

Policy and Guidance on Installing a Domestic Fire Sprinkler System

Version 2

**It's part of our
Blueprint for Yorkshire**



YorkshireWater

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Background

Residential properties in England are not required by law to have fire sprinklers systems installed but the Building Regulations (in England and Wales) 2006 Approved Document B incorporates clear recognition of the value of sprinklers in improving levels of safety for occupants as well as in preventing the spread of fire.

We are committed to providing a high quality service to our new connections customers and have therefore set out clear and concise guidance in this document on our policy on allowing new connections for a domestic fire sprinkler system.

Scope

This policy and guidance covers the application, design, installation of pipe work and fittings to supply water to domestic properties and residential occupancies for the purpose of a domestic fire sprinkler system. Residential occupancies include apartments, blocks of flats, residential homes, houses of multiple occupancy, nursing homes and other residential accommodation for care and rehabilitation. It covers new or existing domestic properties and residential occupancies wanting to have a new connection for a fire sprinkler system.

Based on the Code of Practice BS9251:2014 – Fire sprinkler systems for domestic and residential occupancies and BS8458:2015 - Residential and Domestic Water Mist Systems, this policy and guidance outlines the standards for the design, installation, components, water supplies, commissioning and maintenance of fire sprinkler systems for use specifically in residential and domestic occupancies. It is intended for the use of designers, engineers, architects, surveyors, contractors, installers and water companies who have jurisdiction.

Choosing a Fire Sprinkler Systems

There are two main types of fire sprinkler system you can choose from;

Wet Pipe System

A wet pipe system can be used in residential properties where there is no risk of freezing. It is designed to be permanently charged with water and have a constant stream of water available in the event of a fire. It is the most commonly installed system as occupants generally like to think that water would instantly be released in the event of a fire.

Dry Pipe System

A dry pipe system is connected to a water source but is filled with compressed air. The system still offers automatic protection, but the valve must first be triggered before water floods the pipes. If you have a home that isn't constantly heated this may be the best choice for you, as it reduces the risk of your pipes overfilling and bursting. There are different types of dry pipe systems used which are summarised below;

- The pipes can be full of water for the summer and be drained down and filled with air (under pressure) for the winter.
- The pipes are filled with air under pressure at all times and the water is held back by the control valve
- The pipes are filled with air but water is only let into the pipes when the detector operates (e.g. smoke detectors).

Supply Arrangement

Whether you choose a wet pipe or dry pipe system there are two alternative ways of supplying the sprinklers with water. This needs to be considered as part of the overall design. The options are explained in more detail below:

Mains Fed Storage and Booster Pump Fire System

An automatic sprinkler system provides a means of automatically detecting fire and discharging water at the appropriate location to control or extinguish fires in the early stages of development.

This type of sprinkler system usually consists of a water supply taken directly from our mains to internal storage, which normally has a booster pump which supplies an overhead piping array inside the building to be protected and on which sprinkler heads are fitted. A control valve and a flow activated alarm valve are located on the pipework upstream of the sprinkler so that if the sprinklers start to operate an alarm is triggered. Each sprinkler head is a thermosensitive device designed to operate individually at a predetermined temperature in case of fire. Each independent supply is required to satisfy stated pressure and flow standards and should be independently networked within the property without cross connections to any other system(s).

For insurance purposes, automatic sprinkler systems are classified according to the nature of the fire risk and this in turn determines the water pressure and flow requirements. In some circumstances two water supplies may be required from independent sources, such as public supply mains, private reservoirs, gravity tanks, pressure tanks or automatic pumped supplies drawing from storage tanks or natural sources. Each independent supply is required to satisfy stated pressure and flow standards.

The following example layouts can be found in Appendix A;

- Figure 3 - New House With Storage and Boosted Sprinkler Supply
- Figure 6 - Existing House With Storage & Boosted Sprinkler Supply From Existing Service Pipe

Direct Mains Fed Booster Pump Fire System

This system relies on pressure and flow from our network to meet the fire sprinkler system requirements. The use of a priority demand valve may be used on such systems. This is to ensure in the event of operating the fire sprinkler system the branch of the pipework feeding the domestic demand will automatically shut down.

This type of sprinkler system usually consists of a water supply taken direct from our mains and has a booster pump which supplies an overhead piping array inside the building to be protected and on which sprinkler heads are fitted. A control valve and a flow activated alarm valve are located on the pipework upstream of the sprinkler so that if the sprinklers start to operate an alarm is triggered. Each sprinkler head is a thermosensitive device designed to operate individually at a predetermined temperature in case of fire.

The following example layouts can be found in Appendix A;

- Figure 1 - New House With Separate Fire Main and External Meter
- Figure 2 - New House With Separate Fire Main and Internal Meter
- Figure 4 - New Residential Premises With Internal Meter
- Figure 5 - New Residential Premises With Externally Sited Meter
- Figure 7 - Existing Domestic Dwelling With New Service Pipe and No Metering Provision
- Figure 8 - Existing Residential Premises With Existing Service Pipe Feeding Sprinkler System

Operating Pressure and Flows

The effective operation of fire sprinkler systems requires the delivery of minimum pressure and flows as recommended by BS9251:2014 - Fire sprinkler systems for domestic and residential occupancies.

The Applicant must be made aware that we do not guarantee to maintain any particular flow or pressure when the firefighting equipment is used and do not accept any liability in the event of the water supply to firefighting equipment failing.

If Applicants are relying on pressure and flow from our distribution mains network to operate their sprinkler system, they should be aware that we cannot guarantee pressure or flow above the minimum guaranteed standards set by the Office of Water Services (OFWAT), of 10 meters head pressure and 9 litres per minute flow at the boundary of the property. These Levels of Service exist to protect the drinking water supply and are not applied to the supply of water for fire sprinklers.

We will allow a 'Direct Fed Mains Fire System' over 'Mains Fed Storage and Booster Pump Fire System' where localised water supply arrangements permit. However, Yorkshire Water cannot be held responsible for failure of the sprinkler system to operate in future as long as we continue to meet the minimum guaranteed standards for pressure and flow set by OFWAT.

