NOEL'S
FIRE PROTECTION, LLC

Specializing in Residential & Commercial
Fire Sprinkler Systems.
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13D residential fire sprinkler overview & what a builder should know before hiring a fire sprinkler contractor.

Why have residential fire sprinklers become required.

- In todays homes the fuel load of synthetic furniture, carpeting, and building materials has reduced the average time of escape after a smoke detector has sounded from 17 minutes in 1970 to 3 minutes today. At the three minute mark the tenability (livable atmosphere within the room) has been greatly reduced.
- Residential fire sprinkler systems are design to save lives not property.

Time Line of a Fire w/ smoke detectors only.

- 0-2 minutes: Smoke alarm sounds.
- 2-3 minutes: Fire is reported.
- 3-4 minutes: Fire Department is dispatched. Tenability is greatly reduced.
- 4-6 minutes: Fire Department is responding.
- 7 minute: Flashover occurs. NO ONE SERVIVES FLASHOVER.
- 8-9 minutes: Fire Department is still enroot to fire.
- 9-10 minutes: Fire Department sets up.
- 10 minute: Fire Department opens hose valves.

➢ Of the 3,000 fire deaths reported annually 25% of those deaths occurred in homes with smoke alarms sounding when the Fire Department arrived.

Time Line of a Fire w/ smoke detectors and a Residential fire sprinkler system.

- 0-2 minutes: Smoke alarm sounds and Residential fire sprinkler system is activated.
- 2-3 minutes: Fire is reported. Tenability is maintained by sprinkler system reducing the spread of the fire.
- 3-4 minutes: Fire Department is dispatched. In 90% of cases 1 to 2 sprinkler heads have extinguished the fire.
- 4-9 minutes: Fire Department is enroot to the fire. Sprinkler system has prevented flashover.
- 9-10 minutes: Fire Department sets up.
- 10 minute: Fire Department opens hose valves.

➢ There has never been a death in a home equipped with a fire sprinkler system.

Misconceptions about residential fire sprinkler systems.

1. If my spouse burns dinner the fire sprinkler system will activate.

- False. Fire sprinklers don't have noses. They are activated by heat.

2. When one sprinkler goes off they all go off.

- False! Only the sprinkler within the heat zone of the fire is activated.

3. A sprinkler could accidently go off, causing severe water damage to my home.

- The manufacturing defect rate for residential sprinkler heads is 1 in 16,000,000.00. Your chance of being struck by lightning is 1 in 600,000.00.

4. Water damage from the sprinkler system will be more extensive than fire damage.

- False! Sprinkler systems discharge an average of 341 gallons of water with an average fire loss per single family sprinklered fire incident of $2,166.00.
- Fire departments use an average of 2,935 gallons with an average fire loss per unsprinklered fire incident of $45,019.00.

5. Home sprinkler systems are expensive.

- False! On average a residential sprinkler system cost less than 2% of the homes construction cost.

6. Residential sprinklers are ugly.

- False! With the new concealed pendant and sidewall sprinklers that are available most people wouldn't notice them.

Types of Residential Fire Sprinkler Systems.

Stand alone systems.

- An independent system that services the fire sprinklers only.

Multipurpose system.

- A system that mostly utilizes PEX piping to supply water to the domestic plumbing and fire sprinkler system.

Advantages of a stand alone fire sprinkler system verves a multipurpose system.

- Stand alone systems can be monitored using a flow switch linked to the monitoring system.
- ➢ At this time multipurpose systems can NOT be effectively monitored due to the water flow from sinks, toilets, etc. tripping the flow switch.
- Stand alone systems do not compete with the water demands of the domestic plumbing system.
- ➢ In areas where the water supply is known to be marginal , a multipurpose system may not be feasible due to the regular sustained demands from the domestic system.

• Stand alone systems can be tied into the existing water supply line or can be fed with a independent water service.

➢ Some jurisdictions require an independent water supply line to feed the sprinkler system. Multipurpose system can NOT be utilized for this application.

