DEPARTMENT OF LICENSES AND INSPECTIONS **CODE BULLETIN OF INFORMATION** **No. 1001-R1**		CODE OF GENERAL ORDINANCES OF THE CITY OF PHILADELPHIA TITLE 4 – BUILDING CONSTRUCTION AND OCCUPANCY CODE
SUBJECT OF BULLETIN: RESIDENTIAL FIRE SPRINKLER SYSTEMS: WATER SUPPLY INSTALLATION REQUIREMENTS		REFERENCE CODE SECTION(S): IRC – R313, P2904
ISSUED BY		
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TITLE: Deputy Commissioner / Chief Code Official		PAGE 1 OF 5

PURPOSE

The purpose of this Code Bulletin is to establish criteria for installation of water services for residential fire sprinkler systems in R-3 Residential Occupancy Classifications of three stories or less and residential buildings constructed under the International Residential Code.

BACKGROUND

On September 21, 2008 the International Code Council (ICC) adopted amendment RB64-07/08 to the 2009 International Residential Code (IRC). This amendment mandated that all new one and two family residential dwellings along with townhomes be equipped with residential fire sprinkler systems. On December 31, 2009, per the Pennsylvania Uniform Construction Code (UCC), all jurisdictions in Pennsylvania adopted the IRC and its residential fire sprinkler system requirements. In addition to its own prescriptive requirements in Section 2904, the IRC authorizes installation of these systems per the 13D Standard for residential fire sprinkler systems established by the National Fire Protection Association (NFPA). In Pennsylvania, the provisions of the IRC for townhomes became effective on January 1, 2010, with an effective date for one and two family dwellings of January 1, 2011. The International Building Code requires all new residential occupancy buildings to have fire sprinkler systems.

On April 25 2011, Act 1 of 2011 (HB 377, PN 1520) was signed into law. PA Act 1 made a number of changes to the Uniform Construction Code, including repealing Section R313.2, thus eliminating the requirement that one- and two-family dwellings (detached and semi-detached homes) constructed under the IRC have fire sprinklers. The requirement that townhouses constructed under the IRC have fire sprinklers remained.

While commonly used in commercial and industrial buildings for over a century, fire suppression systems have been uncommon in small residential buildings. Residential fire sprinkler systems are designed primarily as a life safety system, with water suppression activated upon the emergence of a fire. The suppression serves to provide critical time for building occupants to flee the premises before a large fire can erupt. The 2009 IRC code change represents a significant expansion of automated fire protection systems. The configuration of the residential fire sprinkler water supply system employed in Philadelphia differs from the traditional systems supplying commercial and industrial buildings. Over time, the number of residential fire sprinkler systems could grow to exceed the number of fire suppression systems existing in commercial and industrial buildings.

The Codes do not establish requirements for the actual supply of water to a building, only that potable water is to be supplied in the amounts and pressures specified. The authority for the supply of water to a building is the Philadelphia Water Department (PWD). PWD issues separate permits for connections to water mains (ferrule permits) and issues water meters (via meter permits). PWD also has responsibility for protection of their potable water supply.

PWD Regulation 401 requires that **fire service lines and domestic water lines be separate and separately metered**. PWD is now allowing an exception to this regulation for multipurpose residential fire sprinkler systems.

The NFPA 13D Standard and IRC Section 2904 allow for **multipurpose piping systems** which are intended to serve both domestic and fire needs from a single pipeline. For such multipurpose fire sprinkler systems , PWD

has developed requirements for supplying water for both domestic use and fire sprinkler systems to newly constructed residential buildings to reduce the costs associated with separate fire services while maintaining protection of the public potable water supply. This bulletin serves to document these new requirements for both contractors and code officials.

Note that builders can still elect to install fire sprinkler systems designed under the NFPA 13R or 13 Standards for R-3 Residential Occupancy buildings, or designed under the NFPA 13D Standard as a separate sprinkler system (not supplying water to any portion of the domestic system). However, systems designed under these standards are typically more costly and include additional maintenance requirements relative to systems designed under the NFPA 13D Standard for multipurpose systems.

POLICY

A. Water Supply Piping Configuration from Water Main to Building

Per PWD, multipurpose systems designed according to the NFPA 13D Standard or the IRC Section 2904 prescriptive requirements, a single water supply line from a ferrule connection to the water main shall be used to supply both domestic and fire water to the residential building. This type of service connection supplying both domestic and fire flow is known as a Residential Fire Sprinkler Service (RFSS). The minimum size is ¾-inch piping and the maximum size is 2-inch.

Per PWD Regulation 401, for systems designed under the NFPA 13R or 13 Standards, (or stand alone sprinkler systems complying with the NFPA 13D Standard) builders must install separate domestic and fire service lines. The separate fire service must be protected by a backflow preventer (see Section P-806.3 of the Philadelphia Plumbing Code).