We've no obligation to provide a dedicated supply (e.g. a tank) for supplying the sprinklers. Where any fire hydrants are fixed to our water mains, the supply to those hydrants will intermittently be subject to interruptions in supply. Where a developer requests additional flow for fire-fighting and we have to upsize our mains there will be a charge for this.

Design and Installation of the Fire Sprinkler System

Design and installation of the fire sprinkler system is initiated by the Applicant (owner of the property or developer) through an application to us for a new connection.

It's recommended that design and installation is carried out by a qualified designer. It is advised that the designer and installer make reference to BS9251:2014 – Fire sprinkler systems for domestic and residential occupancies in the Application as the correct design needs to consider the fire and fuel loading and layout of the property. The installer must ensure that there's adequate pressure, flow and volume available for the installation of the fire sprinkler system in the property or properties.

Design Considerations

- The designer must take account of headlosses through fittings that may reduce the pressure supplied along the fire main. Headloss estimates, from manufacturers' curves, are provided for ferrules, ferrule straps, stop-taps, boundary boxes and check valves in Appendix B. On the customer side, worst case headloss identified, through a stop-tap and check valve, is estimated to be around 4m. This could vary with different suppliers' products. Further information can be obtained from:
 - BS9251:2014 – Fire sprinkler systems for domestic and residential occupancies
 - Guidelines for the Supply of Water to Automatic Fire Sprinklers (Dec 2013)
- The storage tank must be sized by the designer and installer of the sprinkler system and be in accordance with the Water Supply (Water Fittings) Regulations 1999.
- Ensure that the pipework from the property to the highway boundary is of sufficient size to carry the required flow for the sprinkler system by taking in to account head loss through the pipework, as long service pipes can be susceptible to significant losses.
- The fire main is unmetered but non-return valves are required to ensure sprinkler supply supplies don't impact the quality of the domestic water supply. They should be designed in accordance with Water Supply (Water Fittings) Regulations 1999.
- Ensure that a servicing valve (isolation point at boundary of property) and non-return valve are installed on the sprinkler supply as close to the property boundary as possible in a 600mm x 450mm chamber (minimum size) to allow for access.
- The fire main can be sized up to 50mm.
- Ensure the supply for domestic use and the sprinkler supply are brought to the same location for connection to our network.
- Internal pipe work for drinking water supply must remain separate from the water supplied solely for the purpose of fire sprinklers. The fire sprinkler supply must be marked with appropriate tape. We recommend these three key guidelines to all applicants:
 - WRAS Water Regulations Guide
 - BS6700 guidance for backflow prevention
 - BS1710 guidance for identification and marking of pipe work

Note. The Owner should be aware that future maintenance of the servicing valve and the non-return valve is the responsibility of the Owner. Please Note. A normal service interval is once every 5 years.

WE CANNOT BE HELD RESPONSIBLE FOR THE CHOICE, DESIGN OR INSTALLATION OF THE FIRE SPRINKLER SYSTEM.

Application Process

We should be notified of fire sprinkler system installations in any new property, fitting to an existing property or modification to an existing installation by the owner or developer applying for a new connection via the application process. As part of the application process we'll advise the applicant to consult with the Fire Authority, the building control body and insurers. This requirement also applies where a pump is to be installed in any installation.

Applicant Responsibilities

Complete an Application Form giving the appropriate information

- The name and address of the person giving notice, and if different, the name and address of the person to whom approval should be given.
- A description of the proposed work.
- Details of the required pressure and flow to operate the fire sprinkler system
- Must clearly state whether you plan to install a direct supply or a tank fed supply fire sprinkler system.
- The location of the premises to which the proposal relates, and the use or intended use of those premises.
- A diagram showing the size and run of pipework from the property to the highway boundary to show us where the connection proposed.
- A plan of those parts of the premises to which the proposal relates.
- Where the work is to be carried out by an approved contractor, the name of the contractor. An approved contractor is a contractor approved by the water supplier who is able, by virtue of a recognised qualification, to furnish a signed certificate confirming the installation complies with the requirements of the Regulations.

INSTALLATION WORK SHOULD NOT COMMENCE WITHOUT OUR APPROVAL.

Yorkshire Water Responsibilities

- Respond to an application for a water supply within 28 days of application.
- Install a new or upgraded water connection within 21 days of payment and receipt of the water supply check list.
- Ensure the fittings used in the supply installation provide the agreed flow or ensure the fittings used in the supply installation provide the flow agreed at time of acceptance of the application for supply.
- Approval may be subject to conditions but it should not be withheld unreasonably.

We do not guarantee to maintain any particular flow or pressure when the firefighting equipment is used and do not accept any liability in the event of the water supply to firefighting equipment failing during installation or at any time on the future.

General Conditions of Supply

- We will not be held responsible either at the time of installation or at any time in the future for a failure of the system to operate due to insufficient pressure or flow, where we achieve the minimum guaranteed standards set by OFWAT.

- If you are installing a residential fire sprinkler system you must inform us as under the Water Supply (Water Fittings) Regulation 1999. The application should give details of the required pressure and flow and a diagram showing details of the pipe work you are laying from the property to the highway boundary.
- An Applicant should contact us as early on in the process as possible to understand what pressure and flows are available to allow an appropriately designed system to be fitted.
- The supply to a residential fire sprinkler system does not require a meter (providing the system has an alarm fitted) but a meter is required on the domestic usage supply.
- The sizing of the pipework from the property to the highway boundary is the responsibility of the Applicant.
- The responsibility for the installation and all aspects including the design, control, maintenance, operation and protection of any pump are the responsibility of the Designer.
- We will not carry out the connection to the mains until we are satisfied that the installation is compliant with the Water Supply (Water Fittings) Regulation 1999 and British Standard BS9251: 2014 - Fire sprinkler systems for domestic and residential occupancies.
- Internal pipe work is owned and maintained by the owner of the property. We'll connect to the system at the boundary to the property, designated by the boundary box.
- As part of the Water Fittings Regulations, we'll undertake inspections of sprinkler installations to enforce compliance with the regulations.
- We cannot offer advice or views on suitability of different fire systems, suppliers or installers.