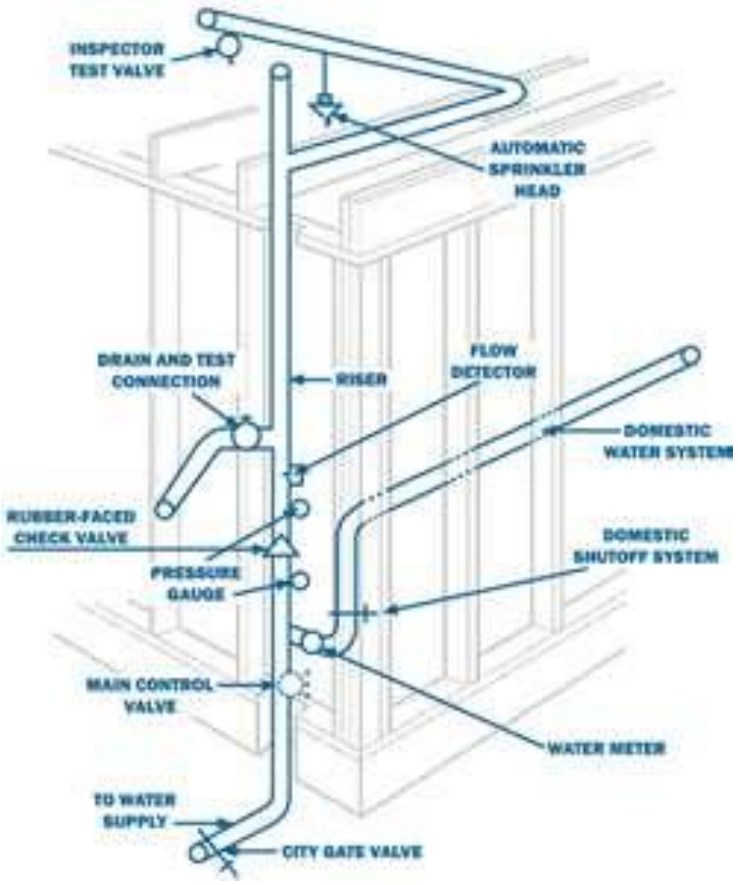
•Stand alone systems can receive water before any pressure reducing devices are entered into the calculations. This minimizes pressure loss and allows for maximum spacing of the sprinkler heads. This saves money for the builder.

➢ Multipurpose systems suffer the effects of pressure loss through all of the devices within the domestic system. Since water softener are added after the final inspection of the system and are not taken into consideration when the system was designed the pressure loss can greatly reduced the ability of the system to work when it is needed.

• Stand alone systems use CPVC rather then PEX. CPVC has a large inside diameter than the equivalent size in PEX therefore giving a better flow and pressure requirements when calculating the stand alone system.

➢Due to design considerations, multipurpose systems may not supply sufficient protection to steeply- pitched ceilings.

Components of a stand alone fire sprinkler system.



