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The ESBIA objects to mandating residential sprinkler use in new single and two family homes. Our prime objection to the use of sprinklers is their added cost to construction that will affect affordability and for the on going cost to the homeowner for maintenance. We also believe that smoke detectors which are currently required by code are more than adequately alerting and protecting homeowners from fire.

There are many problems and issues with residential sprinklers that are presented below that make design and installation difficult. The problems vary based on the type of water supply system (public vs. well) and geographic location, primarily due to outdoor temperatures.

1. **Public Water Supply:** Typical water supply includes a 5/8" to 3/4" service and meter and may include a pressure regulator and/or a backflow preventer. All of these devices are designed for a typical residential flow rate of 5-8 gpm. They can not deliver the 26 gpm required by a residential fire sprinkler system. At a minimum, all of these devices need to be increased in size, typically to 1 1/4". Increasing these sizes is a hidden cost that is often overlooked by a sprinkler contractor bidding on an installation. In addition there are technical problems that must be addressed:
 - A. A residential water pressure regulator that is increased in size to handle the higher fire flows will not properly reduce the water pressure when operating at the low flow rates for the typical one or two family homes.
 - B. A water meter that is increased in size to handle the higher fire flows will not accurately register the low flows that are typical in one or two family homes. Additional there may be rate increases with the size of the water meter.
2. **Private Water Supply (Wells):** Water supplied from a private well is similar to that of a public water system in that the required flow rate is the same 5-7 gpm; however the source of the water is from a well that is typically 100 - 600 ft deep. A pump near the bottom of the well pumps the water into a small pressurized water storage tank (typically 40 gallons) located in the home.

Again, increasing the size of these devices is a hidden cost that is often overlooked because it is part of the plumber's job, and is therefore not included in the fire sprinkler contractor's bid. In addition there are technical problems that must be addressed as follows:

A. Similar to a public water supply, the well system components are sized for residential flow rates. If these devices are increased to handle the higher flow requirements of a residential fire sprinkler system they will not function properly for the home.

B. It is often difficult or impossible to increase the capacity of a well to accommodate the demand of a fire sprinkler system. If the capacity of the well cannot be increased, the capacity of the storage tank will need to be increased such that it can store a minimum of 260 gallons. Because only a third of the volume of a pressurized water storage tank is stored water (the balance of the tank being occupied by pressurized air), this would require a tank that is approximately 780 gallons. Not only is such a tank expensive, it would be very large and may be difficult to fit into a home.

An alternative to a pressurized water storage tank is an open (not pressurized) storage tank. The advantage to an open tank is that all of the tank's capacity is available to store water, and therefore 260 gallons of water can be stored in a 260 gallon tank. This type of tank is significantly less expensive and smaller than the pressurized tank. The disadvantage of this type of tank is that water is stagnant and therefore can only be used to supply a stand-alone or independent fire sprinkler system and not a multipurpose system (see descriptions of system types below). Another disadvantage of this type of tank is that it requires a separate electrical pump dedicated to the fire sprinkler system. This pump not only adds to the cost, but will not function in the event of a power failure (see discussion about backup power supply below).

C. Water from a well is pumped into the storage tank with an electric pump and because a backup power supply is NOT required by the code, a fire sprinkler system on a well would not function in the event of a power failure. A homeowner who did not realize this would have the false expectation that their fire sprinkler system was operational (when in fact it would not be). According to the United States Fire Administration, there is a greater concern for residential fires during or after a natural disaster or power outage since occupants will turn to optional sources of heat or power that could be hazardous. A simple solution to this problem would be to change the code to require a back-up power supply; however there is nothing simple about a backup power supply. A backup power supply would be either a generator or a battery system, both of which are expensive and require frequent maintenance.

3. **Water Softeners:** Residential water softeners are designed for low flow rates and not the higher flow rates required by residential fire sprinklers. This causes technical problems that must be resolved as follows;

A. At the high flow rate required for sprinklers, the drop in water pressure through a residential water softener would be so significant that a fire sprinkler system would not function. On more than one occasion, design professionals for fire sprinkler systems have informed me that there is a device that would cause the water to bypass the water softener in the event of water flow in the fire sprinkler system. In all such occasions, I have thoroughly researched their claims and have found no such device that would solve this problem. Although I believe this device is theoretically possible, I am not aware of anyone that is working on designing it.

