GUIDELINES FOR THE SUPPLY OF WATER TO AUTOMATIC FIRE SPRINKLER SYSTEMS

13 December 2013

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bafsa

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RSA Residential Sprinkler Association

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FOREWORD

Automatic fire sprinkler systems have a valuable role to play in the protection of both life and property from fire and in the reduction of environmental damage such fires can cause. This document reflects the commitment of the participants to maintain and develop the goodwill that currently exists. The guidelines refer to all types of automatic fire sprinkler systems supplied directly or indirectly by mains water in accordance with statutory obligations placed upon water undertakers.

These guidelines have been developed to reflect the legislative framework at the time of writing. Proposed amendments to Section 57 the Water Industry Act 1991 re-defining the scope of water for fire fighting to include fire sprinkler connections, are supported by water companies and by the fire sprinkler industry. Amendments to the legislation would deliver benefits but legislative change takes time and strong guidelines can, in the meantime, be used as the basis for discussions at a strategic level.

These guidelines have been prepared by the following participants;

- The British Automatic Fire Sprinkler Association
- The European Fire Sprinkler Network
- The National Fire Sprinkler Network
- Residential Sprinkler Association
- Water UK

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Jim Marshall, Policy and Business Adviser, Water UK

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AGREED PRINCIPLES

Subject to any legal requirements placed upon water companies regarding the proper supply and use of public water, the participants agree that they will encourage, insofar as they are able, the adoption of the following principles in policy documents which should be published clearly on corporate websites and available on request:

- co-operation at every level within their organisations in facilitating the provision of properly designed automatic fire sprinkler systems and the provision of appropriate water supplies to support those systems, and
- the provision of clear and transparent methods of working with each other, at national and local level, and
- the provision of lead contacts within each water company on automatic fire sprinkler issues so that there is are clear communications between all parties, and
- the provision of water supplies and installation of automatic fire sprinkler systems in accordance with relevant legislation and regulations, British, European or internationally recognised standards, and
- where, for a specific installation, a deviation from such standards affects the interests of the water supplier, then that deviation shall be agreed in writing locally with the parties concerned, and
- make every attempt to resolve any dispute concerning the interpretation or application of these guidelines locally with the water undertaker, and at the appropriate level, as swiftly as possible, and
- take all reasonable precautions to prevent the misappropriation of water, or the commission of a related offence, and
- notify all installations to the relevant water company in order to allow records to be kept and proper information to be shared.

This document will be reviewed, as a minimum, every 5 years or on the occasion of any material change to legislation, regulation, standards or guidance. Any amendments to this document shall only be made with the consent, in writing, of all the Parties, or their successors, following a joint review.

SCOPE

The document is aimed at all parties (water suppliers, sprinkler system designer, installer, user and maintainer) involved in the installation of automatic fire sprinkler systems and is not intended to preclude the use of other automated water based fire suppression systems provided they meet the appropriate standards.

It provides guidelines for all to enable them to work together in a spirit of co-operation and so ensure good working relationships and outlines a set of principles that should form the basis of local policies and agreements. The participants recognise that by so doing they will reduce fire casualties, and property and environmental damage, through the provision of properly designed and installed automatic fire sprinkler systems and the provision of water supplies to support those systems.

This document outlines how water supplied by water undertakers may be used for the suppression of fires by automatic fire sprinkler systems, and establishes agreed guidelines of how these systems may be supplied. It is understood that water companies may produce their own policy, procedures and technical guidance documents based upon these principles and guidelines to reflect their own specific situation.

INTRODUCTION

In many thousands of buildings throughout the UK, permanently installed automatic fire sprinkler systems are used as a preventative measure to control fires, for both life safety and property protection. Some systems are fed directly from the water mains; others via a storage cistern and pump or pressure vessel arrangement.

For operational reasons, including the minimising of leakage, the reduction of disruption from burst mains, and the reduction of power usage, water suppliers actively manage water pressures in the mains network. In doing so it is the water undertakers' responsibility to manage water pressure to a level commensurate with providing an adequate supply to domestic customers, whilst meeting levels of service indicators (for example DG2 standards in England and Wales). Water pressures may also be affected by a growth in demand and the natural variations during the day caused by local demands.

