



EXPLANATORY GUIDANCE NOTE No 1

by

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With respect to

THIRD PARTY CERTIFICATION

for

RESIDENTIAL & DOMESTIC SPRINKLER SYSTEMS to BS9251: 2005
COMMERCIAL & INDUSTRIAL SPRINKLER SYSTEMS to BS EN 12845: 2003/4

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Attachment:

THIRD PARTY CERTIFICATION COMPARISON CHART

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1. FORWARD

This explanatory guidance note has been produced as an aid to “*Authorities Having Jurisdiction*” responsible for the selection of third party certificated contractors involved with the design and installation of automatic fire sprinkler systems.

There are currently two British standards for the design and installation of automatic sprinkler systems installed in the United Kingdom and there are certain types of premises that can be suitably protected using either standard. Usually, these types of premises are considered for sprinkler protection to satisfy local authority requirements for life safety purposes.

It is also common that local authorities are usually obliged to select “Approved” or “Certificated” contractors who are members of a UKAS accredited third party certification scheme.

This guidance note therefore, endeavours to assist with the selection of a suitable design standard for the type of premises being protected and to give guidance as to finding suitable contractors who are members of a UKAS accredited third party certification scheme.

2. SPRINKLER SYSTEM DESIGN STANDARDS

The Fire Office Committee of insurers (FOC) first published the first British Standard for the design and installation of automatic sprinkler systems in September 1888. This standard pre-dominantly covered the design and installation of sprinklers for property protection.

The FOC rules were periodically updated with the final version being published in 1967 as the Rules of the Fire Office Committee for Automatic Sprinkler Installations 29th edition. The responsibility for the updating of the sprinkler rules was transferred to the Loss Prevention Council, (LPC), on its formation in 1988.

The British Standards Institute fully adopted the LPC rules as a stand alone British national standard and published it as BS 5306: Part 2 in 1990, (amended 1998). The latest version was first published in 2003 as BS EN12845: 2003 with BS 5306: Part 2 being withdrawn in September 2007.

The current LPC Rules for Automatic Sprinkler Installations; as published by the Fire Protection Association (FPA) incorporates the full BS EN12845 supported by a series of Technical Bulletins and Supplementary Information.

The first references in the United Kingdom with respect to protection for life safety purposes rather than just property protection first appeared within BS 5306: Part 2: 1990. The LPC issue of BS5306: Part 2 also included a Technical Bulletin specifically for dwelling houses, flats and transportable homes.

Although there has been a recognised increase of use of sprinkler systems for life safety purposes, specific protection criterion for dwelling houses etc is not included in BS EN 12845.

This omission is most likely due to the publication of the second standard, DD251: 2000, a draft standard that was specifically for the sprinkler protection of Domestic and Residential properties. This draft standard evolved to the current code of practise BS 9251 in 2005.

2.1 BS EN 12845: 2003 and 2004

In the United Kingdom BS EN 12845 is not usually utilised as a stand alone standard.

It is more usually referenced as Part-1 of the "*LPC Rules for Automatic Sprinklers incorporating BS EN 12845*" as published in three parts by the Fire Protection Association.

Part-2 of the FPA/LPC Rules consists of a series of Technical Bulletins that clarify, en-large, amend and in some circumstances supersede the contents of BS EN 12845.

Part-3 of the FPA/LPC Rules consists of supplementary information giving recommendations, a technical briefing note on Legionella and guidelines on various aspects regarding sprinkler systems including the FPA guide to domestic and residential sprinklers.

- 2.1.1 The primary objective of BS EN 12845 is to detail the design and installation requirements for property protection to commercial and industrial premises. It also specifies additional requirements if a system is to be designed for Life Safety purposes rather than just property protection.

The inclusion of Life Safety aspects is considered an option rather than a mandatory requirement within the standard.

- 2.1.2 For design purposes, regardless as to whether the system is for Property Protection or Life Safety, BS EN 12845 interprets the occupancy of a building in terms of the fire hazard and then defines suitable performance criteria. The fire hazards are referenced as either:

- Light Hazard, (LH)
- Ordinary Hazard Groups 1 to 4. (OH1-OH4)
- High Hazard Process Risks Groups 1 to 4, (HHP1-HHP4)
- High Hazard Storage Risks Categories 1 to 4, (HHS1-HHS4)

Commentary.

With the exception of LH, which limits a compartment size to a maximum area of 126m², there is little or no dependence on structural fire resistance to prevent fire spread within the design requirements of a sprinkler system to BS EN 12845.