If the builder determines to install a sprinkler system designed under the NFPA 13R or 13 Standards, or stand alone sprinkler systems complying with the NFPA 13D Standard, there will be additional costs encountered from providing and installing a second line. The builder will also incur the costs of additional features required by PWD and the NFPA 13R or 13 Standards, including a backflow preventer, Fire Department connection and a supervised alarm system that must be certified annually. The builder should take into account these and other initial and recurring requirements when determining whether to design a fire sprinkler system under any standard other than the NFPA 13D Standard (or IRC 2904 requirements) for a multipurpose system.

Note Regarding Two-Family Dwellings:
Two family dwellings may have one or two RFSS water accounts. If two separate RFSS water accounts are desired when constructing two family dwellings with multipurpose fire sprinkler systems, a distinct ferrule connection, service line and metered RFSS shall be installed for each of the two dwelling units using a multipurpose system. The interior piping configurations must separate the two systems, and each will require water quality protection as specified in this bulletin. Converting from a single RFSS water account to separate RFSS water accounts in the future will require approved building and plumbing permits indicating that the interior piping configurations have separated the system into two distinct multipurpose systems, each with water quality protection as specified in this bulletin.

B. Domestic Plumbing and Fire Sprinkler Piping Configuration Inside the Building

For multipurpose residential fire sprinkler systems designed under the NFPA 13D Standard (or IRC 2904 requirements), upon entering the building, the water supply piping may branch to separate fire and domestic water supply lines, or be co-mingled as a network system whereby domestic water using fixtures and fire sprinkler heads are supplied from the same piping, as shown in Annex A of the NFPA 13D Standard. Based upon PWD Regulation 401, systems designed under the NFPA 13R or 13 Standards require separate services and therefore have separate and distinct domestic and fire piping throughout the building.

C. Metering

An Underwriters Laboratories (UL) listed residential fire meter will be provided on the single water supply line to buildings with an installed RFSS. The meter shall be installed upstream of any location where the domestic water supply line branches from the fire protection line. PWD will provide the water meter which can range in the following sizes: 3/4-inch, 1-inch, 1-1/2-inch, 2-inch. Piping, valving and appurtenances for the meter installation (i.e. the meter "set") shall be configured and installed to adhere to existing water regulations that require proper spacing for the water meter and valving to allow servicing of the meter. Currently, water meters are not required on separate fire service connections installed under the NFPA 13R or 13 Standards.

D. Permitting

Permits from PWD are required to install a domestic water supply or fire connection, and a water meter. The permitting process also establishes the customer billing account for domestic and fire services. For RFSS designed under the NFPA 13D Standard (or IRC 2904 requirements), it is required that the contractor, developer or construction manager obtain from the Department of Licenses and Inspections (L&I) an approved fire suppression system permit prior to making application for the water supply ferrule and meter permits from PWD. The fire suppression system permit shall indicate the size of the water connection line that is required under the NFPA 13D (or IRC 2904 requirements) multipurpose system design. Personnel at the PWD Permit Desk in the Municipal Services Building will issue ferrule and meter permits based upon the size indicated on the approved fire suppression system permit. If the applicant does not have an approved fire suppression system permit, the ferrule and meter permits for an RFSS cannot be issued. Ferrule and meter permits will not be issued if the applicant produces only a "rough-in" permit.

Note: It is not required that permit applicants obtain an approved fire suppression system permit before obtaining the ferrule and meter permit if the fire sprinkler system is designed under the NFPA 13R or NFPA 13 Standard. Under these Standards, distinct and separate fire connection piping is installed and the permitting of such systems can occur after the separate domestic supply line is permitted.

Licenses and Inspections plan examiners must ensure that building permits issued for multipurpose residential fire sprinkler systems include language in the "Description of Work" field that the system is a multipurpose residential fire sprinkler system designed to the NFPA 13D Standard (or IRC 2904 requirements) and what service size is required for that building system's design.

"Rough-in" sprinkler permits will not be issued for systems designed under the NFPA 13D Standard (or IRC 2904 requirements) to better ensure the requirements outlined in this Bulletin are met.

Building permit applications for installation of manufactured or industrialized housing units must include documentation of the sprinkler water demand requirements of the new building. A fire suppression permit for the fire service connection of water to the new building must be obtained. This permit must indicate the sprinkler water demand as well as the size of the service. The inspector will then confirm that this information matches the design criteria on the manufacturer's data plate.

