



Consortiwm Awdurdodau Lleol Cymru
Consortium Local Authorities Wales

Sprinkler Protection A Best Practice Guide

October 2008

This document has been compiled by
the Engineering Project Group
in association with
Marald Engineering Consultants

FOREWORD

I am pleased to announce the introduction of the CLAW Building Engineering Services Best Practice Guide to Sprinkler Protection.

With the increased adoption by Local Authorities throughout Wales, it has been felt necessary to compile this document for use by the authorities together with consultants and contractors working for local authorities.

This issue represents the culmination of six months work and the result, hopefully, is a complete and useful reference document.

I recognise the volume of work that has been undertaken by the CLAW Mechanical and Electrical Engineers' Group, its editorial sub-group and our partner in this exercise Marald Engineering Consultants. They can be proud of the outcome of their efforts.

As with previous issues of the specification documents, we have maintained the modular format allowing it to be a living document easier to use, flexible and capable of being regularly updated. It has been designed to assist all authorities using a variety of procurement methodologies.

I am sure that all CLAW Members and Associates, Consultants and Contractors will welcome this new document.

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Best Practice Guide to Sprinkler Protection
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Best Practice Guide to Sprinkler Protection
PART 1- SCOPE OF GUIDE

1.00.00 GENERAL

1.00.01 The purpose of this guide is to guide and assist local government officers, facilities managers and similar persons in respect of the requirements and practical considerations requiring the installation of automatic sprinkler systems for fire safety purposes.

1.00.02 The guide provides advice concerning:

- Deciding whether sprinklers are appropriate;
- What information is required to assist in the design process;
- Which parties need to be consulted;
- The appointment of suitable designers
- Design, installation, commissioning and operation.

1.01.00 FORMAT

1.01.01 This guide is divided into a number of parts:

- Part 1 – Scope of the Guide
- Part 2 – A Decision Model
- Part 3 – Pre-design Requirements
- Part 4 – Design
- Part 5 – Installation and Commissioning
- Part 6 – Maintenance

1.01.01 Each part of the guide gives advice on what processes are required by a design team of facilities manager.

1.02.00 APPLICABILITY

1.02.01 This guide considers the use of sprinkler systems to automatically detect and fight a fire as part of an engineered solution.

1.02.02 This guide is applicable to both new build and refurbishment projects.

Cont'd

Best Practice Guide to Sprinkler Protection PART 1- SCOPE OF GUIDE

1.02.00 APPLICABILITY (Cont'd)

- 1.02.03 In the main this guide considers the application of sprinklers in typical local government buildings such as
- Schools and Colleges
 - Offices
 - Residential and Care Homes
 - Houses in Multiple Occupation
 - Domestic Housing
 - Workshops and Similar Premises
- 1.02.04 This guide considers the application and use of various sprinkler systems including:
- Wet installations
 - Alternate wet and dry installations
 - Dry installations
 - Water mist systems

Note: currently there are no nationally recognised standards in the UK for water mist systems. If these are considered to be appropriate then further specialist advice should be sought.

1.03.00 EXCLUSIONS

- 1.03.01 This guide is **not** intended to be a detailed design manual. The design of sprinkler systems is a specialist function which must be carried out by suitably qualified and competent persons.
- 1.03.02 Other than for general guidance, this guide does not give advice on specialist areas such as:
- Manufacturing or production areas with specific fire control requirements;
 - IT machine rooms;

Cont'd

Best Practice Guide to Sprinkler Protection
PART 1- SCOPE OF GUIDE

1.03.00 EXCLUSIONS (Cont'd)

- Archives stores;
- Industrial storage areas.

1.03.03 If guidance is required for these or similar areas, specialist advice should be obtained.

1.03.04 Guidance is not considered for:

- Pre-action installations;
- Recycling installations;
- Deluge installations.