Specific Conditions of Supply for a Mains Fed Storage and Booster Pump Fire System

The sprinkler system must be supplied independently of domestic and industrial supplies

- Connections direct from our mains need not be metered provided they are fitted with an alarm system which is triggered by pressure loss or water flow in the sprinkler pipework, i.e. so that if there are any unauthorised connections made downstream of the sprinkler alarm valve then the alarm will be triggered. However, the water supply will be to a storage tank, and in this case the supply must be metered. An alarmed storage fed sprinkler system will not be activated if water is drawn, or leaks, from the length of service pipe between the boundary and the ball valve in the storage tank.
- The service pipe for the fire supply shall be fitted with an isolating valve and will be located at the property boundary. If the service is connected to the water main by a tee branch then the isolating valve should be a sluice valve fixed on the tee branch at the point of connection to the main.
- In addition, the supply pipe must be fitted with an 'approved' backflow prevention device as close as practicable to the boundary of the premises, on the Owners side.
- Dual connections to our mains in different pressure zones will not be permitted.
- Dual connections of our treated supplies and any other sources are not to be permitted other than via a cistern or tank fitted with the appropriate air gap.
- In circumstances where the supply of water available from our mains is insufficient the sprinkler system must be supplied by pumping from a storage tank. The inlet pipe to the storage tank from our mains shall have level control and a type "AA" or "AB" air gap. The storage tank shall also be fitted with a warning pipe or warning device to indicate whether the tank is overfilled.

Specific Conditions of Supply for a Direct Mains Fire System

- We will restrict the pipe size we lay (the communication pipe) to the fire sprinkler system to a maximum of 32mm.
- Designers are encouraged to contact us during the design phase where available flow and pressures may dictate other types of systems are required. We can potentially provide more detailed network information to aid with design.
- We reserve the right in exceptional circumstances to refuse a ‘Direct Fed Mains Fire System’ design where supply arrangements dictate our existing customers would be adversely affected.

Specific Conditions of Supply for a Direct Mains Fed Booster Pump Fire System

- This type of system could be subject to fluctuations in our network or could cause localised fluctuations in the event of operating the fire sprinkler system. Therefore we would restrict the pipe size to the fire sprinkler system to a maximum of 32mm.
- We will only give permission for this type of installation when there are extenuating circumstances.
- We reserve the right to refuse a design based on our regulatory requirement to protect our existing customers.
- We will require backflow and surge protection installing.
- No element of the domestic supply would be connected to the pump fire supply.
- We will need to see the details of the pump as part of the application i.e. size and capacity of pump OR we will limit the application to certain pumps / sizes OR we will restrict the available flow at point of supply.

Multiple Dwelling Residential Properties

Any multiple dwelling residential properties (such as flats) are subject to our new connections large diameter connection process.

Assessment of Distribution Network Capability

Before any water supply connection (under the terms of Section 47 of the Water Industry Act, 1991) is provided our distribution network capability must be assessed.

After we receive the application we'll assess the capability of the network to provide a water supply that meets the statutory obligations. The assessment will be based on the information provided by the Applicant and it is the responsibility of the Applicant to ensure that this information is correct.

The assessment is required to confirm whether our statutory obligations can be met during peak demands in the water distribution network. There may be more pressure and flow available at the time of application but this may not be there in the future as we actively manage our network 24 hours a day / 365 days a year. So this should be taken into account when designing any sprinkler system.

We'll advise the applicant that “a minimum 10 meters head pressure” will be maintained by us at the property boundary isolation point.

Water Use in the Event of Operation of a Fire Sprinkler

In accordance with the Water Industry Act (1991), the customer will not be charged for the use of water for the purpose of firefighting, training and equipment testing. This does not exempt billing of water use through poor maintenance and leakage of the system.

In the event of a fire, a billing allowance will be applied to the billing period in which the fire occurred; applications for an allowance must be made within 12 months of the event. The domestic water use is calculated using average daily consumption from the same billing period:

Water consumption (during event) - Actual domestic water usage = Billing Allowance

The activation of a sprinkler system, either during an event or accidental operation, can cause a sudden peak demand and a reduction in the operation of the water network. This may result in a breach of the Level of Service (Pressure). Any breach of the Level of Service (Pressure) as a result of the activation of a sprinkler system is exempt.

Further Information

Further information and guidance on residential fire sprinkler systems can be obtained from;

- Yorkshire Water Developer Services on 0345 1 24 24 24 or via our website www.yorkshirewater.com
- BAFSA (British Automatic Fire Sprinkler Association)
Richmond House
Broad Street
Ely
CB7 4AH
Tel: 01353 659187
Fax: 01353 666619
Website: www.bafsa.org.uk
Email: info@bafsa.org.uk
- The Fire Sprinkler Association
Mill House
Mill Lane
Padworth
Reading
Berks
RG17 4JX
Tel: 0118 971 2322
Fax: 0118 971 3015
Website: www.firesprinklers.org.uk
Email: info@firesprinklers.org.uk
- Guidelines for the Supply of Water to Automatic Fire Sprinklers (Dec 2013) - prepared by The British Automatic Fire Sprinkler Association, The European Fire Sprinkler Network, The National Fire Sprinkler Network, Residential Sprinkler Association & Water UK
- British Standard Institute (2014): BS9251 Fire sprinkler systems for domestic and residential occupancies
- British Standard Institute (2015): BS8458 Residential and Domestic Water Mist Systems
- British Standards Institute (2011): BS6700 Guidance for Backflow Prevention
- British Standards Institute (2006): BS1710 Guidance for Identification and Marking of Pipe Work
- WRAS (1999): Water Supply (Water Fittings) Regulations.
- WRAS (2000): Water Regulations Guide
- WRAS Water Regulations Guide and the Water Byelaws 2000 (Scotland) Second Edition (Recommendations R15.27).

