British Automatic Fire Sprinkler Association

Technical Guidance Note No 1
Revision 1: June 2008

The Design and Installation of Residential and Domestic Sprinkler Systems

This document is issued for the guidance of BAFSA members and should be used in accordance with the contents of BS 9251: 2005. In providing this information BAFSA makes no warranties or undertakings as to its accuracy or completeness and assumes no liabilities in connection with the way the advice and information is used. Any deviations from BS 9251: 2005 should be agreed with the Authority Having Jurisdiction and any minor deviations recorded on the Certificate of Compliance detailing the Originator of the Deviation. BAFSA 's advice is that Certificates of Compliance should not be issued where a system has been installed with major departures from the requirements of BS 9251:2005.

Introduction

The standard BS 9251:2005 *Sprinkler systems for residential and domestic occupancies* has been in use for more than two years, following five years experience of its predecessor, BS DD 251. While the advice and information contained in the standard has been found to be generally sound, a number of clauses in the standard have given rise to differences and difficulties of interpretation, and it is generally agreed in the sprinkler industry that parts of the standard would benefit from clarification and amplification. Note that the relevant British Standards committee will be scheduling a review of BS 9251 for 2008/9. BAFSA, as a member of that committee, will be proposing that the contents of this document should be considered during the review.

This Technical Guidance Note (the first of an occasional series to be produced by BAFSA) is intended to supplement the contents of BS 9251 but it is not a substitute or replacement for that standard and users must refer to the actual text of BS 9251 when reviewing or designing/installing residential and domestic sprinkler systems.

BS 9251:2005 is a Code of Practice and, as such, represents guidance through a series of recommendations, this is best seen in the fact that the strongest directive word in the document is 'should' – rather than 'shall' or 'must'. Designers and installers however, in the opinion of the BAFSA Technical Committee, ought to ensure that where a system design or installation deviates from the recommendations in BS 9251, such deviations are brought to the attention to the Authority Having Jurisdiction (AHJ) for acceptance. Any minor deviations must be recorded in writing in the Certificate of Compliance issued by the installer to the owner of the premises. The deviations recorded should indicate who had originated or requested the deviation.[1.]

This Technical Guidance Document has been produced from a wide range of contributions based on first hand of experience in the use of the BS Draft for Development DD 251 and BS 9251 over the past seven years. In the guide, the term "Residential sprinkler" is used to describe the sprinkler heads used in all BS 9251 systems, both for domestic and residential occupancies.

The commentary that follows, marked C1 to C51, is linked to the appropriate headings of sections and clauses in BS 9251, working systematically through the standard. Only clauses where comments are made are addressed. At the rear is an index covering the points addressed in this Guide.

Forward.

C1 Objectives of residential systems. The primary objective of a residential/domestic sprinkler system is life safety, aiming to control any fire that occurs to give time for occupants to escape or be rescued. The operation of any sprinkler system will also provide a significant degree of property protection by minimising damage to the room of origin of the fire and its contents. It is assumed in the standard that the sprinkler protection will form part of an integrated fire safety system as part of the building's design, and that a fire detection system or smoke alarms will also be installed to give warning of a fire as early as possible.

C2 Sprinkler installation standards. Sprinkler protection has been in use in the UK for over 130 years for the protection of industrial and commercial occupancies. The current installation standard for such systems is BS EN 12845: 2004. Care should be taken to use

[1] For example, where a building control official has requested that partial sprinkler protection only should be provided.

the standard appropriate to the occupancy[2].

C3 Mixed occupancy protection. The protection of buildings with mixed occupancies, such as flats above shops, needs consideration on a case by case basis. Examples of approaches accepted by AHJ's include using a BS 9251 system, but with the higher densities specified in BS EN 12845 for the shop area, and residential densities for the living accommodation. In all such cases, the AHJ should be consulted.

Introduction.

C4 Water supply connections. The Figures 1 to 6 in BS 9251 show examples of acceptable water supply connections. These arrangements were agreed with Water UK, the trade association of the Water Companies, and are featured in the document 'Guidelines for the supply of water to fire sprinkler systems', available from the Fire Protection Association.