B. Water softeners regenerate often, typically once a day. During regeneration, almost all of the water flow is used to backwash the softener (much the same as a swimming pool's sand filter). If a fire were to occur during this regeneration, the fire sprinkler system would be rendered inoperative due to a lack of water. A simple solution to this problem would be a water softener that would bypass itself during regeneration. Although I believe this water softener design is theoretically possible, I am not aware of anyone that is working on it.

4. **System design issues:** There are many different types of residential fire sprinklers, each with their own set of advantages and disadvantages. Fire sprinkler heads are simple devices that allow water to flow when the temperature at the head exceeds a preset limit. Also, sprinkler heads can not be painted and each head works independent of the other.

A. Wet System: in a wet system the fire sprinkler piping is always full of water. The advantage to this system is that it responds quickly to a fire and is less expensive than a dry system. The disadvantage to a wet system is that water could freeze if subject to below-freezing temperatures.

I. One solution to this problem is to run all the piping inside interior walls and use wall mounted heads instead of ceiling mounted heads when the space above the ceiling is subject to freezing temperatures. A limitation to this is that the heads must be installed near ceiling level, but in the case of a sloped or cathedral ceiling, the ceiling will continue to rise above the wall and may be too far from the sprinkler head. Another limitation to the wall mounted heads is that they must meet performance standards for wetting the opposite wall near the ceiling level. In larger rooms, this may require increased water pressure or more heads to protect the room.

II. Another solution is to mix antifreeze into the water. A problem with this solution is that over time the antifreeze level in the system decreases and must be maintained. Maintaining requires draining the system and refilling with the proper

mixture. Heads must be removed and air blown in to properly drain down the system. This will be difficult and messy in a furnished home. In addition, antifreeze systems hooked to city water will require a back flow preventer. This would be in addition to the one that protects the regular plumbing fixtures in the home. This type of system also requires yearly maintenance. Also, The National Fire Protection Association on July 6th of this year issued a safety alert for sprinkler systems using antifreeze. A recent study found that the antifreeze in the system can ignite under certain situations. They therefore have recommended that the antifreeze be drained and only water be replaced back into the system.

B. Types of Wet Systems: There are two types of wet systems that are commonly used the stand alone system and multi-purpose system. The advantages and disadvantages are as follows:

I Stand Alone System: the stand alone utilizes piping that is completely independent from the potable water piping. The advantage is:

- a) Antifreeze can be used to prevent the piping from freezing if a backflow preventer is installed.

The disadvantage is:

- a) The system is more expensive than a multipurpose system.

II. Multipurpose Systems: The multipurpose system utilizes the cold water that piping serves the plumbing fixtures in the home to supply the sprinkler heads. The advantage to this system is the reduced cost of installation. The disadvantages of this system are as follows:

- a) Antifreeze cannot be used to prevent piping from freezing because the sprinkler piping and potable piping are interconnected.
- b) Cannot be used in conjunction with water softeners.
- c) Sprinkler heads need to be NSF approved because most heads contain lead which is incompatible with potable water systems.
- d) Piping like the plumbing will need to be insulated from freezing.

C. Dry Systems: In a dry system the sprinkler piping is filled with compressed air. If a sprinkler head is activated by a fire, the air escapes and a control panel detects the loss of air pressure and opens a valve that allows water to enter the piping. The advantage to this system is that it is not subject to freezing. The disadvantage is that it takes longer to respond to a

fire (the air must be expelled first before water can enter the piping) and is significantly more expensive than a wet system. Additionally, dry systems require regularly scheduled inspections and maintenance.

5. **Hidden Costs:** the installation cost is not the only cost for sprinkler systems. In addition the following hidden cost must be accounted for:

A. Architectural plans for one and two family homes do not typically include a reflective ceiling plan. To properly design a sprinkler system one needs to create a reflective plan showing the following;

- I. Heating supply register locations.
- II. Heating supply duct locations.
- III. Light fixture locations.
- IV. Ceiling fan locations.
- V. Changes in ceiling heights.
- VI. Locations of soffits, drop beams, ceiling slopes, etc.

6. **Inspection:** The code is not clear on who should perform inspections and how many and at what stage of construction the inspections should take place. This creates potential liability for builders as they cannot prove compliance with the requirements.

7. **Performance of Residential Sprinklers:**

A. According to the NFIRS data collected in 1998, sprinklers were reported to have been present in 3892 (2.5%) of the total 156,661 reported residential fires. The sprinklers operated in 1,246 (32%) and failed to operate in 2,646 (68%), because the fires were too small to activate the system. Since that time the number of fires where sprinklers were present have been so miniscule, they have not been reported.

