

Pre-Planning with the Fire Service

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that the language of others is set forth, quotation marks so indicate, and appropriate credit is given where I have used language, ideas, expressions, or writing of another.

Signed: Glenn Painter

Abstract

Sprinkler contractors have been doing business for years strictly following the NFPA codes or their Insurance Company's requirements. They are dependent on the plan review department to know what will aid or hinder the fire fighters arriving on scene. In many cases now the people that are reviewing the drawings may not have fought fires before. A sprinkler contractor can design and install fire protection systems that will be to code, but will make fighting fires difficult for the responding fire fighters. There is a line of communication that seems to get lost between plan review and the fire fighters that respond to fire calls. My goal was to look at three areas of concern for fire departments when designing a fire sprinkler system; standpipe locations, fire truck connections and fire boat connections. These are areas of design are regulated through NFPA 13 and NFPA 24 but there are some grey areas that could be interpreted in different ways. Each case needs to be reviewed on an individual basis but with some input from the men and women that fight fires each day we can clear up some of these grey areas. There are two ways that we have been able to do this in Jacksonville. We have had some large extra hazard jobs where we have brought the hazardous materials and fire boat teams on site during the design phase to help us understand their requirements. The other way that we have helped bridge this gap, was with the help of the North East Florida chapter of Fire Protection Engineers. We have had two occasions where we got the fire protection engineers, local designers, plan review department and a variety of fire fighters together at the Jacksonville fire training facility to discuss design issues and fire fighting issues. These events were very informative and are helping to provide standard practices in Jacksonville.

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Introduction:

Over the years fire codes have changed over and over. In most cases they were improved through performance tests and learning from past events. If you look at who wrote the codes you may be surprised. It does not appear to me that there is any representation from the fire service. There are engineers, fire sprinklers companies, fire suppression companies, fire alarm companies, fire product manufacturers, and product testing companies, the military and insurance companies. Some of these representatives may have served as fire fighters before, but I do not see current representation. The problem that arises is that the code can be misinterpreted by the fire protection company as well as plan review. Many of the plan review people that I deal with have little to no hands on fire fighting experience and a little input from an incident commander would clear things up. Most residential and commercial jobs are pretty standard and the plan review department sees them on a regular basis. It is the jobs that are out of the ordinary and deal with extra hazard commodities that really need more communication between the fire fighters, plan review and the sprinkler contractor.

Background:

There are three main areas that I know that fire departments and sprinkler contractors lack communication on. These areas are standpipes, fire truck connections and fire boat connections. The design and requirements for standpipes are covered in NFPA 14 Installation of Standpipes and Hose Systems, NFPA 13 Installation of Sprinkler Systems and NFPA 25 Inspection, Testing and Maintenance of Water Based Fire Systems. NFPA 25 tells us that there are three classes of standpipes that tell us the size of hose connection that is required.

5.3 Classes of Standpipe Systems.

5.3.1 Class I Systems. A Class I standpipe system shall provide 2 1/2 in. (65 mm) hose connections to supply water for use by fire departments and those trained in handling heavy fire streams.

5.3.2 Class II Systems.

5.3.2.1 A Class II standpipe system shall provide 1 1/2 in. (40 mm) hose stations to supply water for use primarily by trained personnel or by the fire department during initial response.

5.3.2.2 A minimum 1 in. (25.4 mm) hose shall be permitted to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the authority having jurisdiction.

5.3.3 Class III Systems. A Class III standpipe system shall provide 1 1/2 in. (40 mm) hose stations to supply water for use by trained personnel and 2 1/2 in. (65 mm) hose connections to supply a larger volume of water for use by fire departments and those trained in handling heavy fire streams.

5.3.3.1 A minimum 1 in. (25.4 mm) hose shall be permitted to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the authority having jurisdiction.