C5 Water Meters. It was agreed with the representatives of the water industry that water meters could be by-passed for the sprinkler supply, provided that the system was provided with a local alarm actuated by a flow of water. See Section 4.2 of the Guideline.

1. Scope

C6 Building height. The recommended height limitation of 20 metres was introduced in BS 9251, without there having been any evidence that this restriction had been necessary during the five years of the utilisation of BS DD251/BS 9251. This somewhat artificial restriction seems to have been acknowledged by DCLG as the guidance note to the 2006 edition of the Building Regulations for England and Wales, Approved Document B, in Volume 2, states:

> *"8.14 Blocks of flats with a floor more than 30m above ground level should be fitted with a sprinkler system in accordance with paragraph 0.16.*
>
> *Note: Sprinklers need only be provided within the individual flats, they are not required in the common areas such as stairs, corridors or landings. For the purposes of this paragraph the limit on the scope of BS 9251: 2005 to buildings below 20m in height can be ignored".*

However this does not mean that BS 9251 can be used without restriction on residential blocks of any height. Special care should be taken in the design of systems in buildings over 20 metres in height. Designs and water supply provision should be agreed with the AHJ. As an alternative, BS EN 12845 could be used as the design standard where significant deviations from BS 9251 are deemed necessary.

BAFSA recommends that for buildings over 20m, the entire building is sprinkler protected and the system be designed as 'Residential'.[3]

C7 Flats: Occupancy classification. Flats are covered in the Scope, and in the definitions.

---

[2] Note for example that while the flats in an apartment block may be protected by a sprinkler system designed to BS 9251, the sprinklers in the car park and rubbish chutes should be designed to BS EN 12845.

[3] Where such properties are fitted with a pumped water supply, BAFSA suggests that dual pumps with independent electrical supplies be installed with a stored water supply of at least 30 minutes duration**.** Alternatively, the premises might be better protected with a sprinkler system designed and installed to BS EN 12845:2004.

In both, individual flats are 'Domestic' and blocks of flats 'Residential'. The intention was that if only one or two flats per block were sprinklered, and no corridors or common spaces were to be protected, then 'Domestic' requirements would be appropriate. Guidance on the Building Regulations, as shown above, suggests that only individual flats need protection, supporting the 'Domestic' classification.

However, it is BAFSA's view that if more than 4 flats are protected in a block, then the 'Residential' requirements of BS 9251 should be met.

If common areas are protected as well as the flats, then the 'Residential' requirements should be complied with regardless of the number of flats protected in the block.

2. Normative References

C8 Sprinkler head component standards. BS 9251 calls for sprinkler heads approved in accordance with to DD252. This document remains, at the time of publication, (June 2008) a Draft for Development rather than a Standard. There are as yet no sprinkler heads tested or listed in accordance with its requirements. This position is unlikely to change in the foreseeable future. There are however two other internationally recognised standards for residential sprinkler heads and these have been in use for some years:

- Underwriters Laboratories Standard 'Residential Sprinklers for Fire-Protection Service UL1626.
- FM 'Approval Standard for Residential Automatic Sprinklers – Class Number 2030.

Currently only sprinklers listed by Underwriters Laboratories to UL 1626 are available in the UK and it is BAFSA's view (supported by the two sprinkler industry certification bodies and many other groups) that these are entirely suitable for use in systems installed to BS 9251.

3. Terms and definitions

C9 Alarm devices. The standard suggests that electrical or mechanical devices can be used. The low flows associated with 9251 systems have led to the exclusive use of electrical alarms. (The typical mechanical/hydraulic device used in industrial/commercial sprinkler systems requires at least a flow of 20 litres/min to be effective.)

C10 Battery capacity of alarm systems. The standard states that an electrical system should be mains powered and have a back up battery of adequate capacity. It is recommended that the battery be of sufficient capacity to support the alarm and associated equipment such as the priority demand valve for 10 minutes after the mains supply to the battery has been inoperative for 24 hours.