Best Practice Guide to Sprinkler Protection

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2.03.00 DECISION MODEL

Best Practice Guide to Sprinkler Protection

PART 2 – A DECISION MODEL

2.00.00 PROCESS

- 2.00.01 This decision model is designed to assist in the process of deciding whether a sprinkler system is required or not.
- 2.00.02 It should be considered as an aide within a rational decision process. It is intended to assist the design team through the decision process. It is unlikely to provide a simplistic yes/no answer.
- 2.00.03 If the model suggests that sprinklers are required then it will assist with design stage processes.

2.01.00 REQUIRED INFORMATION

- 2.01.01 The following information should be considered as an essential element within the decision process:
- National policies and guidelines;
 - Local policies and guidelines;
 - Insurance company policies, guides and requirements;
 - Local fire and rescue service policies, guides and requirements and in particular the consequences of their Integrated Risk Management Plan.
 - Project and/or property design proposals including outline construction information.
 - Nature of occupancy and proposed use patterns and structures;
 - Business continuity plans;

2.02.00 CONSULTATION

- 2.02.01 Appropriate consultation is required at an early stage with:
- The Insurer – to identify any specific requirements and costs/benefits to policy premiums and excesses.
 - The local Fire and Rescue Service – to identify worst case response times and their firefighting policies when life is not at risk.

Best Practice Guide to Sprinkler Protection PART 2 – A DECISION MODEL

2.03.00 DECISION MODEL

2.03.01 The following flow chart is provided to assist with the decision process:

STAGE 1: NATIONAL POLICY

Consideration should be given to the influence of National Policies. In Wales these may be primarily from the Welsh Assembly Government although consideration should be given to guidance from the Department for Children, Schools and Families, Department of Communities and Local Government, etc.



STAGE 2: LOCAL POLICY

Many local authorities have local policies regarding the installation of sprinklers. These may be supported by other groups such as the Welsh Local Government Association.



STAGE 3: FIRE RISK ASSESSMENT

A fire risk assessment, even at an early stage within the design process, will consider life and property risks.

Further consideration should be given to the worst possible attendance time of the local Fire and Rescue Service. The Integrated Risk Management Plan of the Fire and Rescue Service should be examined to determine their fire fighting policies.



STAGE 4: COST BENEFIT ANALYSIS

Undertake a cost/benefit analysis.

For schools a suitable model cost benefit analysis is available from the DCSF and in BB100.

This, or similar models, should be used in a modified format, for other types of premises.

Best Practice Guide to Sprinkler Protection
PART 2 – A DECISION MODEL

After following the requirements of Stages 1 to 4, the option appraisal may indicate that a sprinkler installation is unnecessary. In that case alternative fire precautions should be employed in accordance with the Building Regulations and Approved Document B

Otherwise proceed to Stage 5.



STAGE 5: DEFINITION OF APPROPRIATE STANDARD

If after undertaking the previous stages, there is a requirement for installing sprinklers, then the appropriate standard for the installation should be decided.

Domestic/residential standards may be suitable for HMOs, small offices, domestic properties, small residential homes, etc. For schools, offices, stores, larger residential homes and complexes then a commercial standard will be applicable.



STAGE 6: PRE-DESIGN INFORMATION

Collate all information required prior to design stage. Check with appropriate British Standard (or other national standard) for list of required information.



STAGE 7: APPOINTMENT OF DESIGNER

Appoint an appropriate designer who can demonstrate competence by means of the LPS1301 (for residential domestic systems) or LPS1408 (for commercial systems) quality scheme.

It may be that at this stage the designer, checker and installer are appointed as a single corporate body. In that case adequate safeguards should be employed to ensure that the most appropriate systems and designs are provided. An independent third party (such as The Fire Service College) should be used as appropriate.



Best Practice Guide to Sprinkler Protection PART 2 – A DECISION MODEL

STAGE 8: DESIGN PROCESS

The design process will involve the whole design team.

It is essential that the design of the sprinkler system matches the building concept and proposed use patterns.

A list of required information is included within the appropriate British Standard.

Other aspect of the design (e.g. size of compartments, escape routes and fire fighting shafts) should be adjusted to reflect the sprinkler provision.