The participants acknowledge that there is no guarantee of any particular pressure over and above the regulatory obligation. Pressure levels that may have been available in the past may not be available in the future. Water suppliers will however; provide information to the best of their ability on the prevailing mains pressure and any significant seasonal variations of which they are aware to enable automatic fire sprinkler system design to be optimised.

It should also be understood that the fire service might have based its emergency rescue and fire control tactics on an assumption of effective fire sprinkler actuation and the availability of adequate water supplies for conventional fire-fighting.

Similarly, fire safety requirements made under the Building Regulations in England, Wales and Northern Ireland, and the Building Standards in Scotland, relating to fire safety measures to be incorporated into the design and construction of buildings may have been relaxed in favour of the fitting of an automatic fire sprinkler system.

Because of the importance of automatic fire sprinkler systems as an efficient means of detecting, controlling and/or extinguishing fires, before they become a significant threat to life, property and the environment, coupled with economic use of water, it is important that all the participants concerned co-ordinate their efforts in dealing with water supply issues, both for maintaining the effectiveness of existing systems and for ensuring that new systems are installed and maintained correctly.

WATER POLICY GUIDELINES

1. The Benefits of Sprinklers

1.1 Automatic fire sprinkler systems have been in use for nearly 150 years. Sprinklers have, since the publication of British Standard BS 5306 Pt. 2 in 1990, been recognised as providing a vital life safety function in controlling the size of a fire to allow more time for the escape of occupants. In the UK the majority of existing sprinkler systems have been designed and installed to the requirements of BS 5306 Part 2 and BS EN 12845, the Loss Prevention Council Sprinkler Rules and their Technical Bulletins. More recently systems have been introduced that are intended for the protection of life in domestic and residential property, and which are designed to BS 9251: 2005.

1.2 An automatic fire sprinkler system is designed to:

- detect a fire within a protected building, and
- release water in the fire-affected area via the sprinkler heads, which contain heat sensitive elements designed to operate automatically at a pre-determined temperature, [NB. Only those sprinklers in the vicinity of the fire operate], and
- initiate a water flow-activated, audible, local alarm when a sprinkler head operates, and
- transmit a signal to an approved alarm-receiving centre, when required.

1.3 Records show that by this means of providing detection, alarm and localized water application, fire sprinkler systems are very effective in preventing the development of major fires. Apart from explosions there have never been multiple fatalities in a fully sprinklered building in the UK.

1.4 In industrial and commercial automatic fire sprinkler systems about 60% of fires are controlled by four sprinkler heads or fewer.

1.5 In domestic and residential automatic fire sprinkler systems over 90% of fires are controlled by the activation of just one sprinkler head.

1.6 The volume of water used by properly designed and installed automatic fire sprinkler system to control a fire will be significantly less than that used by the fire service to control and extinguish the same fire. In many cases this will be less than one tenth that which the Fire Service would have used.

1.7 In environmental terms automatic fire sprinkler systems make a valuable contribution by:

- reducing the size and severity of fires, and
- using water in the most effective and economical way to control fire, and
- minimising the problems of contaminated fire fighting water run-off, and
- minimising the potential disruption to water supplies for water company customers, and
- minimising or obviating any adverse effect on water quality.

2. Sprinkler installations and their water supply needs

2.1 Fire sprinkler systems are designed to apply water at various rates depending on the classification of the fire hazard. To obtain the design flow of water from the sprinkler heads, water supply requirements are calculated for the pressure and flow to the system in accordance with the relevant standards or guidelines being employed. See Annex A

2.2 Reliable water supplies are essential, the most common forms are:

- a direct connection to a water supplier's main or
- a stored and pumped water supply:
    - large cisterns, with sufficient capacity to supply design flow for the specified time, or
    - small cisterns, with reduced capacity and dependent on the

inflow from a water service pipe to make up the design capacity, or

- a gravity supply from a storage cistern, or
- a pressurised vessel, or
- acceptable recycled water, e.g. rainwater recovery systems.
- in-line booster pumps- provided there is no risk of creating negative pressure conditions within water mains

2.3 Except in circumstances where supply arrangements dictate otherwise, for domestic and residential fire sprinkler systems water companies will consider direct mains connection as the preferred method of supply.

