CONVERTING WET PIPE SYSTEMS TO DRY PIPE SYSTEMS FOR ENERGY CONSERVATION

INTRODUCTION

The high cost of energy occasionally results in reviewing the need to maintain heat in buildings. In many areas, eliminating heat would expose existing wet pipe sprinkler systems to freezing. Converting wet pipe systems to dry pipe systems alleviates this exposure.

This PRC Guideline specifies how to convert existing wet pipe systems. It does not apply to installing new dry pipe systems, which is covered by NFPA 13.

POSITION

Conversion Criteria

Do **not** convert wet pipe systems protecting storage areas.

Do **not** convert wet pipe systems with pendent heads.

Convert wet pipe systems by replacing system check valves or alarm check valves with standard dry pipe valves.

Confirm that the system meets the demand for the increased area of application required for dry systems, or modify the piping or water supply to meet the increased demand.

Provide an insulated dry pipe valve room, suitably heated and lit, as required in NFPA 13.

Provide quick opening devices on all dry systems over 500 gal (1890 L) capacity and on all dry systems where water takes over 60 s to reach the inspector's test connection after it is fully opened during a trip test.

Establish proper system drainage. Provide trapped sections with auxiliary drains and drum drips as necessary.

Modify or eliminate existing hose connections. The preferred approach is to provide hose valves suitable for air service, replace the elbow on the supply side of the hose valve with a tee, and install a low point drum drip below the tee for draining the trapped piping to the hose connection. If this arrangement cannot be used, eliminate the connection and provide appropriate extinguishers suitable for freezing temperatures as a substitute for the hose connections.

Depending on the size of the facility and the amount of combustibles, supplement extinguishers by providing a 2½ in. (65 mm) hose connection below the dry pipe valve, with necessary 2½ in. (65 mm) hose, couplings and 1½ in. (40 mm) hose on a portable reel.

Relocate existing fire department pumper connections on the system side of valves being converted to the supply side of the new dry pipe valves. This may require installing an additional check valve in the riser or underground.

Remove vane type water flow alarm switches and install pressure type switches in the dry pipe valve trim. Extend surveillance systems to cover high and low air pressure in the dry pipe system and temperature in the dry pipe valve enclosure.

Make conversions permanent. Keep the converted systems dry at all times of the year.

Impairment Handling

Converting wet pipe systems to dry pipe systems requires impairing them. Closely coordinate impairments with AXA XL Risk Consulting. Discuss any proposed conversion with AXA XL Risk Consulting beforehand. Hire a sprinkler contractor to make the conversion and follow the impairment handling procedures outlined in *OVERVIEW*. Include the following procedures:

- Notify the local AXA XL Risk Consulting RSVP at least 48 hr before the conversion will actually be made. Review the final arrangements and planned safeguards with a AXA XL Risk Consulting's representative.
- Schedule the work during a time of minimum hazard, such as on weekends or other period of low activity. Shut down all hazardous operations and fuel fired equipment in the area prior to impairing protection. Prohibit welding or cutting in the impaired area.
- Notify the public fire department of the proposed impairment. Discuss the impairment in sufficient detail so the department can plan a response if an emergency occurs during the impairment.
- Convert only one riser at a time. Once the work has started, continue working until that conversion is finished.
- Complete the installation of any accessory piping or external work before impairing the system. Organize and plan the work to minimize the length of the impairment.
- Constantly patrol the impaired area for prompt discovery of any developing hazards or incipient fires.
- Lay hose from external hydrants to the impaired area and charge them if weather conditions permit.
- Immediately following completion of the work, conduct an acceptance test of the installation. Fully open and seal all valves and conduct 2 in. (50 mm) drain tests.
- Test all water flow and air pressure alarms. Verify proper operation of air maintenance devices and enclosure heaters.

DISCUSSION

NFPA 13 emphasize the desirability of wet pipe sprinkler systems. The inherent delay associated with dry pipe systems in delivering water to sprinklers results in a larger fire at the time water is applied; a larger fire is more difficult to control. The delay in water delivery also allows more sprinklers to open. To compensate for these factors, NFPA 13 requires increasing the design area by 30% over that required for a wet system. This results in an increased water demand.

Systems with pendent heads cannot be economically and effectively converted to dry pipe systems, particularly if there are drops to the pendent heads.

The only acceptable method for converting a wet system is to install a standard dry pipe valve. The conversion of simple risers (no check valve) to dry pipe operation by merely establishing a water/air interface in the riser **is not acceptable** because it is not possible to reliably maintain the proper water level.

Converting an alarm check valve to dry system service, while possible, **is not acceptable** because:

- Quick opening devices **do not work effectively** on this type of system. An accelerator cannot be used due to lack of an intermediate chamber. An exhauster will only serve to drop air pressure until the clapper opens or to a point just slightly below existing water pressure.
- The existing clapper and pilot valve must have resilient facings. A conversion involving metallic facings would likely leak due to the high air pressures involved.
- A reliable high pressure air (or nitrogen) supply is required. In many instances, 100 psi – 150 psi (7 bar – 10 bar) air would be needed as opposed to 30 psi – 40 psi (2 bar – 3 bar) for the more conventional dry pipe valve. The higher pressures significantly increase the water transit time once the system trips, and therefore the overall delay in water discharge.
- The safety factor against introducing water into the system from pressure surges in the water supply is much less than with a conventional dry pipe valve. This, coupled with accumulated condensate, increases the probability of the water level rising above the heated valve enclosure.
- The existing 2 in. (50 mm) main drain attached to the alarm valve casting cannot be used for a flow test of the main shut-off valve, requiring the installation of a standard tee below the alarm valve to provide for another drain similar to the one on the alarm valve. The existing 2 in. (50 mm) main drain must be modified as necessary for air service or capped/plugged to achieve air tightness.
- The trim of a standard alarm check valve must be modified to be equivalent to those normally provided on a dry pipe valve.

Once a system is dry, it is best kept dry. Placing dry systems on wet status during summer months will result in excessive interior scale formation and the need for more frequent flushing and cleaning. Because of how a dry pipe valve is trimmed, making the system wet can also impair the water flow alarm.