3.4 backflow prevention device

C11 Backflow prevention devices (check valves). UK Water Regulations[4] allow a single check-valve for potable (Class 2) water, but for water with additives, such as anti-freezing agents, or anti-corrosion additives, a double check valve is required. Backflow prevention devices restrict water flow, and their resistance needs to be taken into account in hydraulic calculations.

3.5 cistern

C12 Cisterns. A cistern is a water tank with cover. The Water Regulations give

[4] See References, page 11.

requirements for cisterns.

3.7 domestic occupancy

C13 Room size, domestic occupancies. BS 9251: 2005 – Clause 3.7 stipulates a maximum room size of 40m2, but it is BAFSA's opinion that the 'domestic' classification could be equally appropriate for rooms larger than 40m2 provided due regard is paid to the fire loading in the room. Should there be an abnormal fire load in such rooms then its is BAFSA's view that the room should protected by a "Residential" sprinkler system.[5]

3.8 experienced sprinkler contractor

C14 Sprinkler Contractor. The standard recommends that contractors be 'qualified and experienced'. All sprinkler contractors should be in possession of third party accreditation[6] and demonstrate that appropriate staff members have the competence to design and install systems to BS 9251. Attendance at appropriate training courses would be a good way to demonstrate this competence. Residential sprinkler protection is a relatively new discipline, and contractors are advised to attend refresher courses to keep up to date with developments. Suitable courses are shown on the BAFSA web site. Note that where installation contractors are certified to install systems to BS EN 12845 then this certification will be deemed to encompass the requirements of BS 9251.

3.9 fire pump

C15 Pumps. Pumps should be continuously-rated and electrically driven and should have an automatic system to ensure turn-over at least once every 60 days. It is not necessary to specify a "fire pump" as defined in BS EN 12845. Specialised pump packages suitable for domestic and residential sprinkler systems are available from a number of manufacturers.

Pumps should normally be installed solely to supply the sprinkler system. Where pumps are to be used for dual purposes, then the electrical supply should be installed in accordance with the recommendations in BS 9251.

3.14 quick response sprinkler

C16 Quick response sprinkler. Currently, the only 'Residential' pattern sprinkler heads available are those which meet the requirements of UL1626. Under UL1626,' Residential' sprinklers are not classified in the same way as standard sprinklers in terms of response. Although the requirements are similar to those for 'Quick Response' sprinklers, the term 'Quick Response' is not applied to Residential sprinklers heads in the US. In addition to the same response tests which standard sprinklers undergo, 'Residential' sprinklers must also meet extra requirements specific to residential sprinklers such as passing performance-based room fire tests. All Residential sprinklers heads must meet the same requirements and, in terms of response, are simply classified as 'Residential'.

Note: In US standards, the term 'Fast Response' refers to the type of heat sensitive element and should not be confused with 'Quick Response'. There are three types of fast response sprinklers; 'Quick Response' sprinklers, 'ESFR' sprinklers and 'Residential' sprinklers and all are considered types of 'Fast Response' sprinklers because they contain a fast response heat sensitive element.

3.17 residential occupancy

C17 Height and room size limitations in residential occupancies. The limitations regarding height and room size were introduced in BS 9251 without any supporting

[5] It may be the case that where high fire loads are present in large rooms that the premises would be more appropriately protected in accordance with BS EN 12845:2004.

[6] For example, by listing under the LPCB's LPS 1301 scheme or under the Warringtonfire FIRAS scheme

justification. A note is saying that the matter regarding height is receiving the attention of the BS Committee, with a view of producing an amendment. This has not yet been done.

3.22 subsidiary alternate system

C18 Dry or part air charged systems. Subsidiary alarm valves allow air filled sprinkler pipework in areas subject to freezing. Their use is deprecated because residential sprinklers heads are designed to respond swiftly to heat and the use of systems partly or wholly charged with air will result in a delay in water being discharged after the operation of a sprinkler head. This could allow many sprinklers to operate, in excess of the design number, which may result in the sprinkler system not operating as intended. It is BAFSA's view that dry or part air-charged systems should not be specified for Residential or Domestic installations.

3.23 upright sprinkler

C19 Upright sprinklers. At present, there are no listed upright residential sprinklers.

