

Model RSV-1 Residential Domestic Shutoff Valve 1 Inch (DN25) For Dual Purpose Residential Water Supply

General Description

The Rapid Response[™], Model RSV-1 Residential Domestic Shutoff Valves are intended for use in dual-purpose residential water supply piping that serves both domestic and NFPA 13D residential fire protection sprinkler system needs.

When a fire sprinkler operates, the RSV-1 Valve will automatically shut off water flow to the domestic system and divert the available water supply to the fire sprinkler system. Consequently, when the RSV-1 is utilized, the system designer need not add the domestic flow demand to the fire sprinkler system flow demand.

Use of the Model RSV-1 Residential Domestic Shutoff Valve should be considered when either the water supply cannot adequately provide for both the domestic design demand and fire sprinkler flow demand, or it is desirable to increase the effectiveness of the fire sprinkler system by automatically shutting off domestic flow.

The RSV-1 maximizes the effective use of an existing water supply and, therefore, in areas with limited water supplies, it may eliminate the need to add costly pumps, pressurized reservoirs, or electrically operated domestic shutoff valves. The RSV-1 has a built-in check valve in the fire sprinkler system outlet that eliminates the need for a separate check valve. Also, the RSV-1 automatically resets, thereby eliminating the need for valve disassembly after a fire sprinkler system test or operation.

The Model RSV-1 Residential Domestic Shutoff Valve is a redesignation of the Gem Model F540 and Star Model S370 Residential Domestic Shutoff Valves.

WARNING

*The Model RSV-1 Residential Domestic Shutoff Valves described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. **Failure to do so may impair the performance of these devices.***

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.



Technical Data

Approvals

The 1 inch (DN25) Model RSV-1 Residential Domestic Shutoff Valve is UL and ULC Listed and is suitable for use in water supply arrangements for residential fire sprinkler systems designed per NFPA 13D.

Maximum Pressure

175 psi (12,1 bar)

Pressure Loss

Figure 4

Assembly

The Body, Top Cover, and Bottom Cover are bronze. The Piston, Differential Ring, and Sleeve are glass reinforced Polyphenylene Oxide. The Upper Cap is brass. The O-rings are Buna-N, while the Upper and Lower Seals are EPDM. The Spring, Upper Cap Screws, and Piston Screws are stainless steel.

Weight

11 lbs. (5 kg)

Patents

U.S.A. 5,236,002

Design Criteria

The RSV-1 must be installed vertically with the Water Supply Port at the bottom, the Fire Sprinkler Port at the top, and the Domestic Port at the side. The typical arrangement is shown in Figure 1.

Local regulations concerning public water supplies may require a backflow prevention device. The design of the RSV-1 anticipates that the backflow prevention device will be located in the water supply upstream of the RSV-1 as shown in Figure 1. Should the local regulations require the backflow prevention device to be located in the fire sprinkler line downstream of the RSV-1, a by-pass per Figure 2 must be installed.

NOTES

A check valve is not to be installed between the RSV-1 and the fire sprinklers unless a by-pass per Figure 2 is installed. Absence of the by-pass may result in defeating the automatic resetting capability of the RSV-1.

