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2-INCH HIGH-RISE HOSE SYSTEMS

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This Training Bulletin will familiarize and instruct members in the use of the 2-Inch High-Rise Hose System, including methods to make up the hose packs and pigtail assembly, high-rise water system review, standpipe hose lays, extending hose lines, and maintenance of the hose.

I. SPECIFICATIONS

This hose is of a single jacket construction utilizing nitrile rubber impregnated synthetic yarn as the cord material. It comes in 50 foot lengths with 1-1/2" couplings and is ribbed to reduce wear and increase grip. The shoulder of the couplings are tapered to reduce snagging on furniture, door frames, and other obstacles. The hose is blue in color, which will aid in identification. It is more susceptible to damage than double jacketed hose as it has a tendency to incur very small punctures when used around broken glass and sharp objects; however, these punctures will not tear or increase in size even under extreme pressure. Use of this hose for purposes other than hose packs should be avoided. A benefit of this hose, especially when working in the confined spaces of stairwells and interior hallways, is its ability to resist kinks. Under pressure, the hose can be bent to within 12 inches before it will kink. Additionally, it drags more easily than the 2-1/2" dacron/polyester jacketed hose in present use.

When supplying the standard 75 psi nozzle pressure to the 1-1/2" 200 gpm Elkhart (yellow bumper) nozzle, your flow will be 200 gpm with a friction loss of 35 psi per 100 feet of 2" hose.

II. HOSE PACK COMPONENTS

A Company's complement will consist of two complete 100-foot hose packs and one pigtail assembly. This will provide the Company the option of laying a single line of uniform size 200-feet in length delivering 200 gpm or two lines 100-feet in length delivering a total of 400 gpm. Officers should keep in mind that the primary objective of a Company assigned to attack the fire is to get one line into operation.

Each hose pack consists of:

1. Two 50' sections of lightweight blue hose
2. One 1-1/2" complete 200 gpm spray nozzle
3. One 2-1/2" X 1-1/2" reducer
4. Five 2' ladder straps

The pigtail assembly consists of:

1. One 8' section of lightweight 2-1/2" hose
2. One 2-1/2" to 1-1/2" gated wye
3. One lightweight folding spanner
4. Two ladder straps
5. One 2-1/2" 60 degree elbow

III. ASSEMBLING THE PACK

The high-rise hose, unlike many lightweight hoses, has a dull-looking adhering surface that holds together very well in a pack. It takes five ladder straps, each two-feet in length, to effectively hold the pack together. If the straps are too long, cut off the excess and burn the bitter end to prevent fraying. You can begin making your pack with either the hose rolled, or stretched out straight.

The hose packs are fashioned using a 30 minute air bottle to form a "U" shaped single layer or double layer pack.

Considerations for using either the single layer or double layer can be based on compartment space and Company preference. The single layer method produces a pack eight-inches taller than the double layer method.

The pack can be made without using an air bottle; however, using the bottle will insure the pack is ideally fitted to be carried over the breathing apparatus. Listed below is the procedure to assemble a hose pack:

1. Place a 30 minute bottle on the floor.
2. Place the female coupling of the first section of hose about ten-inches below the gauge of the bottle. Attach the reducer to the female coupling.
3. Begin wrapping the hose around the bottle folding it alternately against itself continuing the folds about ten-inches below the gauge of the bottle. There is no need to wrap the hose tightly around the bottle. Keep it loose enough so that the hose forms nicely into the horseshoe shape.

4. Attach the second section of hose:
 - A. For a single layer hose pack, continue folding it alternately against itself.
 - B. For a double layer hose pack, bring the second section on top of the first and continue the horseshoe folds until the second section is completed on top of the first.
5. When you reach the male coupling of the second section, attach the nozzle and position it at the base of the pack on the same side as the female coupling you began the pack with.
6. To secure the hose pack, place a strap about eight-inches above the bottom of the pack on each side. One side will incorporate the nozzle, coupling, and reducer. Placing the straps eight-inches or so above the folds will help prevent permanent kinks in the hose. Place the third strap at the very top, or middle, of the pack. The fourth and fifth straps will be placed at convenient locations to hold the pack together. Utilizing five straps will insure the integrity of the pack.

When complete, the packs will weigh 38 pounds compared to 64 pounds for 100-feet of the old 2-1/2" lightweight hose. The approximate dimensions will be 40" tall by 22" wide for the single layer pack and 32" tall by 16" wide for the double layer pack.