5.1.1 Types of supply

C20 Stored water. Swimming pools, underground tanks, lakes and wells may be used as a source of stored water, provided that they are of sufficient capacity to meet the Standard's requirements. Where tanks are installed for multiple service use, the draw-off point for other services should be above the high water line of the sprinkler supply.

5.1.2 Supply characteristics

C21 Water mains supply connections. The standard recommends that when using an existing service pipe the pressure should be checked and flow rate ascertained at the point of entry to the building.

When specifying the service pipe connection, possible restrictions caused by mains connections, pipe connectors, water meters, backflow prevention devices, or stop cocks should be avoided or taken into account.

5.2.3 Extent of sprinkler protection

C22 Bathrooms. Bathrooms with a floor area of less than $5m^2$ are a permitted exception to full protection of the building. Shower rooms and toilets can be considered as coming under this recommendation.

C23 Loft and attic protection. While fires in lofts and attics are relatively rare[7], the protection of loft spaces can be considered principally as a property protection benefit unless the area is used as living or sleeping space. Subject to the agreement of the AHJ it may be possible to omit protection of loft spaces if these are effectively 'sterile'. Where loft spaces are to be (or are likely to be) used for storage then sprinkler protection should be provided in accordance with BS 9251.

If loft spaces are to be protected, then 'attic type' or 'Residential sprinkler heads listed for use on the appropriate ceiling slopes should be used. Where the loft slopes exceed the listed maximum permitted slopes for these sprinklers, suitable standard sprinklers may need to be employed. Care should be taken to protect sprinklers installed in lofts and attics from freezing.

C24 Integral garages. BAFSA recommends that integral garages should be protected whether or not there is an internal connecting door**.**

5.2.4 Hydraulic calculations

[7] There were 19 fatalities in or resulting from fires in 'Store Rooms or Lofts' in the UK between 1994 and 2004 (*Fire Statistics United Kingdom 2004* ODPM)

C25 Friction losses in valve sets. Most hydraulics programmes calculate the losses downstream of the valves, and care should be taken to allow for the losses in the valve arrangements.

5.2.5 System flow rate

C26 Discharge rates. The flow rates given in BS 9251 of 60 l/min for the first sprinkler to operate and 42 l/min for subsequent sprinklers, each sprinkler covering an area of $15m^2$, were determined at a time when manufacturers' specifications allowed for lower flow rates for the second and, if appropriate, subsequent sprinklers. Since that time, manufacturers have further optimised the performance characteristics of residential sprinkler heads. This is reflected in the approval listing of each sprinkler and clearly stated in the manufacturers' data sheet. The data sheets provide the minimum approved flow and pressure from each operating sprinkler at various approved maximum sprinkler spacings, according to their application. Therefore, for both Domestic and Residential Occupancies, the system must be designed to provide the minimum approved flow and pressure from the design sprinklers at the most hydraulically remote location. Care must therefore be taken to use, as a minimum, the manufacturers' listed flows and pressures. See also **C34.**

5.2.5.2 Residential pattern sprinklers

C27 Types of sprinklers to be used in BS 9251. *Only* residential type sprinkler heads should be used in the habitable parts of the dwelling. Residential type sprinklers have a discharge pattern significantly different from that produced by other types of sprinkler head, which ensures a high degree of wall wetting. Other types of fast response sprinkler may be used, if appropriate, in uninhabitable parts of the building, such as roof spaces.

5.2.5.3 Minimum operating pressure

C28 Minimum operating pressure. The recommended minimum operating pressure at any sprinkler head of 0.5 bar is not related to hydraulic factors. It is to ensure release of the sprinkler valve at any time in the life of the system. In some instances, the manufacturers' specifications call for a minimum pressure at the sprinkler head of less than 0.5 bar. In such instances the minimum pressure of 0.5 bar should be applied, and the increased flow rate addressed in the hydraulic calculations.

5.2.6 Flow rate requirements for mains water supply connections

C29 Minimum mains supply pressures. Available flow rates and pressures should be assessed at the times of peak demand, where the pressure/flow to the sprinkler system is likely to be at its lowest. Only 85% of the available pressure may be taken, giving an allowance for the possibility that water pressure may be reduced at some point in the future.