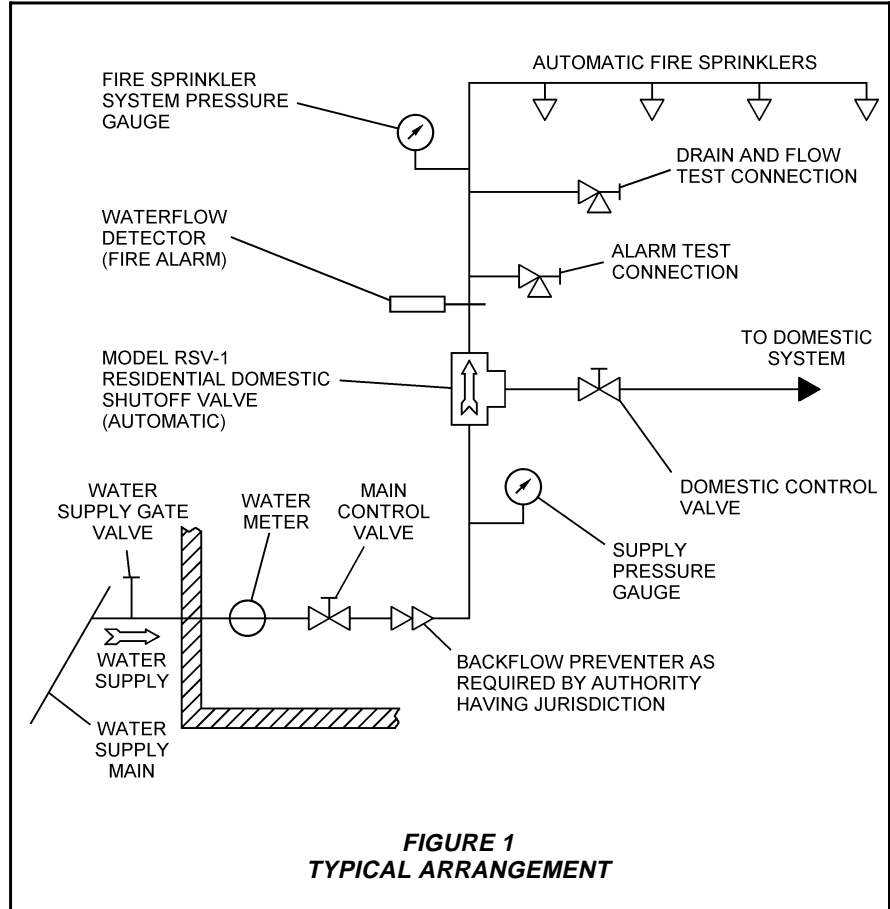
Installation of the by-pass defeats the ability of the RSV-1 to perform as a check valve.

Minimum Water Supply Requirements. In order for the 1 Inch (DN25) RSV-1 Valve to automatically operate, once a fire sprinkler operates, the fire sprinkler system from the water main to the most hydraulically remote sprinkler must be designed to provide a minimum single sprinkler flow of 12.5 GPM (47,3 LPM), when the supply pressure at the main is at its minimum expected value.

NOTES

The minimum single sprinkler flow rate of 12.5 GPM (47,3 LPM), required for use with the RSV-1 Valve, does not take precedence over any more hydraulically demanding single sprinkler flow rate specified for the residential sprinklers being utilized.

It is not necessary to take into account the trickle flow through the RSV-1 Valve By-Pass Restriction, into the domestic system, when performing hydraulic design calculations for the fire sprinkler system.

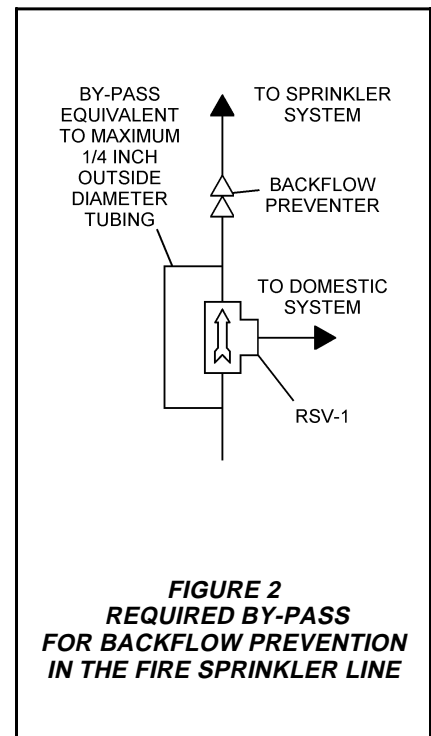


Operating Principles

The design of the RSV-1 Valve is such that if there is a fire sprinkler operation during domestic usage, the RSV-1 Valve will automatically shut off flow to the domestic system and divert the available water supply to the fire sprinkler system, thereby eliminating the lower flow into the sprinkler system that might otherwise be caused by possible significant domestic water usage.

When the RSV-1 Valve is in the normal standby position as shown in Figure 3, the Piston, assisted by the Spring, is in the down position. With the Piston in the down position, the Fire Sprinkler Seat permits the RSV-1 to perform as a conventional check valve. Also, with the Piston in the down position, water is available on demand through the Domestic Flow Passage and out the Domestic Port.