Appendix A

Figure 1 - New House With Separate Fire Main and External Meter

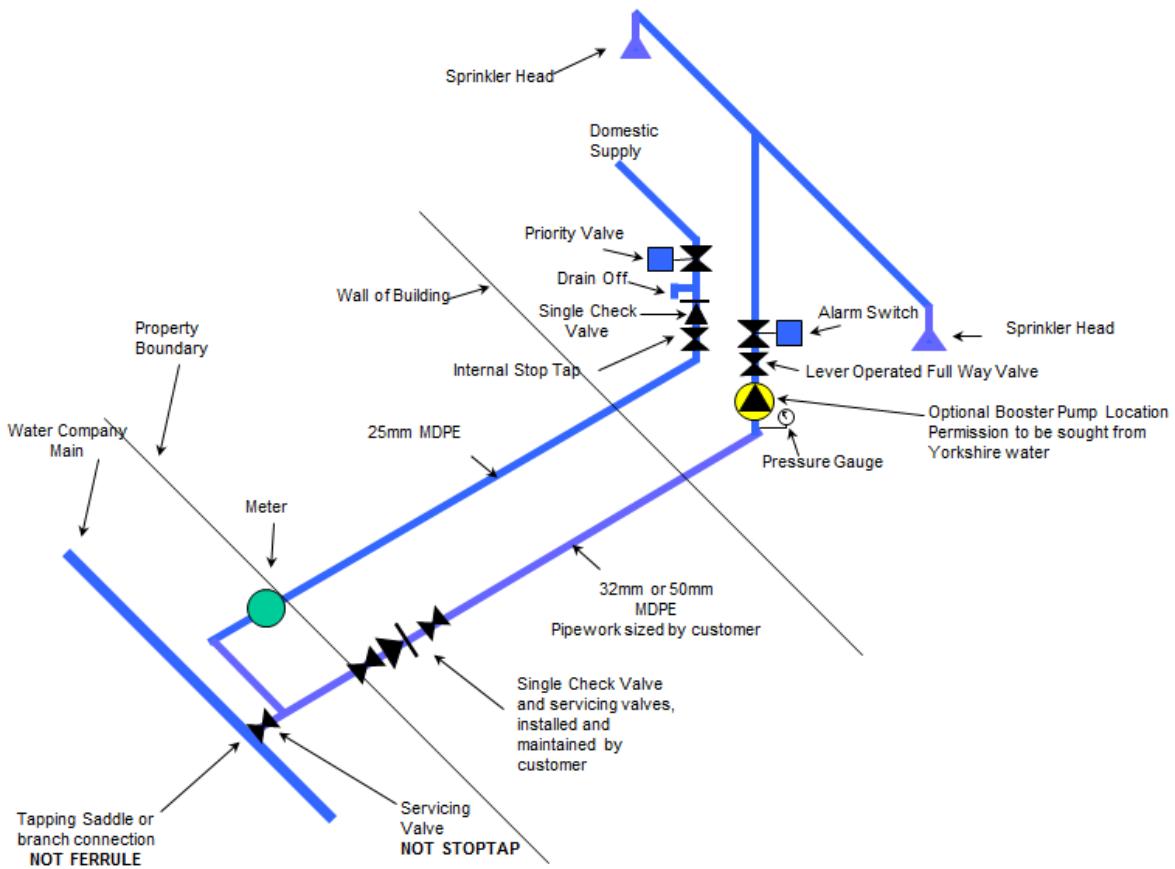


Figure 2 - New House With Separate Fire Main and Internal Meter

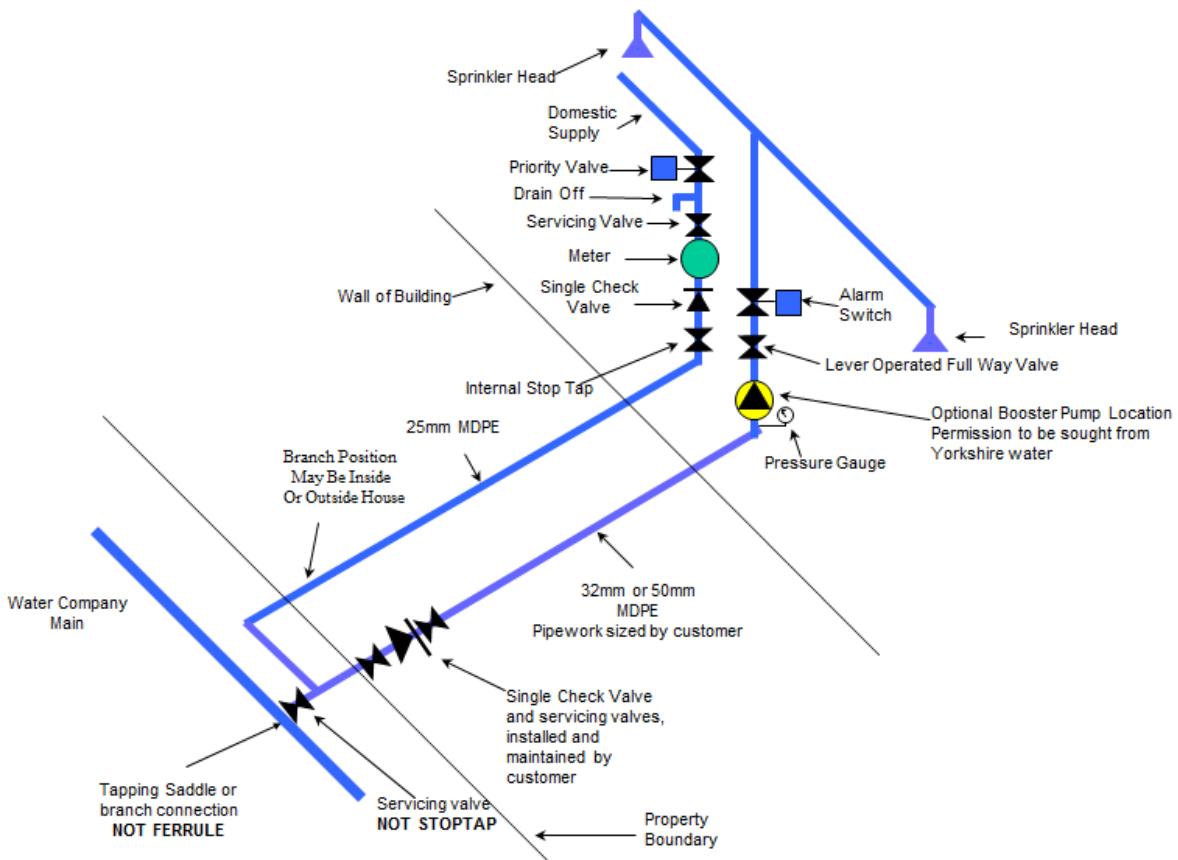