- 2.1.3 Systems designed for Life safety reasons are generally considered for the more non-industrial occupancies that qualify as either a Light or Ordinary Hazard. However, if Life Safety is the primary concern, BS EN 12845 limits the hazard classification to OH1, OH2 or OH3.

Commentary.

Even though a building's fire hazard may qualify as only LH, the minimum performance criteria for the design of the sprinkler system should satisfy at least OH1. If a building's fire hazard is greater than OH3 it is not considered suitable for protection for Life Safety purposes only.

- 2.1.4 Typical non-industrial occupancies considered for Life Safety protection include but are not limited to:

- Hospitals
- Hotels
- Institutions
- Nursing homes
- Prisons
- Schools and colleges etc.

Local authorities that endeavour to satisfy the guidance given in Building Regulations and Approved Document B are usually required to specify sprinkler systems suitable for life safety applications.

2.2 BS9251: 2005

Whereas BS EN 12845's primary objective is property protection of commercial and industrial premises, BS9251 is specific to Domestic and Residential occupancies and its primary concern is Life Safety protection.

As noted above, with the exception of certain specific circumstances, BS EN 12845 tends to disregard the benefits of other fire fighting measures, whereas BS9251 presumes that the sprinkler protection will form part of an integrated fire safety solution and does not negate the need for other fire precautions such as structural fire resistance, escape routes and smoke or fire detector alarm systems.

- 2.2.1 Within BS9251 the terms "Domestic" and "Residential" can be interpreted as an equivalent to BS EN 12845's occupancy and hazard definitions for determining the sprinkler systems performance design criteria.

2.2.2 Domestic occupancies are limited to a single family's use with a maximum room size of 40m² and typically include:

- Individual dwelling houses
- Individual flats and Maisonettes
- Transportable homes

2.2.3 Residential occupancies are defined as multiple occupation premises not exceeding 20m in height, with a maximum individual room size of 180m² such as:

- Apartment buildings
- Residential, aged persons and nursing homes
- Houses of multiple occupancies. (HMO's)
- Blocks of flats
- Boarding houses, residential rehabilitation accommodation and dormitories

It is within this residential occupancy scope of contract that the choice of design standard, (BS EN12845 or BS9251), can become an option and when advice from an experienced sprinkler consultant or contractor is likely to be considered.

3. EXPERIENCED SPRINKLER CONTRACTOR

As there are two sprinkler system design standards it is usual to find that a particular contractor will have more experience for one standard or the other.

3.1 Historically, the Commercial and Industrial standard BS EN12845 has the longest established credentials and not surprisingly most recognised sprinkler contractors are those that predominantly work to this standard. It should however be understood that the design principles involved with BS9251 sprinkler systems requires a full working knowledge of systems designed by full hydraulic calculation (FHC). Not all contractors' associated with BS EN12845 will have the necessary experience to undertake FHC designed systems which, within BS EN12845, are more commonly associated with High Hazard occupancies where it is mandatory for them to be designed by that method

3.2 The majority of BS EN12845 sprinkler system contracts for premises classified as a Light or Ordinary Hazard fire risk or designed for Life Safety purposes are more commonly designed using a series of tables which pre-determine the infrastructure of a system in terms of, suitable pipe diameters, water supply flow/pressure characteristics and water storage tank capacities specific to the defined hazard.

This type of design approach is called the Pre-calculated method and it gives a contractor the advantage of being able to more accurately determine the cost of a system at the tender stage. Once the hazard classification has been established, pipe sizes, pumping requirements, water storage tank capacities etc are all given and there is no need to carry out lengthy and complex verification

calculations. It is also less sensitive to changes in design at later stages and relatively easy to apply when compared to FHC design practises.

It is not unusual for a sprinkler contractor working to BS EN12845 to limit their scope of work to, and be very experienced with, the pre-calculated method and not to undertake contracts that require FHC.

- 3.3 The reason for design by FHC being a requirement within BS9251 is primarily due to the pipe materials used. The majority of systems designed to BS EN12845 utilize mild steel tubing and all the hydraulic criteria and tables given therein are based on this assumption.

BS9251 systems however are normally either constructed with copper or special fire resistant CPVC plastic pipe. As different pipe materials have varying degrees of pressure losses for any specified flow rate, to accurately determine pipe diameters and water supply flow/pressure characteristics necessitates full hydraulic calculation to be done.