It should be ensured that all design layout drawings are prepared utilising a proprietary CAD package and that all information is electronically transmitted



STAGE 9: DESIGN CHECK

Ensure that all aspects of the building design and sprinkler design are checked for compatibility.

Carry out a full co-ordination exercise to ensure no clashes of sprinkler pipework occur with any of the building elements or other mechanical and electrical services.

Checks should also be made to ensure that the discharge from sprinkler heads will not be masked in any way.

Use a third party specialist to examine and check the design of the sprinkler installation.



STAGE 10: APPOINTMENT OF INSTALLER

It is frequent practice that the designer and installer are one corporate body. In that case the installer will have been appointed at the same time as the designer.

Where a different installer is appointed they must be able to demonstrate competence by means of the LPS1301 (for residential domestic systems) or LPS1408 (for commercial systems) quality scheme.

Best Practice Guide to Sprinkler Protection PART 2 – A DECISION MODEL



STAGE 11: SUPERVISION OF INSTALLATION

An independent quality check by a suitable competent person is essential to ensure that the installation is carried out to the required specification and standards.

The installation shall be monitored to ensure that the issued design drawings are strictly adhered to and deviations which prove necessary, for whatever reason, are noted and the drawings re-drafted to ensure that the flow and discharge rates may be checked.



STAGE 12: INSPECTION, TESTING AND COMMISSIONING

Prior to handover the whole installation should be inspected and thorough commissioning tests undertaken.

All test results should be compared to the design and fully documented.

The documentation shall include the updated drawings which shall include, in an agreed format, the recorded flow and discharge rates

All inspection, commissioning and testing should be witnessed by the Client's agent (and when necessary by the Insurer's representative).



STAGE 13: HANDOVER

A detailed list of the information required at handover is included within the appropriate British Standard.

This information should be included within an appropriate Operations and Maintenance Manual and shall include a system log book to record all future system operation, maintenance, repair and modification.

The handover process should include for initial operator training.



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PART 2 – A DECISION MODEL

STAGE 14: OPERATION AND MAINTENANCE

It is common practice that the installer is appointed as the maintenance contractor.

In this case care should be employed in the methodology used to cost long term contracts. It is recommended that the appropriate BERR Cost Indices are used for annual contract cost adjustment.

Inspection and maintenance should be carried out to an appropriate specification by competent contractors.

Competence should be demonstrated by means of the LPS1301 (for residential domestic systems) or LPS1408 (for commercial systems) quality scheme.

Clients and building operators should review the system regularly (annually) so that any operational changes are reported to the maintenance company and the effectiveness of the sprinkler system reviewed.

Refresher training for operators should be carried out at appropriate intervals.

It should be noted that the monitoring of systems in respect of the control of legionella may be carried out by an alternative specialist contractor.

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Best Practice Guide to Sprinkler Protection
PART 3 – PRE-DESIGN REQUIREMENTS

3.00.00 GENERAL REQUIREMENTS

3.00.01 For sprinklers to operate successfully the systems need to be designed, installed and maintained to a high standard. The systems may not be required to operate for many years, but always need to be ready to do so. EN 12845 provides full details on pipe sizing, sprinkler head placement, water supplies, alarms, valves, pumps, commissioning and maintenance.

3.00.02 There are fundamental decisions required of the design team prior to the commencement of the detailed design process. In order to take these fundamental decisions it is essential that there is a detailed consultation with:

- The Client and/or End User of the premises;
- The Insurer;
- The local Fire Authority
- The local Water Supply Company
- The local Building Control Officer

3.00.03 It should be recognised that decisions regarding the provision and extent of a sprinkler system will have an effect on other aspects of a project design. Other fire control measures required by the Building Regulations and Approved Document B may be changed and or relaxed consequent to the provision of a sprinkler system.

3.01.00 APPROPRIATE STANDARDS

3.01.01 There are a number of British, European and other national and industry standards for automatic sprinkler systems that may be applicable. Consultation with the Insurer and other interested parties is essential at an early stage to ensure that the appropriate standard is used in the design process.