Figure 3 - New House With Storage & Boosted Sprinkler Supply

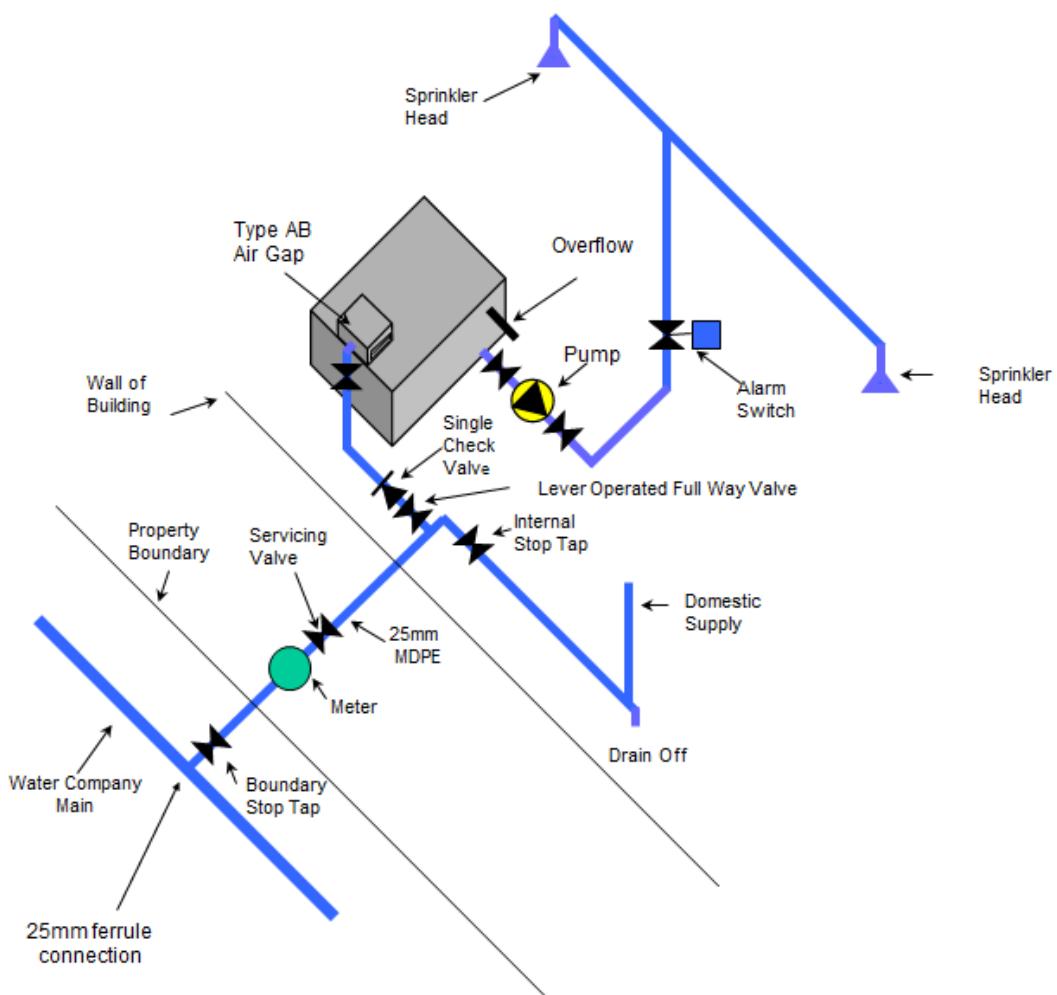


Figure 4 - New Residential Premises With Internal Meter

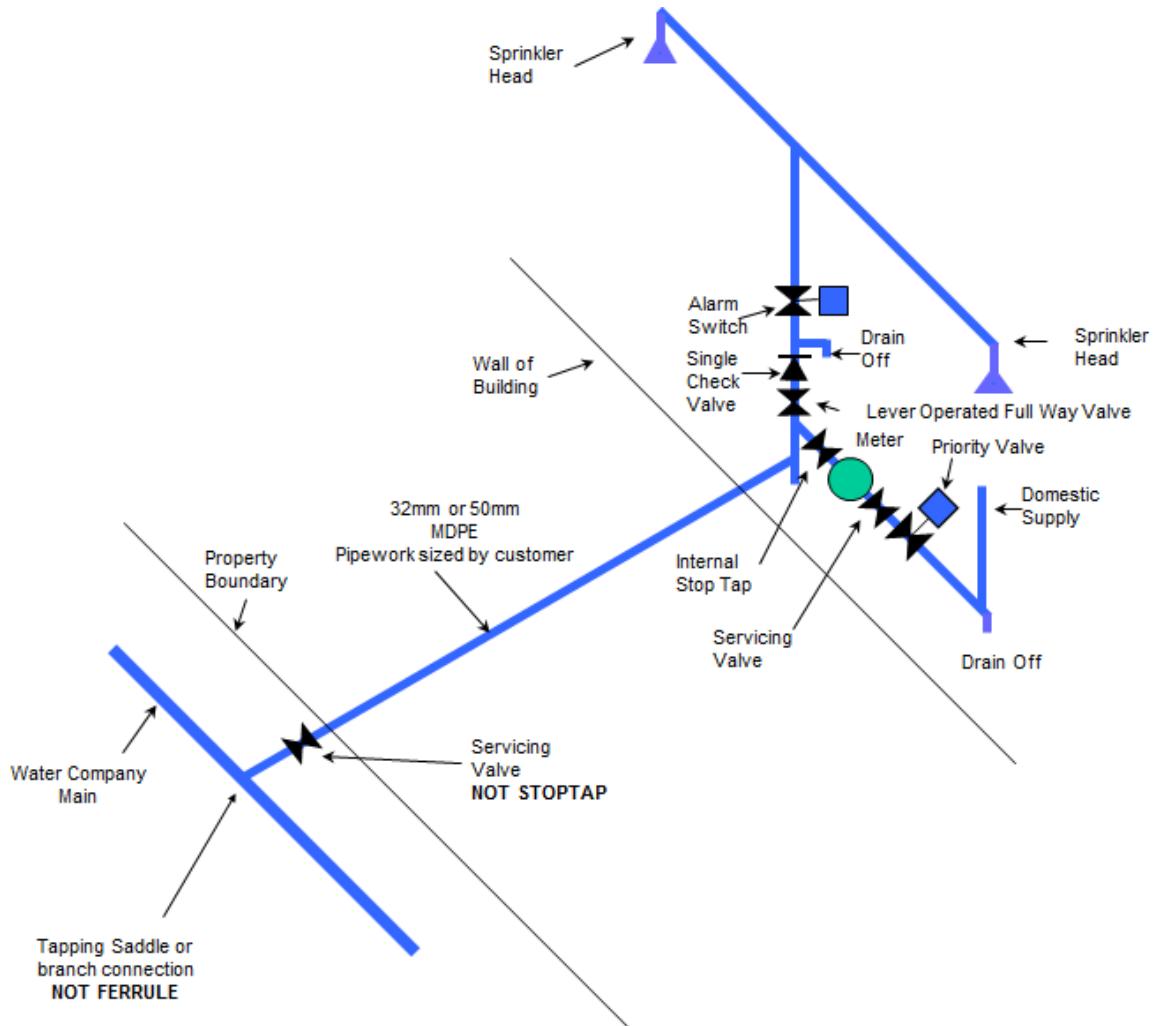