(Chapter 5 of NFPA 14, 2007 Edition)

After discussing with the Jacksonville fire department they have told us that they have never used a 2½” hose connection in a multi-story building and really hardly ever use 2½”. They told us that 2½” hose is too hard to maneuver and so if they come to a 2½” hose connection they reduce down to 1½” right away. It is a good practice to provide a reducer so that it readily available for the fire department to use.

Two more concerns that the Jacksonville Fire Department brought up to us was the location of the standpipe in a stairwell and the use of pressure reducing valves. The code tells us that the hose connection cannot be located behind open or closed doors and tells us the minimum and maximum distances from the floor but in many cases these rules are not followed.

7.3.1.1 Hose connections and hose stations shall be unobstructed and shall be located not less than 3 ft (0.9 m) or more than 5 ft (1.5 m) above the floor.

7.3.1.2 The hose connection shall not be obstructed by the closed or open door or other objects on the landing.

(Chapter 7 of NFPA 25, 2007 Edition)

The Jacksonville Fire and Rescue told us that too many times have they come across standpipes that are located behind doors and that are too close to the wall so that it is difficult to turn the hose valve without hitting your hand on the wall. Standpipes that are behind doors make it difficult to get the hose through the door to fight a fire on

that floor. Their other big concern with standpipes was pressure reducing valves. In high rises sprinkler contractors have to install pressure reducing valves on the low levels to regulate the pressure. According to NFPA 14, Section 7.2 you cannot have a static pressure more than 175 psi at a 1½” hose connection and you cannot have a residual pressure more than 100 psi at a 1½” hose connection. This means that on the lower levels you need to use pressure reducing valves to lower the pressure. You design the system to the top floor and as you go down each floor you gain 0.433 psi per foot between valves. So the larger the building the higher the pressure is on the lower floors. Below is an example of an adjustable pressure reducing hose valve connection.



Field Adjustable Pressure Reducing (URFA)

Elkhart's URFA valve is a true pressure reducing valve operated automatically by inner hydraulic controls. While the valves are pre-set at the factory, they are field adjustable, allowing you to tailor the pressure to your needs. They feature manual valve open and close, as well as pressure adjustment — all of which require extremely low torque to change due to the patent-pending design. Inlet pressure up to 400 psi is controlled under

all-flow and no-flow conditions. Valve size and weight permit installation in significantly tighter areas and smaller hose cabinets (those used for 1½” or 2½” valves) — allowing savings of both space and money. The URFA also functions as a floor control valve in automatic sprinkler systems as well as a standpipe valve or hose valve for Class I and Class III systems.

(Elkhart Brass Website)

These valves have a rod that is used to adjust the pressure on the spot and many times this rod gets misplaced. We have also been told that in the past they have been very difficult to operate adjust. This is a very good reason why buildings need to conduct their annual fire inspections. During the inspection the pressure is checked and the inspector would verify that the adjustment tool is with the pressure reducing valve. Ensuring that we keep these things in mind when designing systems will make it easier for the fire fighters to do their jobs more effectively.

Fire truck connections are a big concern to the fire department because in many cases they are an “eye sore” to the owner so they try and hide them. There are a lot of rules that go along with fire department connections that I know do not happen. These are listed below.

8.17.2.4.5 Where a fire department connection services only a portion of a building, a sign shall be attached indicating the portions of the building served.

8.17.2.4.6 Unless otherwise directed by the authority having jurisdiction, fire department connections shall be on the street side of buildings and shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects, including buildings, fences, posts, or other fire department connections. The location shall be based on the requirements of the fire

department.

8.17.2.4.7 Signs.

8.17.2.4.7.1 Each fire department connection to sprinkler systems shall be designated by a sign having raised or engraved letters at least 1 in. (25.4 mm) in height on plate or fitting reading service design — for example, AUTOSPKR., OPEN SPKR., AND STANDPIPE.