Sprinkler Rack

1” Copper pipe w/ strapping

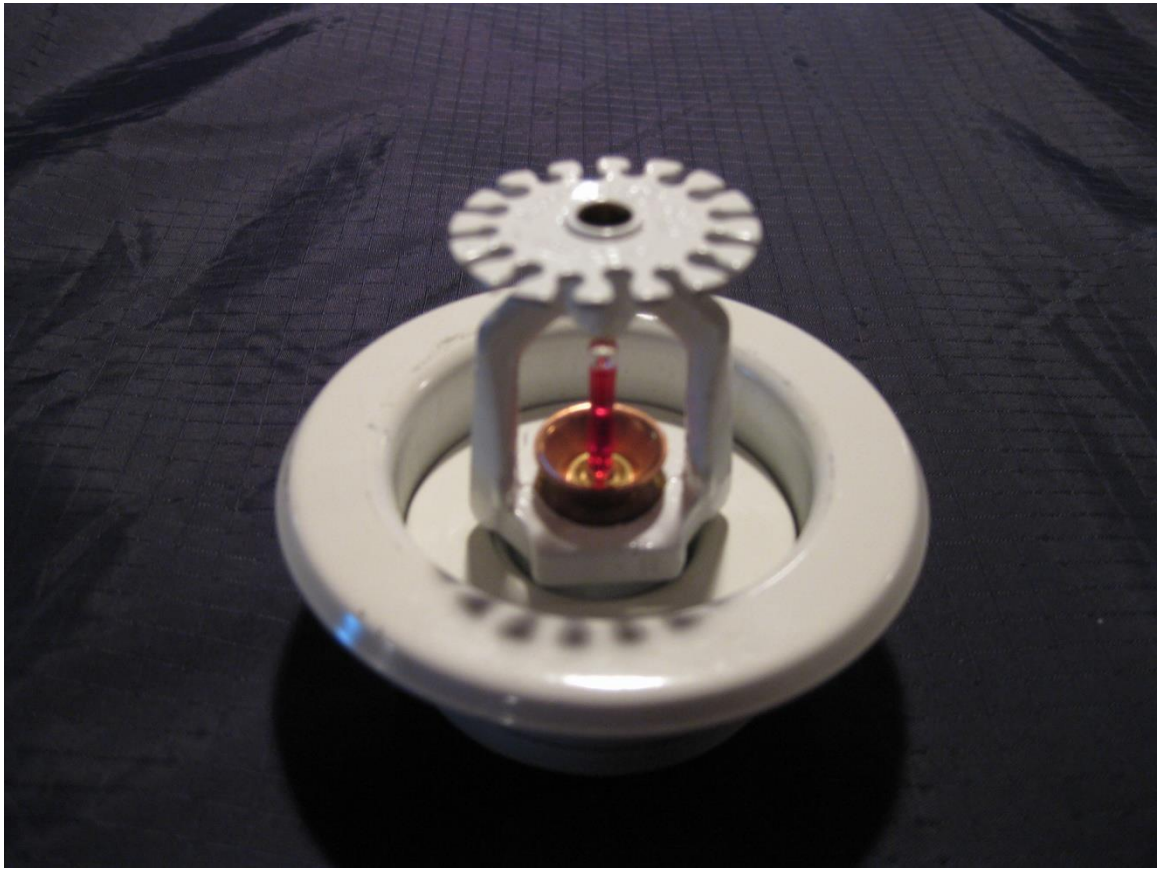
M class copper is used in exposed applications. The pipe is strapped within 18” of the change of direction. A steel nipple is used in place of the sprinkler head.

Transitioning from Copper to CPVC

A Copper to CPVC adapter is used to transition between the different materials. Fire caulk is applied at the penetration.