Figure 5 - New Residential Premises With Externally Sited Meter

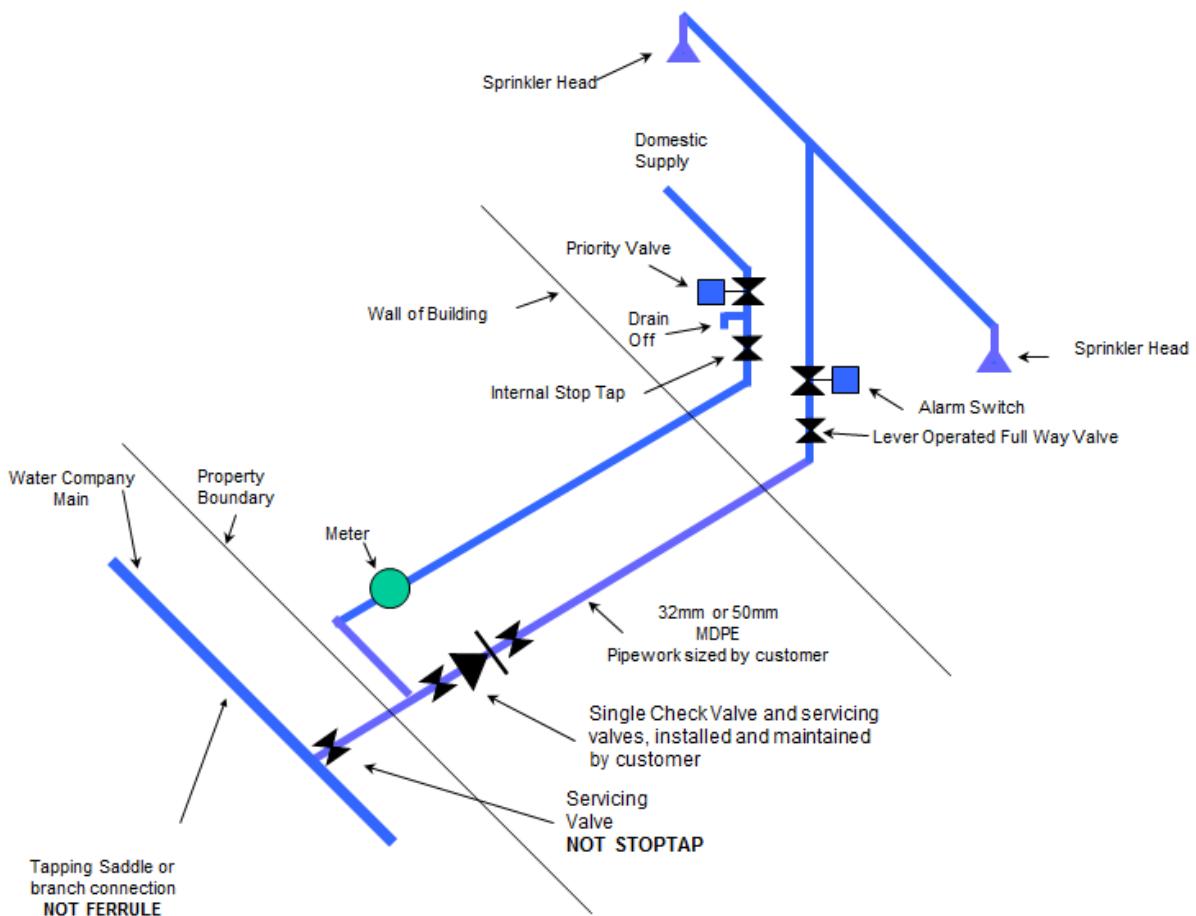


Figure 6 - Existing House With Storage and Boosted Sprinkler Supply From Existing Service Pipe