C30 Number of dwellings on one supply. Where a mains water supply serves more than one dwelling, it should be assumed that a fire would affect only one dwelling at any one time.

5.2.7 Stored water capacity

C31 Discharge durations. The minimum effective storage capacity of stored water supplies should meet the discharge durations of 10min (Domestic) and 30min (Residential given in BS 9251. In some circumstances, particularly in high or very large or complex premises such as residential care homes, longer times may be needed for escape or to allow the rescue of occupants. This may also be the case for premises remote from local fire stations. Residents in care homes may be unable to make their own escape and therefore any fire may need to be controlled for longer whilst they are being rescued. In other cases, shorter times may be acceptable. Any variations to the durations specified by BS 9251 should be agreed with the AHJ.

5.2.8 Fire pump

C32 Fire Pump. To minimise the possibility of a pump not starting upon the operation of a sprinkler head, pumps should have an automatic mechanism to operate the pump for a very short time at least once every 60 days.

5.2.9 Sprinkler coverage and location

5.2.9.1 General

C33 Sprinkler location. It is essential that sprinkler heads are installed in accordance with the manufacturers' instructions. Manufacturers' data sheets deal with sloped ceilings, location of sprinklers in relation to beams and other requirements specific to each sprinkler head.

5.2.9.2 Sprinkler spacing

C34 Sprinkler area coverage. If it is proposed to exceed the maximum area coverage given in BS 9251 (see C26) then the maximum area protected by each sprinkler head should be in accordance with its approved listing performance, as shown on the manufacturers' data sheet. Each sprinkler is listed as being effective over a range of areas of coverage; commensurate with the appropriate flow rates and pressures at which fire control has been demonstrated in tests in accordance with the requirements of UL 1626. The standard areas of coverage at which sprinkler performance has been assessed in fire tests are given in Table 1 below.

Each specific sprinkler type is tested over a range of floor areas, the water flow to the sprinkler being increased as the floor area increases. This ensures the same degree of fire control performance irrespective of room size.

Table 1. Spacings and areas at which residential sprinkler heads are tested in UL 1626.

Pendent, recessed, flush and concealed sprinklers	
Spacing, meters	Area coverage, square metres
3.7 x 3.7m	13.69m^2
4.3 x 4.3m	18.49m^2
4.9 x 4.9m	24.01m^2
5.5 x 5.5m	30.25m^2
6.1 x 6.1m	37.21m^2
Sidewall sprinklers	
3.7 x 3.7m	13.69m^2
4.3 x 4.3m	18.49m^2
4.9 x 4.9m	24.01m^2
5.5 x 5.5m	30.25m^2
6.1 x 6.1m	37.21m^2
4.9 x 5.5m	26.95m^2
4.9 x 6.1m	29.89m^2
5.5 x 6.1m	33.55m^2
4.9 x 6.7m	32.83m^2

The figures above are for rooms with flat ceilings. For sloped ceilings, the manufacturer's design criteria must be applied.

It is vital that the **actual listed** flows and pressures for the specific sprinklers are used as a minimum in hydraulic design.

The approach adopted by Underwriters' Laboratories in respect of sprinkler head coverage allows for the optimum spacing of sprinklers to be used at flow rates at which the sprinklers have demonstrated that they can meet the fire test requirements of UL 1626. The agreement of the AHJ should be sought if the UL approach is to be used.

Where the BS 9251 recommended maximum area of coverage of 15m^2 per sprinkler is applied, then the manufacturers' listed flow rate for the 4.3 x 4.3m (18.49m^2) should be used, as a minimum.

All sprinklers should be installed in accordance with their listed performance for flow rate, pressure and spacing. The distance between sprinklers should not exceed half the listed design spacing from any wall. The distance between sprinklers should not be less than 2.4m, in accordance with manufacturers instructions, and **not** the 2m recommended in BS 9251.