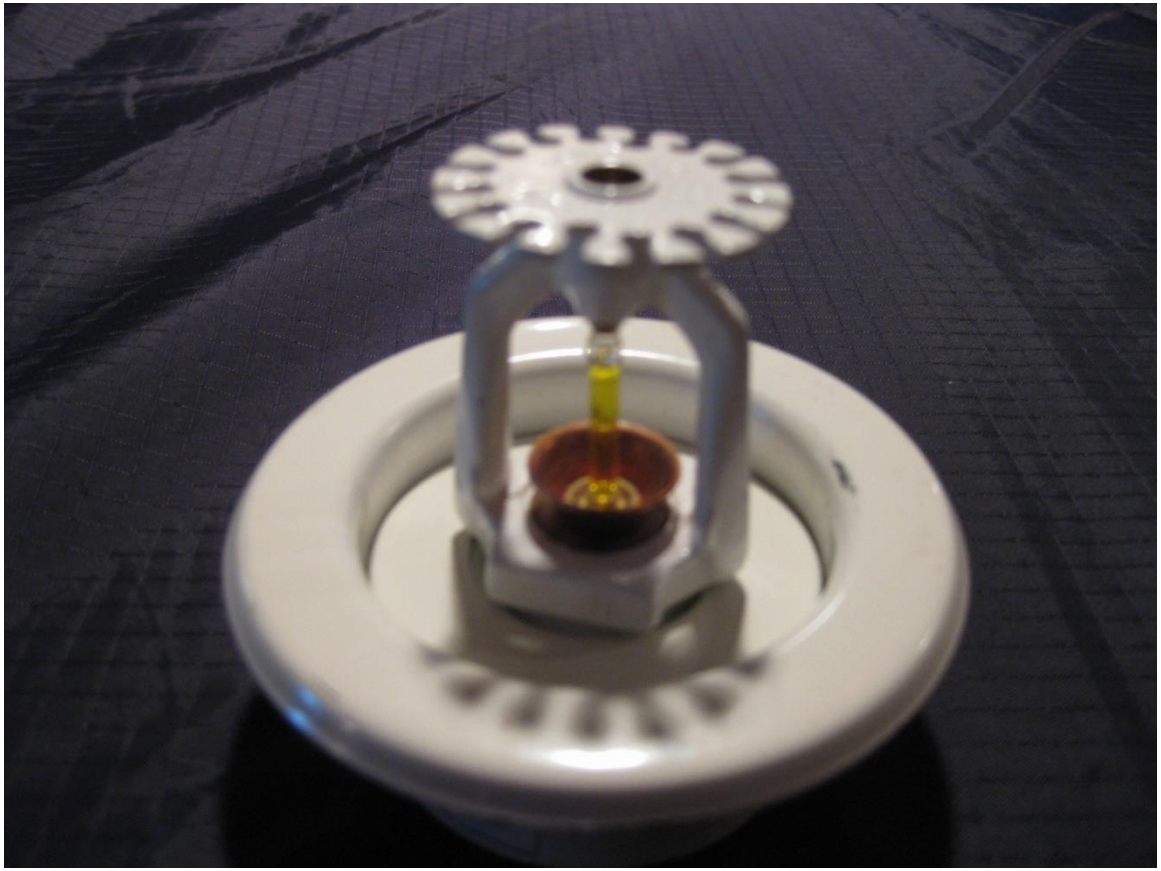
CPVC piping w/ strapping

CPVC pipe is used from this point forward through out the home since it will be protected by gypsum board. The pipe is strapped within 18” of the change in direction. The head adapter is strapped as a company policy.



155 degree glass bulb semi recessed pendant fire sprinkler head. (red dyed liquid)

There is a small amount of glycerin in the red dyed liquid that will expand and break the etched glass bulb at 155 degrees to allow the plunger to open and the water to flow.



175 degree glass bulb semi recessed pendant fire sprinkler head (yellow dyed liquid)

There is a small amount of glycerin in the yellow dyed liquid that will expand and break the etched glass bulb at 175 degrees to allow the plunger to open and the water to flow.

155 degree glass bulb semi recessed sidewall fire sprinkler head.