Upon operation and a minimum design water flow (i.e., 12.5 gpm) to the automatic residential fire sprinkler system, the Piston moves upward. With the Piston in the up position, any water

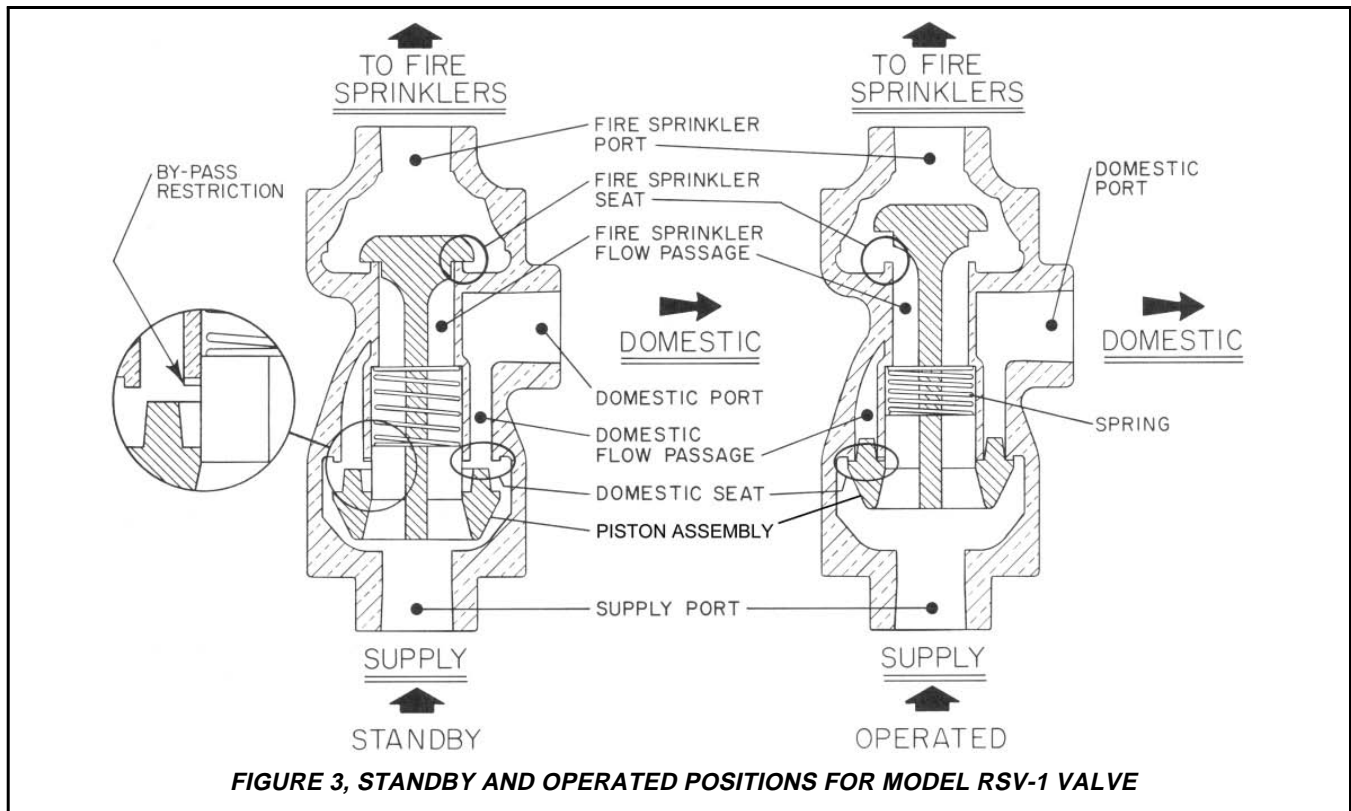
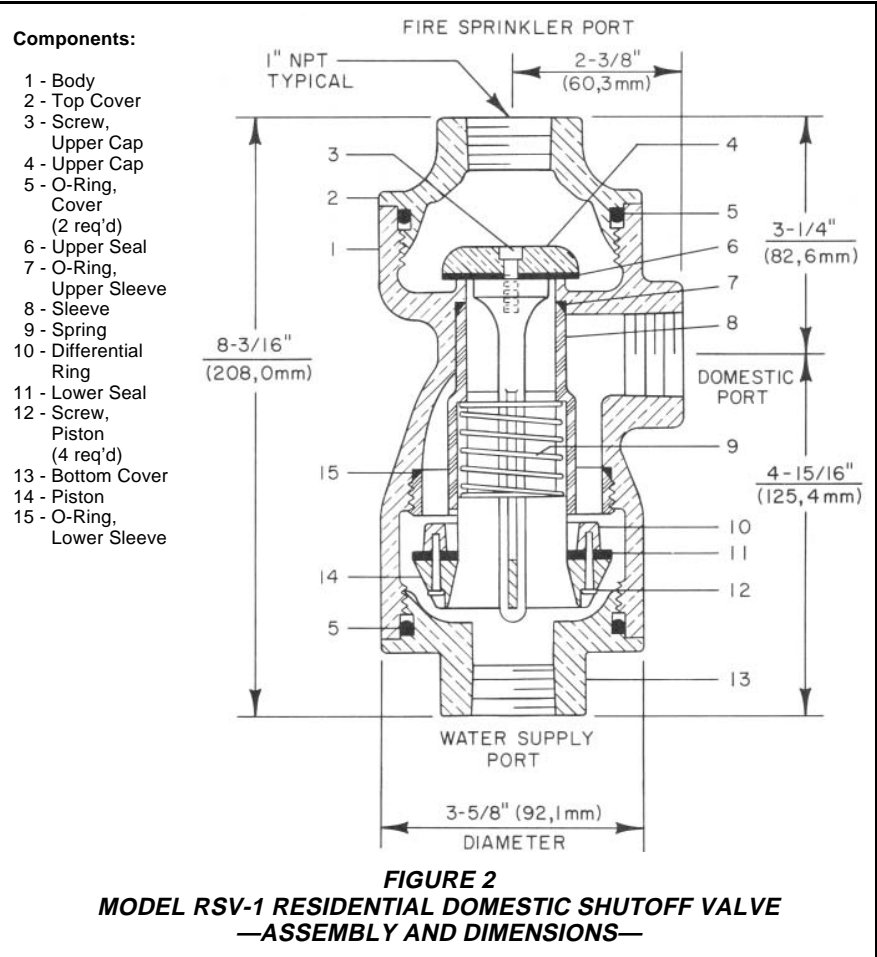