5.2.9.1 Sprinkler positioning.

C35 Concealed and recessed sprinklers. One of the main findings of recent research undertaken by the Building Research Establishment[8] on behalf of the UK Government showed that listed concealed and recessed sprinklers are suitable for life safety applications. Given this, it is so BAFSA's view that the special note in BS 9251 is no longer necessary. However BAFSA believes is still advisable to gain the approval of the AHJ for the use of such heads. Concealed and recessed sprinklers *should not* be boxed in unless this is specifically permitted in the specific manufacturer's data sheet.

5.3.1.1 General

C36 Residential type sprinklers. ALL sprinklers used within the habitable areas of the building should be of 'Residential' type. See C27.

C37 Sprinkler test standards and approvals. While BS 9251 calls for Residential sprinkler heads to comply with the component standard, this is not practicable as BS DD 252 has not yet been reviewed and published. When DD252 is reviewed and confirmed, it is BAFSA's view that this document will be broadly compatible with UL1626 *Residential Sprinklers for Fire-Protection Service*. See also C8.

5.3.1.3 Temperature rating of sprinklers

C38 Colour coding of fusible link sprinklers. The reference in BS 9251, to the colour coding of soldered strut type sprinkler heads is no longer appropriate as this practice referred to is obsolete. The temperature rating for all sprinkler heads (of whatever type) is marked or stamped at a suitable point on the head, usually on the deflector.

C39 Temperature ratings. BS 9251 only gives the suggested nominal temperature ratings for glass bulb sprinklers. 'Residential' sprinkler heads, by virtue of their listing according to UL 1626 have passed performance-based fire tests that confirm their ability to help prevent flashover in residential and domestic occupancies. The thermally-responsive element of Residential sprinkler heads, according to UL 1626, may be either a glass bulb or a fusible link and their respective operating temperatures has been carefully selected by the manufacturer to pass the performance requirements of UL 1626

[8] BRE Research Project: Effectiveness of sprinklers in residential premises: 2006

5.3.2 Pipes and fittings

C40 CPVC plastic pipe. Correctly fixed joints using solvent adhesives approved by the pipework manufacturer is essential. Training is available from manufacturers, suppliers and distributors and all staff involved should complete an appropriate training course before installing pipework. Pipework must only be installed in full compliance with the manufacturer's instructions.

C41 Exposed CPVC plastic pipe. CPVC Fire Sprinkler Systems may be installed 'exposed' if located close to a flat ceiling, provided that the operating temperature of the Residential sprinkler heads is not greater than 74°C. CPVC pipe may also be installed 'exposed' in loft spaces. Suppliers should be consulted for detailed requirements.

5.3.3.2 Alarm devices

C42 Alarm arrangements. For flats and residential care facilities, the actions to be taken in the event of a fire are often determined on a case by case basis, and the alarms arranged accordingly, and are subject to the requirements of the AHJ.

C43 Detection and sprinkler combined alarms. In some cases, the AHJ may require that the sprinkler alarm be linked to a smoke alarm or fire detection system. In this case, care should be taken to ensure that the standby battery capacity is sufficient to support the additional sprinkler alarm requirements.

5.3.3.3 Valves

C44 Stop valves. It is essential that the main stop valve should be clearly marked, and secured in the open position to prevent accidental or malicious shutting-off of the water supply to the system.

C45 Drain and test valve. The valve used for the flow test is that referred to in 5.3.3.3 e). The test facility at the end of the hydraulically most remote range pipe is rarely installed, this having been found to be impracticable due to access problems. In larger buildings, a drain-off facility at a remote point might be of value.

C46 Valve set pipe sizing. The pipes forming the test arrangement should be sized appropriately to allow the full flow rate of the system to be tested. When proving the flow rate of the system, allowance should be made for the hydraulic losses between the drain and test point and the most hydraulically remote sprinkler.

5.3.4 Electrically operated devices

C47 Mains failure. The second paragraph of 5.3.4 is not intended to apply to the power supply to the pump itself, only to alarms and priority demand valves. However, in large and/or high buildings where two pumps are used, it is recommended that each has a separate mains electrical power supply.