3.01.02 For residential and domestic systems the current applicable British Standard is:

BS 9251:2005 Sprinkler systems for residential and domestic occupancies – Code of Practice.

3.01.03 For other and more complex installations the current applicable British Standard is:

Cont'd

Best Practice Guide to Sprinkler Protection
PART 3 – PRE-DESIGN REQUIREMENTS

3.01.00 APPROPRIATE STANDARDS (Cont'd)

BS EN 12845:2004 Fixed fire fighting systems – Automatic
sprinkler systems – Design, installation and maintenance.

3.01.04 The requirements of BS EN 12845 are more complex and stringent than those of BS 9251.

3.01.05 Within the local authority sector it is probable that BS 9251 will apply to:

Domestic houses;
Houses in multiple occupation;
Smaller care and residential homes;
Small offices.

3.01.06 BS EN 12845 will be applicable to:

Larger care and residential homes;
Schools and colleges;
Offices;
Workshops;
Stores, etc.

3.02.00 LIFE AND/OR PROPERTY PROTECTION

3.02.01 In simple terms an automatic sprinkler system consists of pipes and heat sensitive sprinkler heads connected to a water supply. Fire is detected by individual sprinkler heads which open to release water, in the form of a spray, to the seat of the fire. The alarm is raised at the same time and the fire is kept under control until the arrival of the Fire and Rescue Service.

3.02.02 The principal role, therefore, of automatic sprinkler systems is one of property protection.

3.02.03 However, in some properties and circumstances, (e.g. Houses in Multiple Occupation) automatic sprinkler systems may be classified as part of an engineered approach to life protection.

3.02.04 It is essential that the purpose of the proposed automatic sprinkler system is identified at the earliest stage.

3.02.05 If a sprinkler system is designated for life protection, then the specific requirement that applies must be considered within the detailed design process.

Best Practice Guide to Sprinkler Protection PART 3 – PRE-DESIGN REQUIREMENTS

3.03.00 HAZARD CLASSIFICATION

3.03.01 In order to match the capability of an automatic sprinkler system with the type of risk with which it will have to cope, the risks are grouped into hazard classifications.

3.03.02 BS 9251:2005 defines two divisions:

- Domestic Occupancy
- Residential Occupancy

3.03.03 Within BS EN 12845:2004 there are three main divisions:

- Light Hazard
- Ordinary Hazard
- High Hazard

3.03.04 The ordinary and high hazard classes are sub-divided to further qualify the type of risk.

3.03.05 Light Hazard

Low fire loads with low combustibility and no single compartment greater than 126m² with a fire resistance of at least 30mins. The maximum protected area for LH is 10,000 m² per control valve.

Note: This classification depends upon the size of the fire being very limited. No areas of storage are permitted within this classification. In practice these limitations are very restricting and consequently many risks initially classified as light hazard will be re-classified as ordinary hazard.

3.03.06 Ordinary Hazard

Ordinary hazard risks will be commercial and industrial occupancies involving the handling, processing and storage of mainly ordinary combustible materials. The classification is further sub-divided into:

- Ordinary Hazard Group I

Typically: Cement works, sheet metal product factories, abattoirs, dairies, hospitals, hotels, libraries (excluding book stores), restaurants, schools, offices.

Cont'd

Best Practice Guide to Sprinkler Protection

PART 3 – PRE-DESIGN REQUIREMENTS

3.03.00 HAZARD CLASSIFICATION (Cont'd)

- Ordinary Hazard Group II

Typically: photographic labs, car workshops, bakeries, breweries, car parks, museums.

- Ordinary Hazard Group III and Group III special

Typically: industrial processes and buildings with a high combustible load.

3.03.07 High Hazard

High fire load and high combustibility. High hazard categories are typically storage facilities where racking is used and chemical processes.

3.03.08 Premises may contain a combination of different risk classifications. Detailed consultation is required with the Insurer and Fire Authority.

3.03.09 Hazard classification will dictate the minimum amount of water which must be provided at the fire in the form of a spray. This is normally expressed as the 'design density'.