flow to the Domestic Flow Port is diverted to the Fire Flow Port.

The contours of the Piston have been specifically configured to minimize its upward movement except under the level of sustained fire sprinkler system flow resulting from operation of one or more fire sprinklers. However, because most fire sprinkler systems contain air pockets, the Piston will tend to move momentarily upward if there is a surge in supply pressure. The momentary opening and reclosing of the Piston at the Fire Sprinkler Seat will trap a portion of the pressure increase within the fire sprinkler system. The trapping of pressure increases within the fire sprinkler system will help to reduce the possibility of a subsequent surge in the supply pressure from causing the waterflow detector to signal a false alarm (unless a by-pass is installed per Figure 2).

As indicated above, domestic system usage may reduce the pressure available to the fire sprinkler system. However, when utilizing the RSV-1 Valve, it is not necessary to take into account the complex hydraulic modeling of the domestic system that would otherwise be required to determine the minimum possible residual (flowing) pressure that would be available to the fire sprinkler system.

For operation of the RSV-1 Valve, it is



only necessary to design the fire sprinkler system, from the water supply main to the most hydraulically remote sprinkler. The domestic flow need not be considered. As long as the single sprinkler flow is equal to or greater than 12.5 GPM when the supply pressure at the main is at its minimum expected value, the RSV-1 will automatically shutoff the domestic flow.

NOTES

After the Piston has moved to the full up position, only a small amount of water is permitted to trickle through the By-Pass Restriction to the Domestic Port (Ref. Figure 3). The trickle flow through the By-Pass Restriction permits automatic resetting of the RSV-1 Valve, without draining of the fire sprinkler system, after a sprinkler operation or test. When the Manual Domestic Shutoff Valve is closed, the By-Pass Restriction allows the Supply and Domestic Port pressures to equalize and the Piston Assembly to move back down to the standby position. The maximum flow rate through the By-Pass Restriction, when the RSV-1 Valve is in the operated position is less than 1/4 GPM (0,9 LPM) for a typical residual (flowing) pressure of 40 psi (2,8 bar) at the inlet. Consequently, it is not necessary to take into account the trickle flow through the RSV-1 Valve By-Pass Restriction, into the domestic system, when performing hydraulic design calculations for the fire sprinkler system.