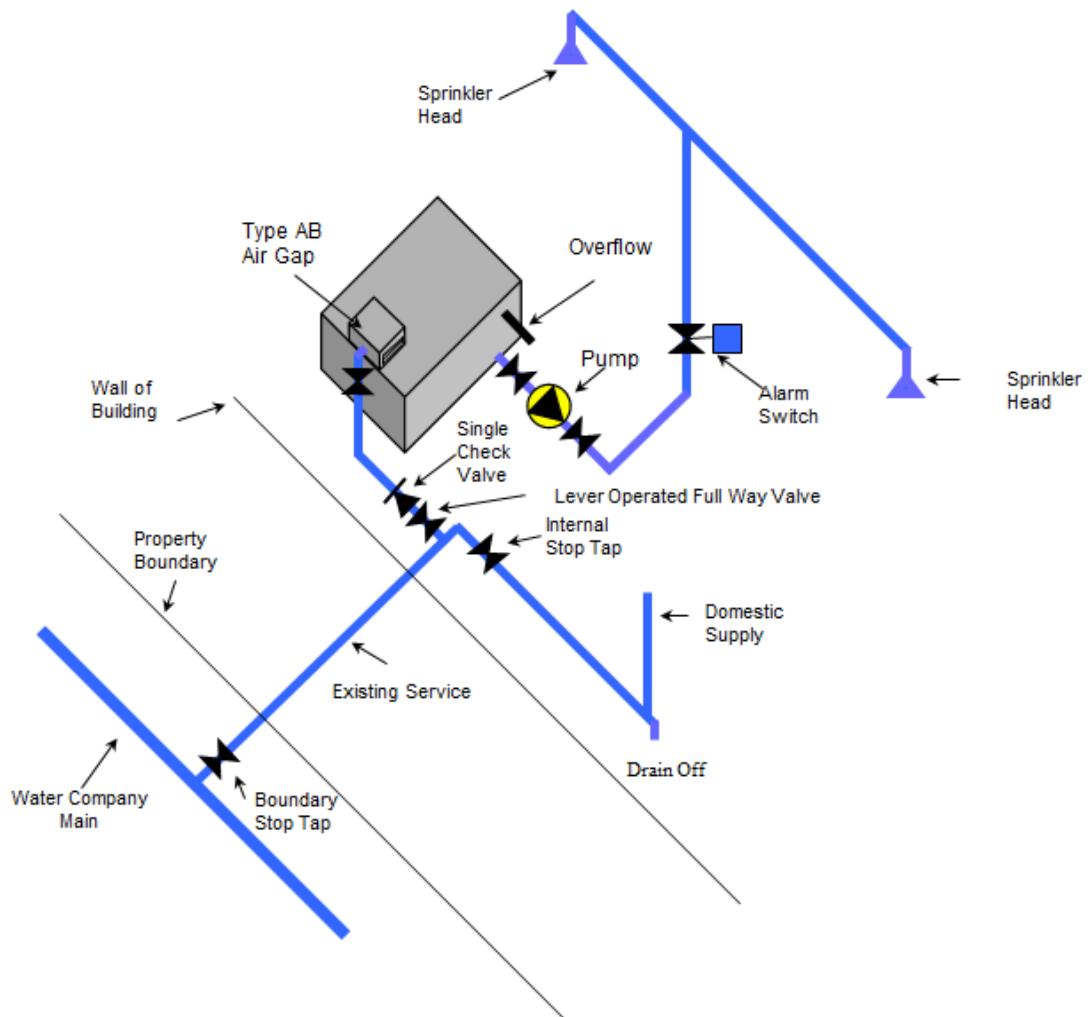


Figure 7 - Existing Domestic Dwelling With New Service Pipe and No Metering Provision