3.03.10 The expected maximum area of the sprinkler system which will be activated by the fire is also dictated and this is known as the 'assumed maximum area of operation'.

3.04.00 EXTENT OF SPRINKLER PROTECTION

3.04.01 Sprinkler protection should be as extensive as possible.

3.04.02 Areas without sprinkler protection should be adequately separated from sprinklered areas. These areas may be lost in the event of a fire.

3.04.03 Where it is appropriate to leave areas unprotected by sprinklers, then alternative provisions of automatic fire detection should be made.

3.04.04 Sprinklers should be installed in all areas of the building; although it is permissible to exclude sprinklers in certain locations: e.g. toilets/washrooms of non-combustible materials; enclosed staircases not containing combustible materials. Sprinklers should be installed in roof, ceiling and floor voids.

Cont'd

Best Practice Guide to Sprinkler Protection PART 3 – PRE-DESIGN REQUIREMENTS

3.04.00 EXTENT OF SPRINKLER PROTECTION (Cont'd)

- 3.04.05 Excluded areas should include electrical switch rooms, IT server and machine rooms, etc. In such locations specialist fire suppression methods are required and further specialist advice should be sought.

3.05.00 TYPE OF SPRINKLER SYSTEM

- 3.05.01 The method of feeding the water supply to the sprinkler heads, the control of that supply and the method of raising the alarm are detailed design issues which must be appropriate to the type of risk, its location and its environment. There are various types of system:

- Wet Installations

Wet installations are the simplest, most reliable and hence most common systems. The entire system pipework is charged with water under its supply pressure and in the event of sprinkler head operation the water is discharged immediately.

- Alternate Wet and Dry Installations

Alternate wet and dry systems are designed for areas which are subject to winter frosts. (e.g. car park spaces) During the warmer months the system is operated as a 'wet installation'. Prior to the onset of winter the system is thoroughly drained and the control valves set to a 'winter' operation mode. The system is then charged with air under modest pressure. If a sprinkler head operates the air pressure is reduced which actuates the control valve allowing water into the system.

The disadvantage of this type of system is the potential delay between sprinkler actuation and the arrival of water to the fire area. This potential delay must be considered as part of the detailed design process.

- Dry Installations

Dry installations should only be considered for areas where a wet or alternate wet and dry installation cannot be used. (e.g. cold stores) The mode of operation is as described for the alternate system during its winter mode.

Cont'd

Best Practice Guide to Sprinkler Protection
PART 3 – PRE-DESIGN REQUIREMENTS

3.05.00 TYPE OF SPRINKLER SYSTEM (Cont'd)

3.05.02 Other types of installation exist which are **not** considered within the context of this guide. These include:

- Pre-action installations
- Recycling installations
- Deluge installations

3.05.03 Should any of these systems be considered necessary then further specialist advice should be sought.

3.06.00 WATER REQUIREMENTS

3.06.01 The provision of adequate water supplies is a detailed design issue.

3.06.02 Water supplies need to be capable of providing the required flow rates for the system and should have sufficient capacity to ensure that the sprinklers can remain in operation for the periods required by the hazard classification.

3.06.03 Water supplies can be town mains, storage tanks, pressure tanks and inexhaustible sources.

3.06.04 Detailed consultation with the local water supply company is essential.

3.06.05 There are a number of examples of innovative water supplies that may be considered. These include:

- Swimming pools
- Adjacent lakes, canals or rivers
- Rain water harvesting systems
- Grey water harvesting systems

3.06.06 If such systems are considered within the design process, it is essential to consider issues of the suitability, reliability, volume and continuity of supply at all times.

3.06.07 There may also be safety and operational issues concerning the sudden removal of large quantities of water from such sources of supply.

3.06.08 It should be noted that if certain conditions are met (e.g. guaranteed response time by the FRS), then it is possible to reduce total water stored volume. Early consultation with the Insurer and FRS is essential.

