The In-Line Gauge in Standpipe Operations

BY RUSS CHAPMAN

Your engine company receives a report of fire in a mid-rise elderly housing complex during morning coffee at the beginning of a shift. You know from past history that this complex has had fires as well as “smells and bells.”

On arrival, you see the familiar seven-story Type I standpipe-equipped apartment complex and note heavy smoke coming from a window on the A side of the sixth floor. You call in a second alarm and order your crew to grab their hose bundles as you grab the standpipe bag. As you enter the building, your pump operator hooks up to the fire department connection. An occupant reports the fire is in apartment 6-G, which you report to all incoming companies and designate the B stairwell as the attack stairwell.

Your company proceeds up to the fifth floor, where you order your crew to connect three lengths of hose and the nozzle as you memorize the floor layout. You order the second-arriving engine company to come to your position and assist with getting the first hoseline into operation. After instructing one of your crew members to connect up to the standpipe outlet, you lead the remainder of the two companies up to the fire floor.

On the fire floor, the hallway has a light smoke condition, so you know the apartment door is controlled. Your companies make their way to the apartment door, and you call for water. Initially, you get great pressure, and you bleed the air from the hoseline. As you proceed into the fire apartment, you order your nozzle firefighter to open up. Suddenly, the line goes limp, there is no pressure, and the stream is poor. You order the crews to back out the hoseline, and control the door.

The firefighter standing by the valve radios you that the valve is fully open. Your pump operator radios you, reporting that he has good water and is pumping at the standard operating procedure (SOP) pressure of 150 pounds per square inch (psi). However, you are still having problems with your stream. Again you radio your pump operator; he says he is still pumping at 150 psi. You instruct him to increase the pressure because you are having water problems. After what seems like an eternity, you call back to ask if he increased his pressure; he assures you he is up to 200 psi.

While you confer with the officer of the other engine company, the ladder company radios that it found an open standpipe outlet in the basement that appears to have been vandalized and that members managed to close it.

You regroup your efforts, but what was originally a room-and-contents fire has now extended to the whole apartment. Your company finally regains pressure and is able to make good progress and knock down the fire.

PRESSURE MONITORING

The preceding incident can happen in any town. Standpipes are not exclusive to high-rise structures. Most standpipe operations that go wrong are directly attributed to water issues. A main tool commonly ignored in standpipe operations is the in-line gauge. A connection that is placed on the standpipe outlet, the in-line gauge has a 2½-inch swivel coupling at one end, a 2½-inch male connection on the other, and an armored pressure gauge in the center (photos 1, 2). The gauge monitors the pressures of the hoselines attacking the fire and is monitored by a firefighter, who should be permanently assigned to the outlet if staffing allows. This firefighter is designated the standpipe valve or control firefighter.

(1) Photos by author.

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Using the in-line gauge has numerous advantages.

- It takes the guesswork out of the apparatus pump operator's hydraulic calculations. The pump operator needs only to pump at the pressures listed in the department's SOPs. For example, for floors 1 to 10, 150 psi; floors 11 to 20, 200 psi; and floors 21 through 30, 250 psi. Be especially careful if personnel are operating near any riser that is pumped at a pressure higher than 250 psi, as this is approaching the test pressures of the system.[1]
- It acts as a safety device indicating that there is a water problem. For example, if the standpipe valve firefighter has the valve all the way open but reports to the pump operator that his gauge is reading only 60 psi and the engine is pumping at 150 psi, there is a problem between the engine and the outlet. Any one of the following may be the cause: an open standpipe outlet, a broken riser, a pressure-regulating device in the standpipe system, or foreign objects in the standpipe outlets.
- It acts as a safety device for the nozzle team. If the nozzle firefighter or officer calls back to the standpipe valve firefighter and reports that there is a pressure problem and the standpipe valve firefighter replies that his in-line gauge reads 100 psi with the valve only partly open, there is a problem between the standpipe outlet and the nozzle, possibly resulting from kinks, a blown hoseline, or debris in the hoseline/nozzle.
- It provides a comprehensive way of detecting the need for increased pump pressure. No two standpipe systems are alike. Some may operate smoothly with SOP pump pressures, but most will need more pressure than the typical 150 psi will provide. You can detect this with an in-line gauge. In departments with limited staffing, the in-line gauge can aid in maintaining proper pressures once they are set. Firefighters may not have to go back and forth from the nozzle or

hoseline to the standpipe outlet to make adjustments, although, ideally, there should always be a firefighter assigned to stay and monitor the standpipe outlet, just as a pump operator does with an engine.

- The in-line gauge can assist the standpipe valve firefighter to determine if the in-house fire system is in use and if it will have enough pressure to support operations.
- If backup hoselines are used off the same standpipe riser, the in-line gauge will allow the standpipe valve firefighters using each outlet to coordinate pressures.
- The in-line gauge stops the unnecessary overpressurization of standpipe risers.

CONFIGURATION

Photo 3 shows a 2½-inch hose with a lightweight 2½-inch by 1½-inch ball-valve shutoff with a 11⁄8-inch smooth bore tip that would flow at 250 gpm. To make it simple, mark the operating pressures to be used on the in-line gauge. The pressures below are for a setup with 2½-inch hose with the pictured nozzle (photo 4). For 150 feet, allow 75 psi; for 200 feet, 85 psi; thereafter, allow an additional 10 psi for each additional 50-foot length.

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You must also take into consideration the five psi needed for one floor above the outlet.[2]

If the members are operating on a floor other than one floor below the fire, as in the case of the backup line, add an additional five psi per floor.The firefighter assigned to the valve needs to know how many lengths were added.

One note of caution: Standpipe systems have an inherent “lull” in them. They take time to “level out” because of pressure surges. All firefighters need to know the difference between static pressure (pressure of water not moving) and residual pressure (pressure of water moving). The last thing the valve firefighter should do is “chase the pressures.” It is important for the standpipe valve firefighter to flow the standpipe outlet to flush out any debris in the outlet before connecting the in-line gauge, to ensure that the gauge does not get clogged.

Before the nozzle team moves in on the fire, the team should open the nozzle and flow it until all kinks are removed and until the standpipe valve firefighter tells the nozzle team he has the proper pressures.

Also, firefighters need to be patient as far as waiting for the pressure to build up. Standpipe operations have extended “reflex times.” An engine connected to a fire department connection may be a long way from the outlet. Even wet standpipe systems take time to adjust, and water will take time to get to the standpipe outlet (photo 5 shows the in-line gauge connected to a standpipe outlet).

(5)

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The in-line gauge is not just a “nice thing to have.” It is a lifesaving tool all engine companies should carry for standpipe operations. It is relatively inexpensive and lightweight. Use the in-line gauge during all standpipe operations, regardless of the size of hose and the type of nozzle your department uses.

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Crews have a lot going against them during a standpipe operation and should use all available tools to ensure the safety of companies attacking the fire. The in-line gauge will ensure that crews will be going into the job with the proper flows and give them the confidence to carry on the fight.

Endnotes

1. Fire Department of New York, “High-Rise Office Buildings,” *Firefighting Procedures*, Volume 1, Book 5, DCN: 3.02.01, January 1, 1997, 9-10; www.firetactics.com/HIGH-RISE.pdf.

2. McGrail, David M, “*Firefighting Operations in High-Rise and Standpipe-Equipped Buildings*,” Fire Engineering, 2007.

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