Installation

NOTE

A fire sprinkler water supply connection to a public water supply is usually subject to local regulations concerning metering and backflow prevention requirements. Consult with the local water authorities concerning local requirements which may apply to the arrangement of these components in the fire sprinkler system water supply.

Figure 1 illustrates a typical arrangement using the Model RSV-1 Residential Domestic Shutoff Valve. The arrangement may need to be modified to meet the requirements of the authority having jurisdiction; however, the Model RSV-1 Residential Domestic Shutoff Valve must be installed in accordance with the following criteria:

Step 1. The RSV-1 Valve is to be installed vertically with the Supply Port at the bottom, the Fire Sprinkler Port at the top, and the Domestic Port at the side. It is recommended that a suitable clamp be installed along the water

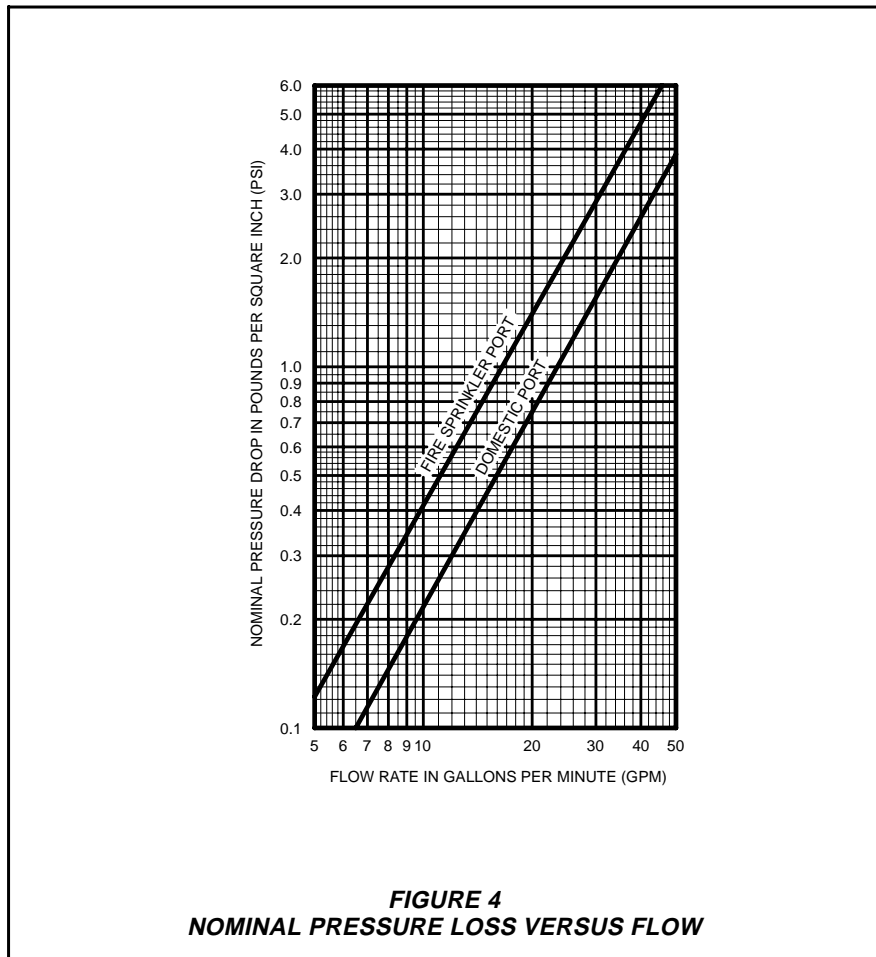


FIGURE 4
NOMINAL PRESSURE LOSS VERSUS FLOW

supply riser piping, to provide support for the weight of the RSV-1 Valve.

NOTE

The maximum water supply service line is to be 1 inch (DN25).

Step 2. The water supply to the RSV-1 Valve must be free of contaminants and particles of a size greater than 1/8 inch (3,2 mm).

Step 3. The RSV-1 is to be installed so that the arrows cast on the Body point in the direction of flow.

Step 4. A Domestic Control Valve is to be located between the RSV-1 Valve and the domestic system. The inlet to the Domestic Control Valve is to be located within 12 inches of the Domestic Port of the RSV-1 Valve.

Step 5. The Drain and Flow Test Connection (Ref. Figure 1) is recommended to be minimum 1/2 inch (DN15) for systems per NFPA 13D.