2.4 Domestic and residential premises include dwellings, residential care facilities, houses in multiple occupancy (HMO's), hostels and the like, may be protected by automatic fire sprinkler systems directly supplied with mains water and designed and installed in accordance with the relevant standards and guidelines.

2.5 Commercial premises such as shops, schools, offices, warehouses and manufacturing facilities may also be protected by sprinkler systems directly supplied with mains water

2.6 For automatic fire sprinkler systems designed for life safety protection continuity and reliability of water supplies are of particular importance. However, it should be noted that mains water supplies may be interrupted for maintenance work or because of a failure in the supply system. Such circumstances may on occasion be due to events beyond the water supplier's control. Designers should bear such possibilities in mind when designing automatic fire sprinkler systems.

2.7 It is essential that automatic fire sprinkler systems are properly maintained to ensure correct operation when required. All participants recognise the importance of proper maintenance and testing of fire sprinkler systems in accordance with the relevant standards and guidelines and this should be brought to the attention of the system owner or user. If this necessitates shutting off the system for any length of time, alternative precautions need to be instituted, as required by the relevant standards.

3. Key relevant legislation

3.1 The principal legislation on which water is supplied and controlled in England and Wales is;
(a) The Water Industry Act 1991; and
(b) The Water Supply (Water Fittings) Regulations 1999

3.2 The principal legislation through which water is supplied and controlled in Scotland is:
(a) The Water Industry (Scotland) Act 2002; and
(b) The Scottish Water Byelaws 2004

3.3 The principal legislation through which water is supplied and controlled in Northern Ireland is:
(a) The Water and Sewerage Services (Northern Ireland) Order 2006; and
(b) The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009

3.4 For new buildings or those undergoing significant alteration or refurbishment, Approved Documents accompanying the Building Regulations in England and Wales make specific reference to the use of sprinklers (so too do Regulations for Scotland and Northern Ireland although they differ slightly). The guidance not only recognises the use of sprinklers for life safety but it is clear that future legislation will call for the increased use of sprinklers.

3.5 The Welsh Assembly has approved The Domestic Fire Safety (Wales) Measure, commencing in April 2014 will require the installation of sprinklers in a wide range of residential buildings that will ultimately in January 2016 include all new dwelling houses and flats.

3.6 For existing buildings the Regulatory Reform (Fire Safety) Order 2005 which replaced most existing fire legislation in England and Wales requires employers and others (the Responsible Person in the Order) to consider whether the duties imposed by the Order could be better discharged by fitting fixed fire suppression systems.

3.7 In Scotland and Northern Ireland, similar legislation exists; and automatic fire-fighting systems are increasingly being utilised as part of the fire risk assessment requirements throughout the UK to discharge legal obligations in the protection of both life and property.

For the benefits of readability the remainder of this document references legislation in England (or England and Wales). Where there are devolved regulations in Wales, Scotland or Northern Ireland the references should be updated when drafting company specific protocols.

4. Conditions of Supply

4.1 The principal requirements which water suppliers place upon customers are to ensure that installations are designed and installed to avoid waste, undue consumption, misuse, contamination of water and erroneous measurement, and to ensure compliance with the regulations throughout their useful life. In particular:

- all materials and fittings used in systems that are directly connected to the water supplier's mains must comply with the requirements of the Water Supply (Water Fittings) Regulations 1999, and
- all below and above ground water pipes on private ground used solely for an automatic fire sprinkler system must be readily identifiable from all other pipework.

4.2 Water for automatic fire sprinkler systems may be supplied independently of domestic or industrial supplies. It need not be metered dependent upon adequate safeguards against fraud being provided. In accordance with Section 147 of the Water Industry Act 1991, no charge may be made for water used for fire fighting or testing fire fighting equipment.

4.3 An isolating valve must be fitted between the mains supply and the sprinkler installation

4.4 An appropriate backflow prevention device must be fitted between the mains supply and the sprinkler installation. Maintenance of this device is the sprinkler user's responsibility

4.5 Dual connections to mains in **different** pressure zones are not permitted. Where there is no practical alternative means of supply the water undertaker should be consulted on what supply arrangements may be acceptable.