8.17.2.4.7.2 A sign shall also indicate the pressure required at the inlets to deliver the greatest system demand.

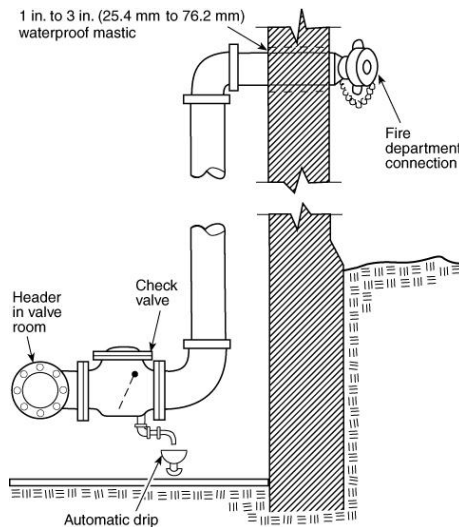


FIGURE 8.17.2.1

Fire Department Connections.

(Chapter 8 of NFPA 13, 2007 Edition)

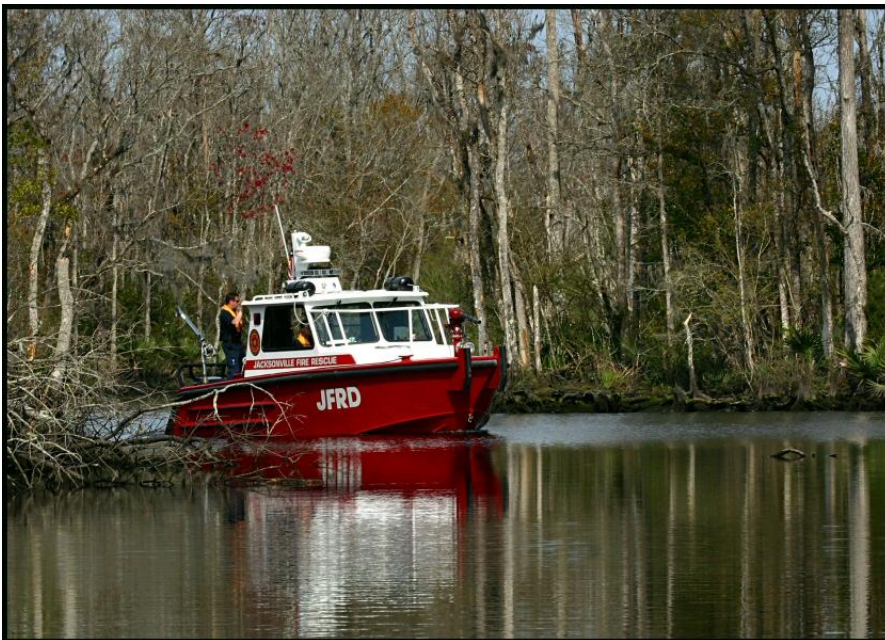
I cannot say that I have ever seen a pressure required sign on the standpipe and it is very rare that buildings with multiple standpipes have signs explaining what system they are attached to. Many times the fire department connection is hidden behind a bush or at the back of the building. Here are a couple of bad examples.



It is very important that the fire department knows where the fire department is and what system it is connected to. In today's economy the Jacksonville Fire Department has reported more and more fire truck connections being stolen for the brass. Annual inspections will ensure that the connections are visible, the cover plates are in place to prevent debris from building up and that they have proper signage.

Fire boat connections are found where the facility is located on a large body of water. A fire boat connection is a great feature to have if available because you have a very large water source and fire boats can produce a substantial amount of pressure. The facilities that we have been dealing with on the St. Johns River require a large volume of water. The code does not get very specific with fire boat connections and this can be a big problem. Back in the mid 90s a one hundred foot diameter fuel tank caught on fire. The terminal had a fire boat connection tied into their underground piping. The problem was the location of the connection on the shore. When the fire boat connected made its

connection the boat was sitting in approximately three feet of water. This means that the boat was sucking a large amount of sand and debris from the bottom of the river. The boat would have to take breaks from pumping and the fire burned for three days because they could not get sufficient water. Even though the terminal had a fire boat connection it did not help the way it should have. Some docks are also built to support large ocean lines and the dock level is very high above the water. Most fire boats do not sit that high in the water and we had to keep that in consideration when designing the fire boat connections. We had to build supports and guides on the hand rails to prevent the hose from rubbing and giving it a smooth transition from the boat to the fire boat connection. Jacksonville has two, twenty foot boats, a forty foot boat and a seventy foot boat on its way. When designing a fire boat connection it is good to contact the marine division to make sure that the location that you are proposing will meet their needs.