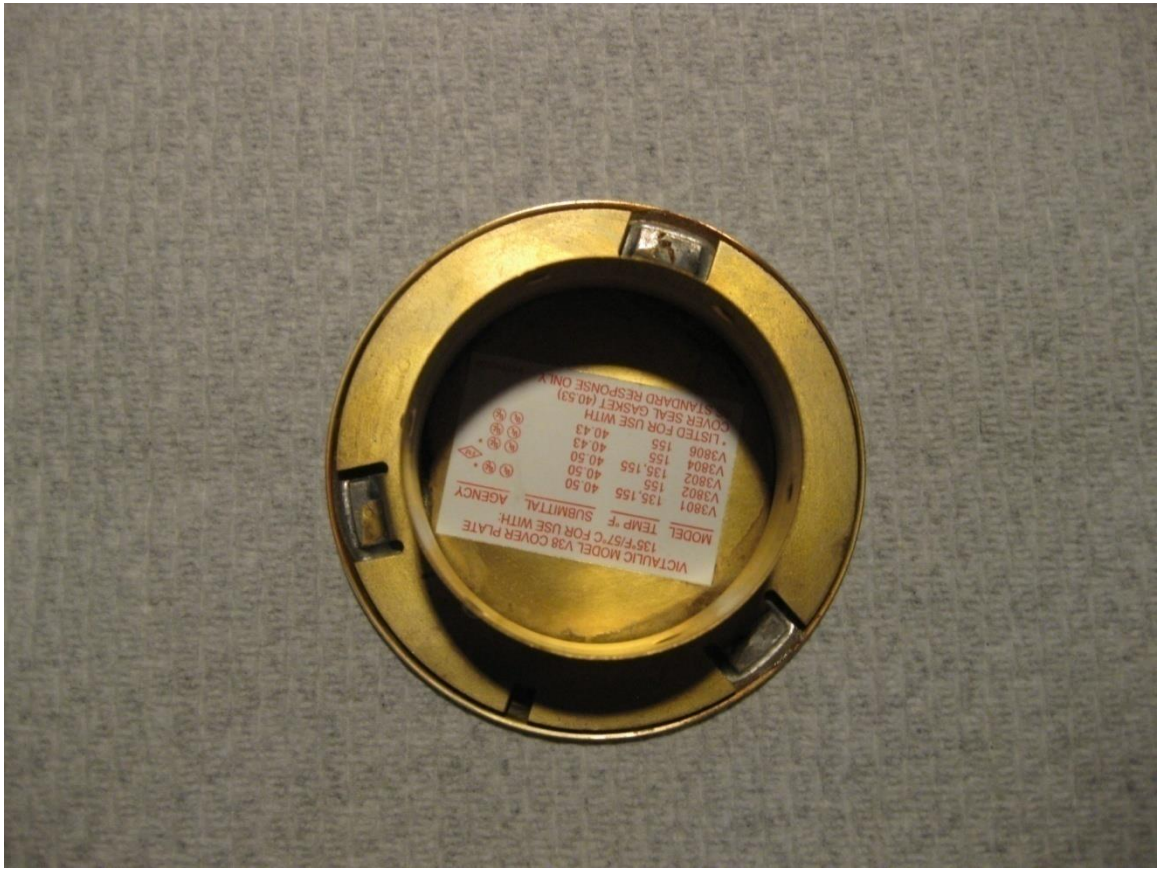
There is a small amount of glycerin in the red dyed liquid that will expand and break the etched glass bulb at 155 degrees to allow the plunger to open and the water to flow. These heads are most commonly used on the top floor when wet piping is not wanted in attic spaces.

175 degree glass bulb semi recessed sidewall fire sprinkler head.

There is a small amount of glycerin in the red dyed liquid that will expand and break the etched glass bulb at 175 degrees to allow the plunger to open and the water to flow. These heads are most commonly used on the top floor when wet piping is not wanted in attic spaces.

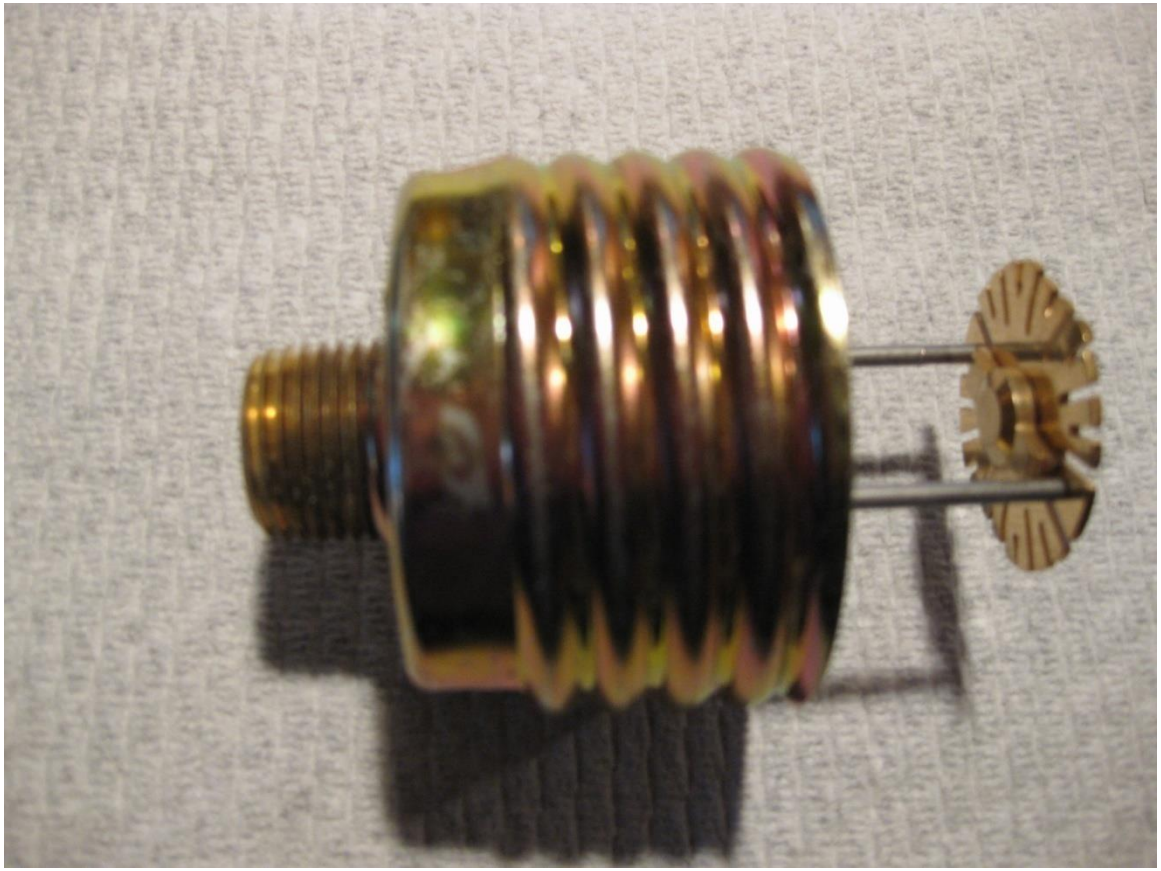
155 degree solder link concealed flat plate fire sprinkler head.