Best Practice Guide to Sprinkler Protection
PART 3 – PRE-DESIGN REQUIREMENTS

3.07.00 AESTHETICS OF INSTALLATION

- 3.07.01 Sprinkler heads are a crucial element in any sprinkler system. They will act to both detect a fire and release water, in the form of a spray, and in appropriate quantities and spray characteristics to control the fire effectively.
- 3.07.02 The thermal response and spray pattern characteristic of the sprinkler head must be considered within the design process and be appropriate to the risk classification.
- 3.07.03 In many installations, for aesthetic reasons or as a means of combating vandalism, it may be desirable to use a flush, recessed or concealed pattern sprinkler head.
- 3.07.04 All recessed and concealed ceiling style sprinklers are likely to react more slowly to fire conditions. It is essential that this is a consideration of the detailed design process.

3.08.00 EFFECTS ON OTHER DESIGN ISSUES

- 3.08.01 The installation of automatic sprinklers in a new build or major refurbishment scheme should be considered as an element within a fire engineered approach and as such is a fundamental element of that scheme.
- 3.08.02 Other fire control measures required by the Building Regulations and Approved Document B may be changed and or relaxed consequent to the provision of a sprinkler system.
- 3.08.03 This is particularly applicable to issues and requirements concerning compartment size, horizontal and vertical escape routes and fire fighting shafts.
- 3.08.04 In many instances this can mean that the installation of sprinklers can be 'cost neutral' when considered within the context of the whole scheme.

3.09.00 STANDARDS AND SPECIFICATIONS

- 3.09.01 The design, installation and maintenance of sprinkler systems is a specialist area and should be entrusted to those who are competent to do so.
- 3.09.02 There are British and European Standards (as well as other national and industry standards) that are applicable and it is essential that these requirements are followed in detail.

Cont'd

Best Practice Guide to Sprinkler Protection
PART 3 – PRE-DESIGN REQUIREMENTS

3.09.00 STANDARDS AND SPECIFICATIONS (Cont'd)

- 3.09.03 There are different requirements for commercial and residential or domestic installations and the appropriate guidance should be consulted.
- 3.09.04 Further reference is provided within the appendix to this guide.
- 3.09.05 In large or complex installations, where the provision of sprinklers is divided into a number of zones, the specification should include for a system to test individual zone flow switches.
- 3.09.06 Detailed consultation with the Insurer, local Fire and Rescue Service and Building Control authority is essential.

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Best Practice Guide to Sprinkler Protection

PART 4 – DESIGN

4.00.00 GENERAL

- 4.00.01 This guide considers the principles of sprinkler design and application. It is not intended to act as a detailed design manual. Specialist advice should be sought whenever a system needs to be designed.

4.01.00 APPOINTMENT OF COMPETENT DESIGNERS

- 4.01.01 Voluntary schemes exist within the UK for the registration of sprinkler systems which are constructed to a recognised standard. These schemes are administered by the Loss Prevention Certification Board (LPCB).

- 4.01.02 For schemes conforming to the requirements of BS 9251:2005 the scheme is termed:

LPS 1301: Requirements for the approval of Sprinkler Installers in the UK and Ireland for Residential and Domestic Sprinkler Systems.

- 4.01.03 For schemes conforming to the requirements of BS EN 12845:2004 the scheme is termed:

LPS 1048: Requirements for Certificated Sprinkler Installers, Supervising Bodies and Supervised Installers.

- 4.01.04 Within LPS 1048, Contractors who work within the scheme are listed as either “Certificated”, and can issue their own certificates of conformity for projects, or “Registered Supervised” in which case their work needs to be supervised by a Certificated Supervising Contractor who will issue a certificate for the completed project.

- 4.01.05 It is essential that all designers, installers and maintenance contractors are listed in the LPCB’s “List of Approved Products and Services”.

4.02.00 THE BRIEFING PROCESS

- 4.02.01 Briefing should be considered as a fundamental part of the design process. It is essential that the brief to the designer includes information regarding the insurer’s requirements and the results of the early consultation with the local FRS. It should clearly stipulate expected performance criteria including links to other fire and security measures and monitoring stations.