Results:

We have been keeping the fire marshal involved in many of our fire sprinkler designs. If it is not a simple design it is much easier to involve the fire marshal along the way so that you can get his/her input and ensure that you are both on the same page. Now that you and the fire marshal are on the same page it is a good idea to involve other department that may be affected by your design. We brought in the hazardous materials unit in to decide where they wanted fire hydrants throughout the tank farm and along roadways throughout the terminal. They requested five inch storz connections throughout the whole plant except for the fire water tank, where they asked for four and a half inch female hose connections that we had to have specially fabricated. We would have never suspected that unless we had them involved from the beginning. We also had the fire boat engineer bring both size of fire boat out to see where the best location for the connections would be. They also helped us come up with a design for hose guides and a platform to make the transition from the boat more gradual. Another boat connection that we did at another location required a different scenario. They had an existing fire boat connection but if the boat were to pull up close to it the water was too shallow. If the boat was fifty feet from the shore then the boat was deep enough to operate properly. So we are in the process of installing pilings for the boat to tie off to. This will keep it in the deeper water and keep the boat from moving around with the current.

The Northeast Florida chapter of Fire Protection Engineers has made an alliance with the Jacksonville Fire and Rescue department to exchange information. We have had two meeting so far with a number of fire chiefs, fire fighters, plan review officers,

sprinkler companies, designers and fire protection engineers to share information about fighting fires and how designers can help them do their job better. These meetings have taken place at the Fire Departments training facility and we (sprinkler companies) have been given a hands on look into the operation of standpipes and how the location design affect the fire fighter. We also looked at how the fire truck connections are made and why hydrants need to be certain distances apart. Where the pumper truck needs to be positioned to feed from a hydrant to a fire department connection, and the operation of an aerial truck and the required clearances that they require. I believe that both sides of the spectrum have gained a great deal from these meetings. The fire department has been able to learn from us and understand some of the struggles that we have to deal with in designing systems. They have learned more about the different kinds of systems that we design. We have got a first hand look at how fire fighters approach a fire and what is needed for them to get water to the fire. I believe that we will continue to have these meetings to that the fire marshal/plan review, fire fighters and sprinkler contractors can understand each other better and figure out how we can work together to provide better fire protection for all different situations.

Recommendations:

Fire fighters and fire sprinkler companies are working toward the same goal, protect property and lives. In doing so it is important that the lines of communication stay open. Many designers rush through a design and cross their fingers that it will be accepted. Many plan reviewers are happy to give their input and give suggestions if you ask them. It makes their job easier if they already have a good comprehension of the project that they are reviewing. So the first step that I would recommend is to stay in contact with your local plan reviewers and ask questions if you are unsure. Secondly if your project is not your standard strip mall and has hazardous materials then you may want one fire chief or captain to walk the facility with you to point out their concerns and get their recommendations. Lastly if at all possible work together with your local chapter of fire protection engineers to get involved with the fire department and see whether you can have a conference to discuss fire department and design issues. This is the best way to get to know your local department and learn at the same time. There are many ways to design a sprinkler system but it is important that it will operate correctly and that it will help the fire department when they arrive.

Bibliography:

- 1) Elkhart Brass Website: <http://www.elkhartbrass.com/products/industrial-valves/field-adjustable-pressure-reducing/manuals>
- 2) NFPA 13 – Standard for the Installation of Sprinkler Systems, 2007 Edition
- 3) NFPA 14 – Standard for the Installation of Standpipes and Hose Systems, 2007 Edition
- 4) NFPA 25 – Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2008 Edition