IV. ASSEMBLING THE PIGTAIL

The pigtail assembly weighs ten pounds and is made by rolling the gated wye inside the hose and elbow. Listed below is the procedure to assemble the pigtail:

1. Attach the eight-foot section of the 2-1/2" lightweight hose to the 2-1/2" to 1-1/2" gated wye.
2. Wrap the hose tightly around the wye.
3. Attach the 2-1/2" elbow to the female coupling of the 2-1/2" lightweight hose.
4. Secure it with a short strap also capturing the lightweight spanner.
5. Attach a longer strap to the pigtail to use as a carrying handle.

V. WATER SYSTEM REVIEW

There are three basic types of systems that you will encounter based upon the year the building was built:

- A. Buildings built prior to 1960 were limited to 150-feet in height and were required to have only a Dry Standpipe (Class I) System for our use.
- B. Buildings built between 1960 and 1974 were required to have a Combination (Class III) Standpipe System. Combination means that the 1-1/2" interior wet standpipes for use by the occupants is supplied by the same riser as the 2-1/2" outlet for our use. Pressure is supplied by an on-site fire pump. This system may also have 2-1/2" hose with a 1" straight tip attached to it. These will be found in hose cabinets located in the stairwells above the fourth floor, and are intended for Fire Department use. However, this hose should not be used due to its unreliability. This system is the primary reason for carrying the eight-foot 2-1/2" hose in the pigtail. The pigtail allows you to connect to the outlet, which is located in a recessed cabinet, and then operate two lines off the gated wye in order to maximize the available water from the outlet.
- C. The third type of Standpipe System you will encounter is a Combined Standpipe Sprinkler System required in buildings built since 1974. A Combined System use the same riser to supply Fire Department outlets and the sprinkler system.

Keep in mind that any of these buildings may have an upgraded system. The only way to know for sure which system you will encounter is to pre-fire plan the occupancies in your first alarm district.

VI. STANDPIPE HOSE LAYS

- A. The Dry Standpipe (Class I) System is found in buildings built prior to 1960. The outlet is adjacent to the fire escape, usually directly above the inlets at street level. However, if the building has been upgraded to meet seismic criteria, you may find that the outlets have been moved inside to a new enclosed stairwell.

Very often, the best way to get a line on a fire in one of these buildings is to drop bag a 1-3/4" or 1-1/2" hand line directly from your apparatus. Keep in mind that your 2" hose pack has the same 200 gpm nozzle that the 1-3/4" line does. If you need to extend off one of these lines with a 2" hose pack, your friction loss will be 50 psi per each 100-feet of 1-3/4". If you attempt to supply the hose pack from a 1-1/2" line, the friction loss in 100-feet of 1-1/2" alone would be approximately 130 psi, which would be prohibitively high.

If the outlet is adjacent to the fire escape, the eight-foot section of pigtail hose can be used to bring the gated wye around so the 1-1/2" outlets are pointed in or at the window, and then use one of the straps to secure it to the balcony. If the dry standpipe is in a stairwell, attach the elbow and gated wye directly to the outlet. Using the elbow will get the hose coming off the outlet/gated wye down onto the landing instead of sticking out blocking the landing.

B. Combination Standpipe Systems

Outlets on the Combination Standpipe (Class III) System, above the fourth floor, will have 100-feet of 2-1/2" with a 1" straight tip attached and located in a cabinet. A dripcock is attached to the outlet to prevent any water that might leak from the valve from getting into the hose while it is stored on the rack.

This system has orifice plates specifically engineered to reduce the flow of water supplied from a particular outlet. The size of the orifice plate is determined by the static pressure on the supply side of an outlet. The higher the pressure in the system, the smaller the inside diameter of the orifice plate will be. Due to gravity's effect on the water (head), the higher pressures will be found on the lower floors of a building. It is important to remember that the orifice plate does not regulate pressure, it restricts flow. The orifice plate can be found at one of the following locations:

- Soldered to the outlet itself
- Behind the gasket on the dripcock
- Soldered to the male end of the dripcock
- Behind the gasket on the 2-1/2" hose

Removal of the orifice plate is recommended in order to get the maximum flow from the outlet. Failure to do so will restrict the flow from the outlet to 200 gpm at a minimum of 50 psi residual pressure. Obviously, leaving the orifice plate in place will prevent you from getting the required 75 psi nozzle pressure and will not enable you to supply any additional lines. This is the outlet the pigtail hose was designed for. It allows you to attach your lines to the gated wye outside the cabinet.

The orifice plate is removed by either removing the gasket, removing the orifice plate, and replacing the gasket; or, if it is soldered into place, by using a slotted screwdriver or your channel locks, and using them as a pry bar to break the plate off of the opening. Be careful not to damage the threads on the outlet.

