invented over 150 years ago. What digit would be in front of the “g” today? I suspect that Richard Parmalee and Frederick Grinnell never contemplated this idea. Yet, the sprinkler system itself has undergone amazing transformation over the last 150 years. It is also likely that this evolution will continue. People are continually finding more and more ways to use sprinkler technology to limit the fire problem.

Sonny Scarff, recently retired from the Marriott International Inc. as the Senior Director, Marriott Fire Protection. He is a long term advocate of fire sprinkler systems. On October 10<sup>th</sup> & 11<sup>th</sup>, 2012 he demonstrated a new generation of fire sprinklers at the Maryland Fire and Rescue Institute (MFRI). The event was held in conjunction with the National Fire Prevention Week, which has been an annual celebration since 1922.

Mr. Scarff provided a unique opportunity to witness a technological breakthrough in water systems. The demonstration was to provide fire service personnel with an opportunity to view how a new low pressure water mist system worked. The concept is based on using sprinkler technology with an emphasis on a particularly low consumption of water at lower pressures than are required for high pressure misting systems, but also using the idea of very small droplet size to gain effectiveness. The system is called Minifog EconAqua.

The extinguishing water is applied through special nozzles or sprinklers as a water mist system, so that the total surface area of the extinguishing water is multiplied many times by fine droplet formation. In particular, the water entrains the heat from the fire very efficiently so that the base of the fire and its surroundings are immediately cooled effectively. In addition, evaporation of the extinguishing water in the fire captures a great deal of additional latent heat, and, at the same time, the steam produced impedes the supply of oxygen to the base of the fire. The reduction of the oxygen concentration in the



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immediate vicinity of the flame zone results in an additional smothering effect. The arrangement of the nozzles and the optimal droplet formation mean that the base of the fire is still reached, even if there are inhibiting factors, such as thermal currents or air movement.

Over 200 fire service personnel participated in the observation of the demonstration of the Minifog EconAqua. Participants were allowed to witness the actual activation of the system when fires were in progress through a complex video feed system that practically put the participants in the fire room itself. They were then provided an opportunity to do a walkthrough of the various scenarios to examine the results of the demonstrations.

Regarding generational differences, this demonstration provided insight to the changes over time in sprinkler technology. Early fire sprinklers, like the heads in the 1880's did not have the science to support some of their performance measurement possibilities. In the first generation of sprinklers, the heads had fairly large droplet size and relatively low pressures. The second generation of sprinklers that were significantly different was the residential sprinklers which had faster response times and were tested to deal with the products of combustion also. The third generation was the concept of high pressure misting systems. These were systems that used very small droplet size, but had very high pressures.

This new "4g" system uses relatively low or medium pressures also, but has a head that produces a more "mist-like" water distribution pattern. This new concept is a relatively obvious extension of the idea of putting a small amount of water on a fire in its early stages, rather than waiting until the fire gets bigger and requires larger volumes of water. Test results indicate that this system uses up to 85 percent less water when compared to conventional fire sprinklers.

Smaller droplets mean more surface for the heat transfer to occur when the water is applied. The concept of using the latent heat of evaporation as a means of cooling both atmosphere and fuel is found in the use of fire nozzles but is equally important in fire sprinklers. The faster the water is converted from liquid to steam, the more likely that a small amount of water can dissipate an incipient fire.

The concept of water mist is not to create droplets but to create a mist. This is done by assuring that very small orifices are used with appropriate pressures.

The fire demonstration at MFRI confirmed the following features:

1. The system is based on low and medium pressures
2. It has very low water demand
3. It has small and space saving components to make retrofits easy
4. The components of the system are third party approved



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5. This is an innovative approach that may fit the residential application

With a minimum supply pressure of 72 psi, the Econ Aqua Sprinklerhead flows 8.2 gpm. This is in contrast with the design flow of a classical residential head of 16 gpm and 7 psi.

The proponents of this system indicate that this application would work well in:

- Single family dwellings
- Offices, banks and conference rooms
- Hospitals
- Residential care facilities
- Hotels and restaurants
- Schools, universities and dormitories
- Prisons and reformatories

Mr. Scarff advocates that this generation of fire protection has price advantages over conventional sprinkler systems plus it provides the advantages of a system that uses a minimum amount of water to achieve the objective of restraining the fire. Each day two live fire demonstrations were conducted which were witnessed by invitees. Video and thermal imaging camera footage was captured as well as instrumentation of the fire environment. Data was collected on room temperature, oxygen level and carbon dioxide levels.

A website is being established for all post event materials for access to all of those parties interested. Those reviewing this article may wish to go to the following website to view videos: [www://http Minimax.de](http://www.Minimax.de).

One of the outcomes anticipated from this demonstration, was the development of a public education story in video. This ten minute DVD is under production and will be available soon. For any follow-up information or questions regarding the availability of information, you should contact Mr. Sonny Scarff at [robersonny@yahoo.com](mailto:robersonny@yahoo.com). (240-529-2228)

A major difference between the creation of a new generation of sprinklers, as compared to other technologies, is that each generation that evolves to address specific fire problems does not void the justification for the previous generation. In my opinion, every stage of the evolution of fire sprinklers has resulted in them being more applicable to solve a specific fire problem. Commercial and residential sprinklers are different and they ought to be. In our case, a new generation does not mean obsolescence but rather that we are building upon a capacity to attack America's fire problem where it all begins, at the point of ignition.

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