Best Practice Guide to Sprinkler Protection PART 4 – DESIGN

4.03.00 CHECKING THE DESIGN

- 4.03.01 It is implicit within BS EN 12845:2004 that the design should be checked by a responsible person who is not the designer of the installation. This can be undertaken using a third party or another person within the contractor operating within the LPS scheme.
- 4.03.02 In all instances, the completed design should be submitted to the design team for approval with adequate information to demonstrate its compliance with the appropriate standards and the requirements of the Insurers, local Fire and Rescue Service and Building Control Authority.
- 4.03.03 The design information provided must include:
- Hazard classification to which the system is designed;
 - Details of proposed materials and installation methods;
 - Details of system components;
 - Design drawings – both layout and schematic **in CAD format**;
 - Sprinkler spacing and location;
 - Details of pipework systems including hydraulic calculations;
 - Details of proposed fixings and pipe supports;
 - Details of proposed water supplies with information regarding reliability, flow rate and capacity;
 - Full engineering specification for pump sets including pump performance curves;
 - Space requirements of water storage;
 - Details of links to automatic fire detection and alarm systems and monitoring call centres;
 - Details of connections to other services including electrical supply requirements;
 - Coordination with other services.

A complete list is included in section 4 of BS EN 12845:2004.

Best Practice Guide to Sprinkler Protection
PART 4 – DESIGN

4.04.00 CONSULTATION

4.04.01 The designer should be required to consult with all relevant parties including:

- The project team;
- The local Fire and Rescue Service
- The Building Control authority
- The local Water Supply Company

4.05.00 COORDINATION WITHIN THE BUILDING DESIGN

4.05.01 Co-ordinate the whole of the sprinkler system with the building elements together with the mechanical and electrical services to ensure that potential clashes and obstructions are avoided.

4.05.02 As the building envelope design develops into it's construction phase, ensure that the sprinkler system is amended to suit.

4.06.00 CONSIDERATION OF LEGIONELLA CONTROL

4.06.01 The requirements of HSE's document L8: "The control of legionella bacteria in water systems" applies to automatic sprinkler systems and their associated storage tanks, pipework and ancillary equipment.

4.06.02 The system designer must provide a written risk assessment and provide details of proposed management and control systems to limit that risk during construction, installation, operation inspection and maintenance.

4.06.03 The requirements the Fire Protection Association Briefing Note "Legionella and Firefighting Systems" should be noted.

4.07.00 ADDITIONAL DESIGN CONSIDERATIONS

4.07.01 Ensure that the tanks and pipework, where necessary, are temperature protected against freezing i.e. trace heated.

4.07.02 Ensure interlink between sprinkler control panel and fire alarm panel to register alarm condition when sprinkler system is activated.

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- 5.05.00 CONTROL OF LEGIONELLOSIS

Best Practice Guide to Sprinkler Protection PART 5 – INSTALLATION & COMMISSIONING

5.00.00 QUALITY

- 5.00.01 Contractors operating within the LPS 1048 scheme will also have been assessed to BS EN ISO 9000: Quality Standards.
- 5.00.02 Nevertheless, it is recommended that the works are supervised and inspected as a part of the normal project management process.

5.01.00 CO-ORDINATION

- 5.01.01 Co-ordination of the sprinkler installation within the construction process is essential.
- 5.01.02 It is essential that the location and potential operation of sprinkler heads is not compromised by other services.
- 5.01.03 Similarly the final fix of sprinkler heads or concealing plates should be co-ordinated with decoration works.

5.02.00 SUPERVISION

- 5.02.01 Supervision of the installation is essential. Particular attention should be paid to:
- Installation methods;
 - Fixing of pipework and sprinklers;
 - Co-ordination with other services;
 - Identification of services;
 - Installation of water storage tanks, pump sets, valves and associated equipment.
 - Relationship of the installation to other building elements or services that could have a detrimental effect to its operation (e.g. combustible roof linings that could 'smother' a sprinkler head)

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PART 5 – INSTALLATION & COMMISSIONING

5.03.00 COMMISSIONING & TESTING

5.03.01 In common with all piped services, proper commissioning and testing of the completed installation is very important. Unlike other piped services, the completed installation will not normally be tested in full operational mode therefore even greater care is required to ensure that the design objectives are met.