To initiate the hose lay, place the pack on the landing and remove the straps. Secure the 2-1/2" X 1-1/2" reducer in a safe location.

One Firefighter takes the coupling that connects the two sections of hose together from the center of the pack and carefully flakes it out up the stairwell.

Once it is flaked out up the stairwell, the other Firefighter places the nozzle in front of the door and attaches the pigtail assembly, without the elbow, to the outlet and then the female hose coupling to the wye.

Open the outlet slowly allowing the hose to be loaded. If the orifice plate has not been removed, open the valve fully. If the orifice plate has been removed, the outlet should be opened one and one-half turns, then adjusted from there. Have a member assigned to stay at the gate valve throughout the firefighting operation to insure no one accidentally adjusts your outlet.

Have the Firefighter who took the coupling up the stairwell remain there until the hose is completely loaded. After climbing 20, 40, or 60 floors, is no time to get in a hurry and end up with a giant pile of spaghetti that you cannot untangle on the fire floor landing. The Firefighter should make sure the hose is flaked out neatly and that the first section through the stairwell door is laying on top of the section connected to the outlet. This will allow the hose to slide down the stairs and into the hallway with a minimum of effort. When properly laid out, this hose works very well and requires minimal effort to drag it down hallways and around corners.

The nozzle person should open the nozzle, adjust the nozzle pressure and pattern prior to entering the hallway. Removing the orifice plate will allow the gate valve to be used as an adjustable orifice plate.

If conditions in the stairwell will not allow you to connect to the standpipe on the fire floor, you can connect on the floor below and easily pull this hose up the stairwell. Ideally, you want to flake the hose up the stairs from the fire floor.

C. Combined Standpipe Sprinkler System

The Combined Standpipe Sprinkler System is found in buildings built since 1974 that are more than 75 feet in height. These high-rise buildings are required to be fully sprinklered and also have a standpipe for our use. The sprinkler system and Fire Department outlets are fed by a common or "combined" riser.

The hose lays will be the same as with a Combination Standpipe Sprinkler System with the difference being the outlet valve.

This system utilizes a Pressure Reducing Valve (PRV) when the pressure at the outlet exceeds 150 psi. Therefore, it is possible in new construction to encounter orifice plates on the upper floors where the system pressure falls below 150 psi. This will typically be the top six to eight floors. Usually the "PRV's" are very obvious; however, some of them are very similar in appearance to the gate valve, which re-enforces the need to pre-fire plan the buildings in your area.

When making connections to the Combined Standpipe Sprinkler System connect the elbow and gated wye directly to the outlet, and when ready, open the PRV fully. Failure to open the PRV fully will result in severely reduced flow.

VII. EXTENDING HOSE LINES

Two different methods of extending your hose lines will be discussed. Both methods allow for extending from the nozzle in order to maintain control of your water supply. By utilizing complete hose packs to extend the original line, the need for additional fittings will not be necessary.

The first method involves laying out the pack you are going to extend with in the stairwell in the same manner you would the initial firefighting line.

Take the nozzle and female coupling of the dry line down the hall to the nozzle. This should leave your extension line flaked out behind you.

Shut the nozzle down and remove the tip. Attach and load the extension line, strapping the shut off butt on the original line open, and continue firefighting operations.

The second method will require leaving the hose pack that is not connected to the outlet, on the back of the Firefighter backing up the nozzle person. Remove the reducer and two of the hose straps while still in the stairshaft. This will simplify the operation at the nozzle.

Remove the remainder of the straps and stretch the hose out behind you, as mentioned above. Shut off the nozzle on the wet line and remove the tip. Attach and load the dry line, and strap the shut off butt on the original line in the open position. Advance the line.

Having a nozzle on each pack will allow you to shut the first line down, remove the tip, attach the second pack or a single section, and advance your line. This, of course, is not that easy when visibility is reduced due to smoke and loss of light. However, your routine practice of recognizing couplings while blindfolded during search and rescue drills will pay off. Shutting down the nozzle will not create a problem when opening it back up under the static pressure built up due to the new design of the nozzles.

VIII. MAINTENANCE

Due to the construction of this hose (synthetic nitrile rubber) a thorough drying after use is not necessary. After each use, scrub the outer jacket to free it of dirt and fire debris. Drain excess water from interior of hose jacket, then form a pack as described earlier. The annual service test will be performed as per the instruction for hose testing in Volume 3 6/11-25.96. The service test pressure for this hose is 300 psi.