To this end Annex-A of BS9251 gives the necessary hydraulic formulae to be used and includes a series of pre-calculated pressure loss tables for the relevant pipe materials. However, these tables should only be considered "normative" as they have been produced based on just the flow rate required assuming a single sprinkler to be in operation. Depending on the building use, room layout and sizes, the actual number of sprinklers assumed to be in operation could vary between one up to a maximum of four.

- 3.4 Consequently, it is imperative that sprinkler contractors' who design and install Residential & Domestic sprinkler systems are fully conversant with FHC principles and should be able to demonstrate that they are competent to undertake full hydraulic calculation.

However, it does not necessarily follow that a competent BS9251 contractor is also capable of undertaking FHC contracts to BS EN12845.

- 3.5 Although the FHC formulae and basic principles used are the same for both standards, it should be understood that systems designed to BS EN12845 cover a much wider range of fire hazard classifications, sprinkler head types and sizes, areas of assumed operation and flow requirements.

This requires a far more in-depth hazard analysis to be carried out before a systems design criteria is correctly established and can result in up to 10 times more sprinkler heads to be in operation, introduce far more complex piping layout scenarios and necessitate the use of a much wider range of pipe diameters than normally associated with systems designed to BS9251.

- 3.6 In summary, sprinkler system design and installation is a very specialised industry and it is of the utmost importance that any selected contractor employed to undertake the work is fully conversant with the design practises of

the correct relevant standard and can demonstrate competency within that particular scope of work.

4. THIRD PARTY CERTIFICATION SCHEMES

A third party certification scheme endeavours to alleviate some of the issues discussed above by offering an independent assessment of a contractors ability for a particular scope of work and by means of certification, inspection and testing ensure that a system is fit for purpose and is in full compliance with the relevant standard to which it has been designed and installed. On successful completion of a contract, a contractor who is a member of a third party certification scheme is able to issue a "Certificate of Conformity" thus verifying compliance with the defined installation standards.

Contractors who are members of a third party scheme are regularly audited to various degrees depending on their standing within the scheme and have to be quality assessed to ISO 9001: 2008. Design personnel have to demonstrate full competence in their field of work to the satisfaction of the scheme operator.

Both sprinkler system design standards, BS EN12845 and BS9251, strongly recommend the use of third party "listed" or "approved" contractors for the design and installation of sprinkler systems.

4.1 Currently, there are two accredited bodies that operate such certification schemes for sprinkler installations.

- The Loss Prevention Certification Board.

Operate the LPS 1048 scheme generally for commercial automatic sprinkler installations and the LPS 1301 scheme specifically for Residential & Domestic sprinkler installations.

- Warrington Certification Ltd

Operate separate specific FIRAS schemes for commercial & industrial sprinkler installations and Residential & Domestic sprinkler installations.

Both are members of the United Kingdom Accreditation Service, (UKAS), who bear responsibility for assessing and accrediting the competency of organisations in a number of related fields, including testing and certification of systems and products.

4.2 Loss Prevention Certification Board (LPS 1048)

This is the longest running and most established scheme primarily concerned with sprinkler contractors and systems for commercial & Industrial premises protected to BS EN12845 although other internationally recognised equivalent

standards such as those published by the National Fire Protection Association of America (NFPA-13) can be included.

LPCB also allow certain "self-certificating" contractors within the scheme to design, install and certificate systems to BS9251 although they have recently launched a separate scheme (LPS1301) specifically for that scope of work.

4.2.1 Under the LPS 1048 scheme, contractors are listed and approved based on their evaluated level of competency and usual scope of work. Design personnel are required to demonstrate their competence by undertaking and passing a design revue examination for the appropriate approval level.

- Approval Level-1 – Pre-calculated installations only excluding all base build contracts and under supervision by LPCB for each and every contract.

Note: A base build contract is defined as one that includes the water supplies.

- Approval Level-2 – Can self-certificate Level-1 pre-calculated installations without supervision and undertake base build contracts but under supervision by LPCB for each and every base build contract.
- Approval Level-3 – Can self-certificate all pre-calculated installations without supervision and undertake FHC contracts but under supervision by LPCB for each and every FHC contract.
- Approval Level-4 – Can self-certificate all pre-calculated and FHC installations without supervision. Can also undertake and self-certificate Residential & Domestic installations to BS9251.

Note: Self-certificating status is still dependant on regular periodic technical audits being carried out on design personnel and randomly selected contracts at least twice a year.