6. Frost protection (see 5.2.2)

C48 Frost protection. Sprinkler pipework should, whenever possible, be installed within the heated envelope of the dwelling. Since sprinkler pipes have no flow in them except when a sprinkler operates, trace heating as well as normal lagging may be necessary to prevent freezing during prolonged periods of sub-zero weather.

6.2.2 Hydraulic test

C49 Flow test. For the flow test to be conducted through the drain and test point labelled 14 in figure 4 of BS 9251, the pressure/flow rate required at this point must as a minimum correspond with the system demand in the most remote area. This must be calculated and

include static loss. The flow test should demonstrate that the full flow requirement of the system can be met, with the pressure not dropping below that required at the most remote sprinkler. The flow test should be used when the system is commissioned, and during the annual maintenance check, and a record kept in the system logbook.

Spare sprinkler heads

C50 Spare sprinkler heads. BS9251 recommends that the householder is left with spare sprinkler heads and a sprinkler spanner. It is BAFSA's view based on the experience of the past eight years that in most cases, it is preferable if the contractor retained to undertake system maintenance retains the heads and spanner.

Supports for plastic piping

C51 Spacing of typical, listed cpvc pipe supports[9]. The manufacturer's data sheets should be used in preference to the data in Table B3 of BS 9521. The recommendations are:

Nominal diameter (mm)	Horizontal run (m)	Vertical run (m)
20	1.7	3.0
25	1.8	3.0
32	2.0	3.0
40	2.1	3.0
50	2.4	3.0
65	2.7	3.0
80	3.0	3.0

References

BS 9251:2005 *Sprinkler systems for residential and domestic occupancies. Code of practice*
BS Draft for Development DD 252:2001 *Components for residential sprinkler systems — Specification and test methods for residential sprinklers*
BS EN 12845:2004 *Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance*
UL 1626 *Residential Sprinklers for Fire-Protection Service*, Underwriters Laboratories
Approval Standard for Residential Automatic Sprinklers: Class Number 2030: 1983, Factory Mutual Global
Water Industry Act 1999 Cap 9.
Water Supply (Water Fittings) Regulations (SI 1999 No. 1148 and No. 1506)
Water Supply Byelaws 2004 (Scotland)
LPS 1301: *Requirements for the approval of Sprinkler Installers in the UK and Ireland for Residential and Domestic Sprinkler Systems* LPCB/BRE Certification Ltd
FIRAS Residential Sprinkler Scheme: Bodycote Warringtonfire
Effectiveness of sprinklers in residential premises: 2006 BRE for ODPM

[9] The data shown is that for Blazemaster ®

Index

Alarm arrangements	C42
Alarm devices	C9
Backflow prevention devices	C11
Bathrooms	C22
Battery capacity of alarm system	C10
Building height	C6
Cisterns	C12
Colour coding of fusible link sprinklers	C38
Concealed and recessed sprinklers	C35
CPVC plastic pipes	C40
Detection and sprinkler combined alarms	C43
Discharge durations	C31
Discharge rates	C26
Drain and test valve	C45
Dry or part air charged systems	C18
Exposed CPVC plastic pipes	C41
Fire pump	C15,C32
Flats: occupancy classification	C7
Flow test	C49
Friction losses in valve sets	C25
Frost protection	C48
Height and room size limitations	C17
Integral garages	C24
Loft and attic protection	C23
Mains failure	C47
Minimum mains supply pressures	C29
Minimum operating pressure	C28
Mixed occupancy protection	C3
Number of dwellings on one supply	C30
Objectives of residential sprinkler systems	C1
Pumps	C15, C32
Quick response sprinkler	C16
Residential type sprinklers	C36
Room size, domestic occupancies	C13
Spacing of typical, listed cpvc pipe supports9	C51
Spare sprinkler heads	C50
Sprinkler area coverage	C34
Sprinkler contractor	C14
Sprinkler head component standards	C8, C36
Sprinkler installation standards	C2
Sprinkler location	C33
Sprinkler test standards and approvals	C37
Stop valves	C44
Stored water	C20
Temperature rating	C39
Types of sprinklers	C27
Upright sprinklers	C19
Valve set pipe sizing	C46
Water supply connections	C4
Water meters	C5
Water mains supply connections	C21