These allow for a more aesthetic appearance. They are usually limited to use in ceilings with a pitch of 2/12 or less. There water requirements are more demanding than semi recessed pendants.



Concealed head activation.

When the temperature reaches 135 degrees the three solder points melt and the cover plate falls away.



Concealed head activation.

Once the plate falls away the deflector drops.

Concealed head activation.

At 155 degrees the solder link melts and the head is activated.

155 degree solder link concealed sidewall sprinkler head.

These allow for a more aesthetic appearance. There water requirements are more demanding than standard sidewall sprinklers.

Concealed sidewall head activation.

When the temperature reaches 135 degrees the three solder points melt and the cover plate falls away.

Concealed sidewall head activation.

At 155 degrees the solder link melts and the head is activated.

QUICK RESPONSE
DRY UPRIGHT

Fuel Fire equipment in attic spaces.

When fuel fire equipment is present, at least one quick-response intermediate temperature sprinkler shall be installed above the equipment.

Solutions to inadequate water supplies.

Booster Pump.

Booster pumps are utilized when there is inadequate pressure and/ or volume. A pressure switch is installed in line with the sprinkler riser. The switch is preset to trip and supply electricity to the pump when the water pressure drop below the preset limit.

Pump & Tank.

Pump & Tanks are utilized when there is an inadequate water supply. A flow switch is installed in line with the sprinkler riser. The switch is preset to trip and supply electricity to the pump when a sprinkler head is activated and water flows.

Testing & Insulating before close in.

- NFPA 13D requires that the system must be hydrostatically tested.
- The standard states that before the system is enclosed the main valve should be opened filling the piping with water at street pressure and checked for leaks. At this stage of construction the sprinkler system is not tied into the domestic water making this recommendation impossible.
- Our company experience has shown that this pressure check is inadequate. A dry fit joint can withstand this test with out showing a leak. Following the 13D standard for a system with a fire department connection is best. It states that the system must be pressurized to 200lbs.. We maintain this pressure for at least two hours. This will show any defects in the system.

Cold weather testing.

- Standing water in the piping of an unheated house will freeze. During the cold months of the year a cold weather testing procedure should be followed.
- First this procedure allows for the sprinkler heads to be replaced with steel caps and nipples for the pressure test.
- Next if the codes enforcement inspector will allow you to do a self inspection that is witnessed and confirmed by the GC you can pressurize the system with water, check for leaks and drain it before there is a risk of freezing.
- Finally you will remove the steel nipples allowing and water in the drops to be drained and replaced with the sprinkler heads and protective paint caps.