4.2.2 Full listings and information on LPS 1048 contractors can be found on the Internet at www.redbooklive.com.

4.3 Loss Prevention Certification Board (LPS 1301)

Launched in 2008, LPS 1301 is currently the shortest running and least established scheme primarily concerned with sprinkler contractors and systems for Residential & Domestic premises under BS 9251.

As to date there are no known contractors to have joined this scheme. More information can again be found at www.redbooklive.com.

4.4 Warrington Certification Ltd (FIRAS Commercial & Industrial Sprinkler Systems)

At the specific request of the British Automatic Fire Sprinkler Association (BAFSA) the principal sprinkler trade association, and the Insurance Industry for an alternative and equivalent scheme to LPS 1048, Warrington Certification Ltd Launched the FIRAS Commercial & Industrial Sprinkler Systems scheme in 2004.

At that time Warrington Certification Ltd were already operating the well established FIRAS Residential & Domestic Sprinkler System scheme and the expansion in to the Commercial and Industrial market place was seen to be a natural scope progression.

It was formulated in complete Liaison with representatives from both BAFSA and principal members of the Insurance Industry and is now considered by the aforementioned parties to be an equivalent to the LPS 1048 scheme in all respects.

- 4.4.1 Under the FIRAS C&I Scheme, contractors are also listed and approved based on their evaluated level of competency and usual scope of work but in comparison with LPS 1048 there are only three defined scope levels compared to its four. More emphasis however is placed on as to whether a contractor is considered as "approved" or "certificated" within the defined scope. To move from "approved" status to "certificated" status is not just dependant on design personnel successfully passing a design review, but is also reliant on successfully working under a supervisory regime for a minimum specified period.

The three defined scopes of work are as follows:

- PC – Pre-calculated installations excluding water supplies.

Approved status: under supervision by FIRAS for each and every contract.

Certificated status: self-certificating without supervision.

- PCW - Pre-calculated installations including water supplies.

Approved status: under supervision by FIRAS for each and every contract.

Certificated status: self-certificating without supervision.

- FHC – Full hydraulically calculated installations including water supplies.

Approved status: under supervision by FIRAS for each and every contract.

Certificated status: self-certificating without supervision.

Note: As with LPS 1048, self-certificating status is still dependant on regular periodic technical audits being carried out on design personnel and randomly selected contracts at least twice a year.

- 4.4.2 Full listings and information on FIRAS Commercial & Industrial sprinkler contractors can be found on the Internet at www.warringtonfire.net. Or www.firas-database.co.uk

4.5 Warrington Certification Ltd (FIRAS Residential & Domestic Sprinkler Systems)

This is the longest running and most established scheme specifically concerned with sprinkler contractors and systems for Residential & Domestic premises

protected to BS9251 or other similar nationally recognised standards such as NFPA13D/13R, (the scheme was launched in 2003)

As there is less variation in the design requirement of a sprinkler system for Residential & Domestic premises, there are no separately defined scopes of work or distinction placed between "Approved" or "Certificated" contractors within the scheme.

- 4.5.1 Under the FIRAS R&D Scheme, contractors are required to have successfully completed FIRAS recognised training courses in the design, installation and maintenance of Residential & Domestic sprinkler systems. It is mandatory that this training is successfully undertaken and "Qualification Certificates" are verified by FIRAS before certification may be granted.

Typical courses recognised are the BAFSA approved courses as run by Xact Fire Safety and Engineering. Information on these courses can be found at www.xact.org.uk.

- 4.5.2 On application to join the scheme, contractors also have to undertake a pre-certification inspection audit of their office premises and quality assessed, although not necessarily to ISO 9001: 2008. A full design review and site inspections of completed contracts is also carried out.

Subject to satisfactory verification of training qualifications, inspection of the office premise, design review and installation inspections, certification status is awarded.

- 4.5.3 After certification has been awarded to the contractor, on-going surveillance of system designs and of installation work is carried out by FIRAS on a random basis the frequency of which relates to the contractor's activity level.

- 4.5.4 Although contractors are considered as certificated, they can only "self-certificate" designs and installations comprising of less than 200 sprinkler heads. Contracts with 200 or more sprinklers are carried out under supervision by FIRAS for each and every contract and are subject to design drawings being "over-stamped".

- 4.5.5 Full listings and information on FIRAS Residential & Domestic sprinkler contractors can be found on the Internet at www.warringtonfire.net. Or www.firas-database.co.uk