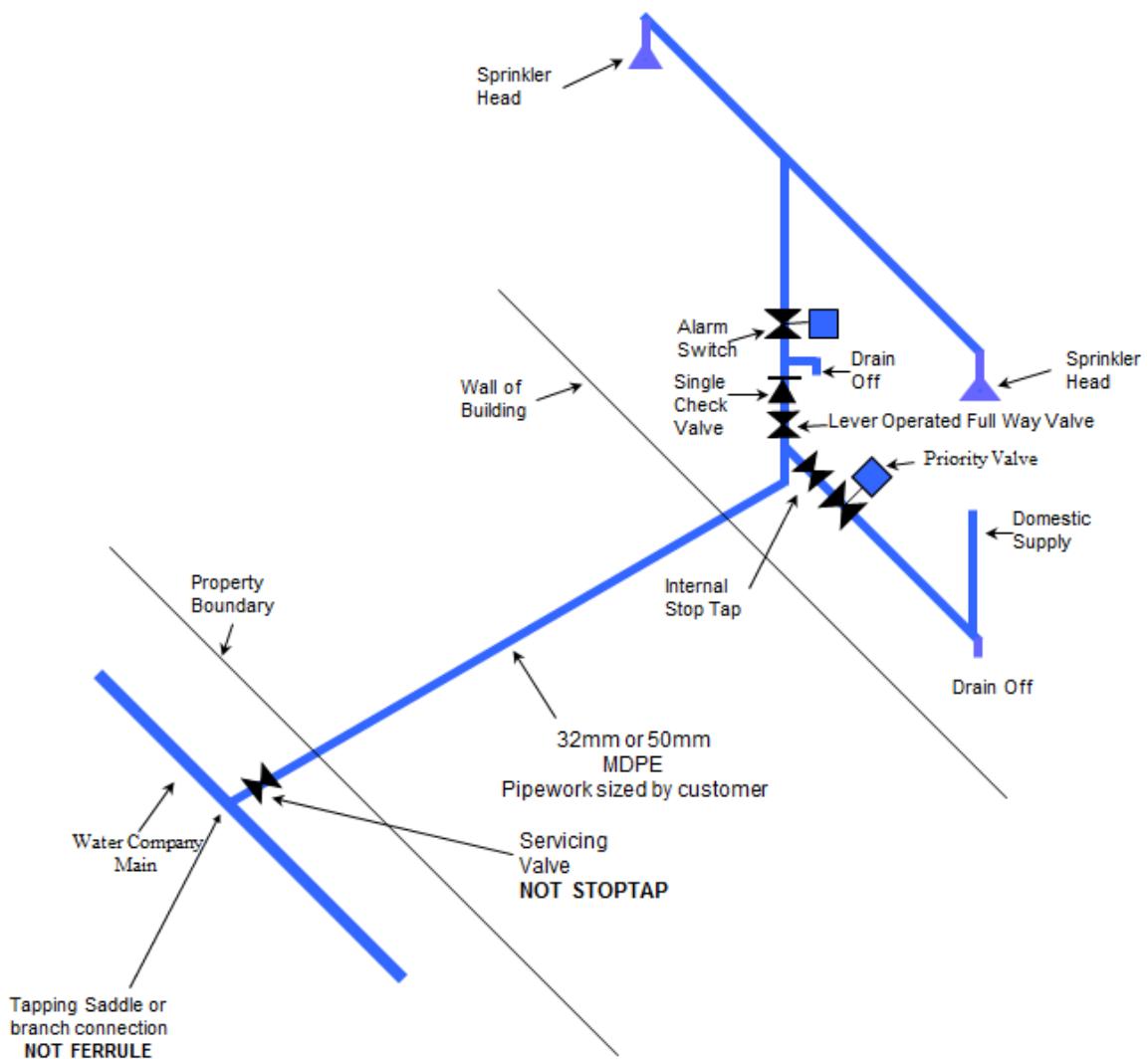
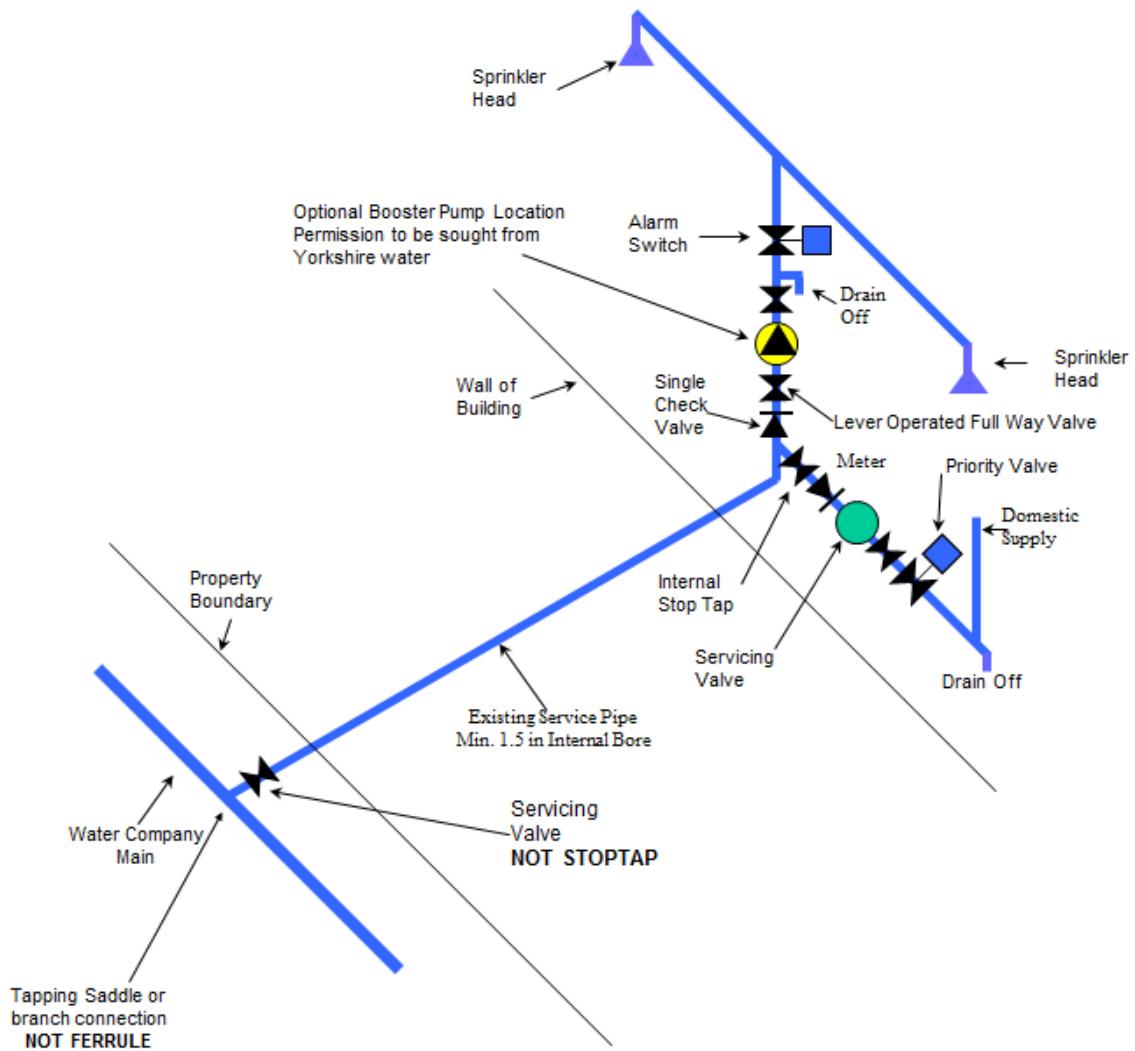


Figure 8 - Existing Residential Premises With Existing Service Pipe Feeding Sprinkler System



Appendix B

Headloss considerations for fittings

Mains designers are requested to provide a minimum of 20m head and typically 21l/min flow at the ferrule. This comfortably provides our service level requirement of 10m head and 9l/min at the external stop-tap.

Stop-Taps – WRc Headloss Tests 1990

Size	Velocity 0.5m/s	Velocity 1.25m/s
20mm	0.8m (5.8l/min flow)	1m (14.5l/m)
25mm	0.2m (10l/min)	1m (25l/min)
32mm	Not tested (16.3l/min)	Not tested (40.7l/min)

Boundary Boxes – provided by Elster (25mm)

Size	Flow-rate 9 l/min	Flow-rate 15l/min	Flow-rate 21l/min
25mm	0.4m	1.1m	10-15m*
32mm	0.4m	0.7m	1.1m

Non-Return Valves (12-18mm Philmac, 25-50mm AVK)

Size	Flow-rate 9 l/min	Flow-rate 15l/min	Flow-rate 21l/min
12mm	<0.1m	0.1m	0.2m
18mm	<0.1m	<0.1m	<0.1m
25mm/1"	3.2m	3.1m	3.0m
50mm/2"	2.5m	2.5m	2.5m

Ferrules – ductile iron

Size	Velocity 0.5m/s	Velocity 1.25m/s
20mm	0m (5.8l/min)	0.25m (14.5l/min)
25mm	0.1m (10l/min)	1.0m (25l/min)
32mm	0m (16.3l/min)	0.24m (40.7l/min)

Ferrule straps (AC, PVC, PE)

Size	Velocity 0.5m/s	Velocity 1.25m/s
20mm	0.1m (5.8l/min)	0.4m (14.5l/min)
25mm	0.0m (10l/min)	0.3m (25l/min)
32mm	Not tested (16.3l/min)	Not tested (40.7l/min)

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