B. USFA reported similar findings, showing that in 57% of the reported fires the fire was too small to activate the sprinklers in residential properties. In 39% of the reported fires, the sprinkler did operate and were effective, while in 3% the sprinkler activated and was not effective.

C. Temperature ratings of sprinkler heads vary by location and estimated maximum ceiling temperature. There heat rating will be influenced by ceilings that reach over 100 F, under skylights, uninsulated roofs, near heat sources like ducts, light fixtures and hot water pipes.

8. **One and two family fire incidents, injuries and death continue to decline without the installation of fire sprinklers or the need to mandate them in new homes.**

A. Because of changes in residential construction technology, improved building code requirements – especially for electrical and smoke alarms, as well as consumer behavior and the concerted efforts of fire fighters, home

builders and other safety advocates, the number of fatal fires has dropped dramatically in the last 20 years without the mandate of fire sprinklers.

B. NFPA data clearly shows this progressive annual decline

C. From 1980 to 2005, while the existing one and two family housing stock grew by more than 45%, the number of one and two family fires decreased by more than 51%.

D. In 2005, fires occurred in less than four tenths of one percent (0.35%) of existing homes. Of those fires, substantially less than percent (0.86%) resulted in fatalities.

E. Even more dramatic is the drop in actual fire death per million persons from house fires. From 1979 to 2003, the rate dropped by more than 58%, based on data from the centers for Disease Control.

F. According to data in the U.S. Experience With Sprinklers, of all the reported fires in homes from 1980-2003, less than 1.3% were reported occurring in homes equipped with sprinklers. It was also reported that less than 2% of all new residences were equipped with sprinklers at the time. During the same time frame, the number of home fires dropped 50% and the number of fatalities dropped by 35%. This demonstrates that there are other contributing factors leading to the decrease in the number of fires and fatalities, such as improvements to the building code and the use of smoke alarms.

9. Smoke alarms work, consumers feel safe without sprinklers and demand is not there.

A. According to the most recent NFPA report on smoke alarms, it is estimated that over 890 lives could be saved annually if every home had working smoke alarms. 65% of the fire fatalities reported from 2000-2004 occurred in homes where smoke alarms were not present or alarms were present but did not operate.

B. The IRC requires hard-wired, interconnected smoke alarms installed in all bedrooms, outside of them and on each additional story, including basements. When one alarm activates, all other alarms are activated as well. Over 90% of the occupants survived fires that were reported to have occurred in homes equipped with hard-wired, interconnected smoke alarms from 2000-2004.

C. When the firm Public Opinion Strategies asked 800 likely voters if fire sprinklers should be required in new homes, 89% said that smoke alarms already do an adequate job of protecting them and 28% would not.

D. According to a Harris public opinion poll, only 38% surveyed said they would likely purchase a home that included fire sprinklers, leaving 62% indicating they would likely not purchase one. The poll also showed that 55% of survey participants responded that a home with sprinklers was

less desirable compared to 45% who thought that a sprinklered home was more desirable.

10. Much has been said about the homeowner receiving a discount on their insurance for having a sprinkler system.

A. The problem is that the average discount is about 10%. That can average about \$125/yr on a \$250,000 policy. The problem is that the average increase in a homes cost for installing a sprinkler system is \$6,000. So there is no real pay back to the homeowner for installing sprinklers.

Some Final Thoughts

How many fire deaths in *just* new home construction have been documented in the County over the past few years that justify the addition of residential sprinklers?

What will happen to current homeowners who file for a building permit for renovations of their homes that than trigger bringing their homes up to current code? Will they too be required to install fire sprinklers throughout the home? And what about all current homes? Shouldn't they too be required to upgrade to sprinklers?

Sprinkler costs do have a dramatic negative impact on housing affordability. For each \$1,000 added to the price of a home, another 217,000 potential home buyers are forced to remain on the sidelines.

Fire sprinkler mandates should remain an option for local jurisdictions. The 2006 IRC Appendix-P adequately provides for this option and this approach was overwhelmingly endorsed by the ICC membership at the previous Final Action Hearings where inclusion of the appendix was approved.

As you can see there are many issues to consider in this proposal. And in this current economic environment, our members can not afford an extra construction expense that will make selling or the affordability of a new home even more difficult or expensive than it already is. Especially when there are so many foreclosures and short sale homes on the market that are priced less than what it costs to build a new home.