E. Water Quality Protection for the Water Distribution System

Water quality in dead end piping in buildings may degrade due to stagnation. Degraded water poses a risk of entering the PWD water distribution system should a backflow or backsiphonage event occur. The best safeguards against these possibilities are to limit the opportunity for water stagnation to occur within building piping systems. The following applies to the two general building multipurpose piping configurations that are defined in NFPA 13D, or in the IRC Section P2904:

a) For network piping systems which co-mingle domestic water piping and fire sprinkler piping, adequate circulation should exist and no water quality protection is necessary.

b) For piping configurations using a separate branching domestic line and fire sprinkler supply line dedicated to supplying sprinkler heads only within the building premises, water in the dead end fire sprinkler line encounters the opportunity to stagnate since fire sprinkler activation will occur rarely. If the builder pursues the option of supplying water via such a dedicated fire sprinkler line, the system shall be designed to minimize the potential for stagnation. At a minimum, the builder shall install an additional water line from the fire sprinkler line closest to the most remote sprinkler head in the system to a toilet tank determined by the contractor. The additional line will provide water to flush this toilet from the fire system piping in order to periodically move water through the fire line and avoid stagnation of the water. In cases where significant lengths of such sprinkler pipe exist on multiple floors, sprinkler line-to-toilet tank connections may be required on multiple floors of the

building. Alternatively, contractors may design sprinkler pipe loops that fall in between the extremes of the network system design and the branching system design, and provide additional circulation of water through piping that supplies sprinkler heads. These design options will be evaluated and approved by L&I during the review process for the Fire Suppression System Permit. The builder must affix a permanent sign to the RFSS piping to toilet tank connection noting that the supply line supplies water to the toilet. This sign should not be removed.

Backflow preventers shall not be used in RFSS installations unless required by PWD. The use of additives, such as antifreeze chemicals, in dedicated fire sprinkler lines requires the use of a permitted backflow preventer, approved by PWD. Systems designed under the NFPA 13R or 13 Standards, or stand alone sprinkler systems complying with the NFPA 13D Standard, require a listed backflow prevention assembly.

F. Sprinkler Piping Materials

Installers of residential fire system piping and premise plumbing shall follow current City of Philadelphia codes and regulations regarding allowable piping materials for both underground customer piping from the water main connection in the street to the building premises; and piping for plumbing systems and RFSS inside of residential buildings.

G. Shutoff Valves

Per NFPA 13D, no valves are permitted on the fire sprinkler piping unless supervised per the exceptions detailed in the Standard. A shutoff valve may be provided on the domestic line within the building premises, downstream of the point where it branches from the fire line. Valves that shut off both the domestic water and fire sprinklers at the same time are permitted. A shut off valve must be installed upstream of the RFSS meter at the service entrance to the building. A sign or tag shall be installed at this main shutoff valve as required in Section 6.3 of NFPA 13D or IRC Section 2904.7. (See section on “Inspection of Newly Installed Residential Fire Sprinkler Systems” of this Bulletin for more information on signs/tags)

H. Installation

Installation work shall be carried out by either a licensed fire suppression company or registered master plumber for service line piping. The meter box and internal plumbing to supply domestic fixtures must be installed by a registered master plumber. A licensed fire suppression company must install the fire sprinkler piping, sprinkler heads, and related piping/appurtenances.

I. Inspection of Newly Installed Residential Fire Sprinkler Systems

The residential fire sprinkler system must be tested by a licensed fire suppression company in order to be commissioned into active service. The installer of a RFSS designed under NFPA 13D or IRC Section P2904 shall attach a tag to the valve at the service entrance which provides instructions for the homeowner on maintenance of the system. The tag shall indicate the name of the licensed fire suppression company responsible for the installation and the date the system was tested and placed into active service. This tag will serve in lieu of a sprinkler system certification (acceptance test) which is required for NFPA 13 and 13R systems.

Systems designed to meet NFPA 13R and 13 Standards shall be inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.*

J. Routine Maintenance and Testing

The fire suppression contractor must supply manuals to the homeowner. The burden for maintenance and testing of any R-3 or IRC residential building’s fire sprinkler system falls upon the property owner These residential fire sprinkler systems must be functional and in working condition at all times.

K. Shutoff Policy & Notification

PWD executes water service termination in accordance with the Residential Customer Service Regulations for water supply in the City of Philadelphia. Shutoff is executed at the curbstop on the multipurpose line supplying both domestic water supply and fire protection. Customers are provided multiple advance notices that shutoff action will be undertaken. Shutoff is a last resort action taken after multiple attempts to address longstanding payment delinquency or other significant violation on the part of the property owner/rate payer.

Lack of water to a residential property renders that property unfit for habitation per Section PM-307.3 of the Property Maintenance Code.

L. Billing and Water Rates

All water services are permitted and activated in the PWD Customer Billing System. The meter number is tracked and this will be used by PWD to identify systems as having a RFSS. PWD periodically revises the structure of its water rates and charges and updates the actual rates. In 2011, PWD launched a review of its current rates and charges structure and will issue a revised structure likely in 2012 or 2013. With the advent of the requirements for residential fire sprinkler systems detailed in this bulletin, it is likely that the rates and charges for fire service will be revised and expanded with the next issue of the water rates and charges schedule.