R38 insulation should be tented over the piping in the attic w/ the paper side down and stapled to trusses.

By tenting over the pipe you are creating a pocket .This allows the heat from the room below to be trapped between the drywall and the insulation maintaining a temperature of at least 40 degrees. Insulation should never be allowed to invade the space between the drywall and the piping. This prevents the transfer of heat to protect the pipe from freezing.

Inspectors will want to see the insulation in place during the rough-in inspection. They do not want to crawl around in the attic to check the insulation during the final inspection.

Finale Inspection.

- Prior to the inspection the paint caps are removed and the heads are checked for paint over spray. Sprinkler heads can never be painted. Paint can prevent the sprinkler head from operating or activate properly. If paint is found on a head it must be replaced.
- The echelon plates are installed for frame style heads or the cover plates are secured on concealed heads.
- The sprinkler rack is tied into the water main after the meter and the water is turned on.
- A visual inspection is performed to ensure there are no leaks.
- If a booster pump or pump & tank system has been installed then the flow or pressure switches should be tripped to ensure they are wired correctly and operational at the preset pressure or flow rate settings.

Sprinkler Head Flow Test

- Every mechanical system in a home from the hot water tank, furnace, electricity, ect., is tested to ensure it operates when it is needed. The sprinkler system is a life safety system and should not be excluded from testing. You are not going to set off the sprinkler heads to ensure there is enough water to properly operate the system, but you can mandate as the GC or codes inspector that a two head flow test is performed.
- The number one, most important, way to determine if the sprinkler system has been calculated , designed, and installed properly is by making your sprinkler contractor perform a two head flow test.
- A sprinkler system is designed for two sprinkler heads to flow 13 gallons of water each for ten minutes. Or 26 gallons of water x 10 minutes = 260 gallons.
- First you must determine which sprinkler heads in the system are the most remote two sprinkler heads from the water source.
- Once that it is determined the most remote two sprinkler heads are removed and each are replaced with a test rig. The hoses from the rigs are placed in to separate containers that have premeasured marks indicating 13 gallons. By allowing the system to run for exactly 1 minute you can determine if the system will flow enough water to operate the system properly.

Since PA has no licensing requirements unlike there neighboring states that have had fire sprinkler regulations in place since 1993 it is up to the consumer to determine who is qualified to install this life safety system.

- Experience

➢ As in any profession work experience can not be replaced. This experience should cover every aspect from design, installation, supervision, inspections, and consulting for builders and codes officials.

- Design Professionals

➢ These individuals create the foundation that the fire sprinkler system is built on. They take all of the information from the water supply line sizes, available water, elevations of the property from the water source, structural design of the home, and put it all together to design a system that will work when needed to save a life.

- Qualified Installers

➢ All installers should be certified from the material manufactures to ensure they are installing these materials as per the listings the manufactures have been certified for. The installer along with there supervision determine the quality of the installation.

- Company ethics

➢ Any company that only follows the minimum required by the code is unethical. With company experience comes knowledge of deficiencies within the code. Going the extra step in the design, installation, inspection, and testing doesn't cost any extra. It does ensure quality craftsmanship.

- Insurance

- Ensure you contractor has proper coverage's. They should have workers comp. and extended liability insurance that is designed for fire sprinkler contractors. If you have chosen the wrong company to install your fire sprinkler system you will regret not ensuring they had the proper insurance when you are holding the bag for the cost of the repairs. Hiring a qualified contractor pays in the long run.

Conclusion

Knowledge is priceless. Hopefully everyone will leave with a better understanding of residential fire sprinkler systems. If you take nothing else away from this today remember these things.

- Fire sprinkler systems are designed to save lives, but if there not designed and installed correctly they can fail to do so.
- Have the system hydrostatically tested at rough in at 200lbs to ensure any leaks are detected before close in.
- Ensure you make the installer flow test the system. This will prove if the system was designed and installed properly.
- Inspect the insulation. If a system is frozen water can’t flow and the system can’t work.
- Hire a qualified contractor who has your good name in there best interest. Your name is on the finished product.