4.6 Dual connections to different mains in **same** pressure zones may be acceptable by agreement with the water company provided the pressures at the points of connection are similar. Backflow prevention would be particularly important in such scenarios.

4.7 Dual connection of treated water supplies and any other sources (such as rainwater harvesting systems) are <u>not</u> permitted other than via a cistern or tank fitted with an appropriate air gap.

4.8 The method of providing water supplies for automatic fire sprinkler systems (mains fed or storage) will vary by region/area and are likely to be influenced by a variety of local factors such as availability of supply, condition of infrastructure, water company operational requirements and customer service obligations.

4.9 The preferred method of supply is via a direct feed from the water main. In these situations the property owners should be advised that the system may not operate

should there be an interruption to mains supply.

4.10 Where the fire sprinkler system is supplied by pumping from a storage cistern, the inlet pipe to the storage cistern from the water suppliers' mains must have an automatic level control and an appropriate air gap, or an arrangement of fittings as prescribed in the Water Supply (Water Fittings) Regulations 1999. The storage cistern should also be fitted with a warning pipe or level device to indicate if the cistern is overfilled.

4.11 Existing water company policies may prohibit the direct connection of booster pumps to the water supplier's mains. With the availability of programmable smart pumps, and on the basis that the activation of an automatic fire sprinkler system is a rare but vital event, an exception should be made, subject to agreeing details and conditions of installation with the water supplier.

4.12 In order to ensure the correct design and method of supply is chosen at the outset, it is essential that contact is made with the relevant water company at the beginning of the design stage.

ANNEX A - typical flow rates for different types of sprinkler system

Type of Property/hazard	Min Design Flow (L/min)	Max Design Flow (L/min)
Domestic dwelling	60	100
Residential (i.e. care home)	60	200
Light Hazard	109	225
Ordinary Hazard 1	375	540
Ordinary Hazard 2	725	1,000
Ordinary Hazard 3	1,100	1,350
Ordinary Hazard 4	1,800	2,100

- Domestic and Residential installations are defined in BS 9251: 2005
- Light Hazard, Ordinary Hazard 1, 2, 3 & 4 is defined by BSEN 12845 and LPC Sprinkler Rules for Automatic Sprinkler Installations.

ANNEX B - Glossary of Terms

Backflow Preventer: Check valve that will close at zero flow.

Backflow Prevention: Arrangement of pipe and fittings designed to prevent reverse flow and back-siphoning of potential contaminants into the water supply.

Check Meter: Meter installed by the Water Company to monitor potential illegal usage, no standing or volumetric charge is made unless there is usage for purposes other than fire related.

Check Valve: Device to ensure that water only flows in the single intended direction in a pipe.

Cistern: Water Storage vessel with a water surface exposed to atmospheric pressure.

Communication Pipe: The section of service pipe owned and maintained by the Water Undertaker.

Domestic Supply: Supply to points of demand within premises using water for domestic purposes, i.e. drinking, cooking, washing, bathing, sanitary purposes, central heating, food preparation. For a full definition refer to Water Industry Act 1991 Section 218.

Downstream: In the direction of normal flow of the water in a pipe

Priority Demand Valve: Device automatically operated by control system to isolate the flow to the domestic system in the event of a fire, thus ensuring all available pressure and flow is directed to the sprinkler system.

Pump and Tank Supply: Supply of water from a storage cistern via a booster pump to ensure adequate pressure and flow to meet sprinkler system requirements.

Service Pipe: The branch from a water main to the first internal stop valve intended to provide a supply of water to a specific customer or group of customers.

Sprinkler Head: The outlet fitting from which water is discharged in a spray pattern to control fires.

Sprinkler System: The assembly of pipes fittings and valves to distribute water under pressure to sprinkler heads.

Stop Valve: Device to isolate the supply of water. Also referred to as a “stop tap.”

Supply Pipe: The Section of service pipe owned and maintained by the customer.

Upstream: In the direction opposite to the normal flow of water flow in a pipe.

Water Main: Pipe belonging to the Water Undertaker (Water Company) installed with the purpose of providing a general supply of water.