Step 6. An Alarm Test Connection with a test orifice equal to or less than the smallest K-factor sprinkler in the system is to be located downstream of the Waterflow Detector.

Step 7. Apply pipe thread sealant sparingly only to the male pipe threads which are to be assembled to the three ports of the RSV-1 Valve. The use of a Teflon* based pipe thread sealant is recommended.

Valve Setting Procedure

Steps 1 through 9 are to be performed when initially filling the fire sprinkler and domestic system piping with water or after a fire sprinkler operation (Ref. Figure 1).

Step 1. Close the Main Control Valve.

Step 2. Close the Domestic Control Valve, and all water outlets in the domestic piping system.

Step 3. Close all drain valves in addition to the Drain and Flow Test Connection in the fire sprinkler system, and replace all operated sprinklers as necessary.

Step 4. Partially open the Main Control Valve until the sound of flowing water just begins, and then leave the Main Control Valve in the partially open position.

Step 5. After the fire sprinkler system pressure gauge indicates approximately the same pressure as the supply pressure gauge, fully open the Main Control Valve.

Step 6. Open the highest elevation outlet on the domestic system.

Step 7. Partially open the Domestic Control Valve until the sound of flowing water begins. Allow the domestic piping to slowly fill with water.

Step 8. Close the highest elevation water outlet on the domestic system when un-aerated water begins to flow.

Step 9. Completely open the Domestic Control Valve, and then check that the domestic system is properly pressurized by verifying that at least three water outlets in the domestic system can flow full at the same time.

If the water outlets flow full, the RSV-1 Valve is set and ready for service and the water outlets on the domestic system may be closed.

If the water outlets do not flow full, reclose the Domestic Control Valve, wait a minimum of ten seconds, and ensure that there is no flow from the fire sprinkler system piping. Reopen the Domestic Control Valve and then recheck that the water outlets are flowing full.

Care and Maintenance

The following inspection procedure must be performed as indicated, in addition to any specific requirements of the NFPA, and any impairment must be immediately corrected.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

NOTES

No attempt is to be made to repair any RSV-1 valve component in the field.

The operational test and flow test procedures will result in operation of the associated alarms, as well as an interruption of the domestic water supply service. Consequently, notification must be given to the owner and the fire department, central station, or other signal station to which the alarms are connected, and notification must be given to the building occupants.

Before closing a fire protection system control valve for inspection or maintenance work on the fire protection system that it controls, permission to shut down the effected fire protection system must first be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

After placing a fire protection system in service, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

Operation Test Procedure

Step 1. Fully open two or three water outlets in the domestic piping system.

Step 2. Open the Alarm Test Connection of the fire sprinkler system, to simulate a sprinkler operation.

Step 3. Verify that the alarms are operating and that the flow from the do-

mestic water outlets has decreased to no more than a trickle.

Step 4. Reset the RSV-1 Valve in accordance with the Valve Setting Procedure.

Flow Test Procedure

Step 1. While there is no water flowing in the domestic system, completely open the Drain and Flow Test Connection.

Step 2. While water is flowing, record the pressure reading on the fire sprinkler system pressure gauge and then compare this reading to previous readings. If there is a significant decrease in pressure since the last time the pressure reading was taken which is not due to a normally expected drop in the water supply pressure, there may be an impairment that should be immediately identified and corrected.

Step 3. Close the Drain and Flow Test Connection to allow the RSV-1 Valve to automatically reset. Automatic resetting will occur within ten seconds.

Step 4. After waiting ten seconds, completely open at least three water outlets in the domestic system and allow them to simultaneously flow.

If the water outlets flow full, the RSV-1 Valve is set and ready for service and the water outlets on the domestic system may be closed.

If the water outlets do not flow full, close the Domestic Control Valve and verify that there is no flow from the fire sprinkler system piping (such as at the Inspector's Test Connection). Wait a minimum of ten seconds. Reopen the Domestic Control Valve and then recheck that the domestic system water outlets are flowing full.

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

Ordering Information

Valves with NPT Connections:

Specify: 1 Inch NPT (DN25) Model RSV-1 Residential Domestic Shutoff Valve, P/N 52-540-1-001.

Valves with ISO Connections:

Specify: ISO Rc1 (DN25) Model RSV-1 Residential Domestic Shutoff Valve, P/N 52-540-1-011.