5.03.02 It is recommended that all commissioning tests are witnessed by the Client's agent.

5.03.03 Full details of the commissioning and acceptance tests are detailed within Section 6 of BS 9251:2005 and Section 19 of BS EN 12845:2004.

5.03.04 All commissioning and acceptance tests shall include:

- Dry pipework shall be tested pneumatically to a pressure of 2.5 bar for not less than 24 hours.
- Wet pipework should be tested hydrostatically to a pressure of 15 bar, or 1.5 times the working pressure, whichever is the greater, for a period of at least 1 hour.
- With chlorinated polyvinyl chloride (CPVC) pipe, the manufacturer's recommendations and requirements should be followed.
- Dry systems should be tested to demonstrate response times to the most remote sprinkler head.
- The capability of the water supply should be tested, through the complete range of its design requirements, to prove performance.
- Flow measuring devices shall be provided at the installation control valves and adjacent to pumps such that water flow and pressure can be measured accurately.
- In the case of diesel driven pump sets additional tests should be carried out to prove the automatic starting sequence.
- All alarms and alarm connections shall be tested.
- All links to remote monitoring locations shall be proved.
- All valve monitoring functions shall be proven.

Cont'd

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PART 5 – INSTALLATION & COMMISSIONING

5.03.00 COMMISSIONING & TESTING (Cont'd)

5.03.05 Any non-compliant aspects of the installation shall be reported in the certification documentation.

5.04.00 HANDOVER INFORMATION

5.04.01 Full details of the commissioning certificates and documentation to be provided at handover are detailed within Section 6 of BS 9251:2005 and Section 19 of BS EN 12845:2004.

5.04.01 Upon completion of the installation the following information should be handed over:

- Log book;
- Full operation and maintenance manuals;
- 'As fitted' drawings;
- Schematic drawings;
- Copies of all commissioning tests;
- Test certificates for pneumatic and hydrostatic testing of pipework;
- Details and test certificates regarding water supply testing;
- Certificate of Conformity.

5.05.00 CONTROL OF LEGIONELLOSIS

5.05.01 The control of legionella bacteria shall be considered throughout the installation and commissioning process.

5.05.02 All pipework shall be thoroughly cleaned and chlorinated.

5.05.03 The complete installation shall be chlorinated prior to commissioning.

5.05.04 Appropriate certification shall be provided.

5.05.05 The design risk management regime shall be commissioned as a part of the overall commissioning process.

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PART 6 – MAINTENANCE

INDEX TO CLAUSES

6.00.00 LOG BOOK

6.01.00 USER CHECKS & TESTS

6.02.00 MAINTENANCE SPECIFICATIONS

6.03.00 APPOINTMENT OF SPECIALIST CONTRACTORS

6.04.00 REPORTS

6.05.00 REVIEW

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PART 6 – MAINTENANCE

6.00.00 LOG BOOK

6.00.01 When the system is handed over to the user a comprehensive operation and maintenance manual must be provided which should contain:

- Full documentation for the entire system, its components and all associated plant, alarms, utility supplies, etc., including record drawings (in both paper and electronic format).
- Instructions for day-to-day operation of the system and procedures to be adopted in and after fire conditions.
- A full schedule of all maintenance and testing required to keep the system in full working order.

6.00.02 It is essential that a Log Book is maintained for the system. The Log Book should record:

- all maintenance, inspection and testing;
- all repair works;
- as fixed drawings of alterations or additions;
- copies of fire risk reviews;

6.01.00 USER CHECKS & TESTS

6.01.01 When the system is handed over to the user, the installer must provide appropriate training to a nominated person (Caretaker, facilities manager/technician, etc.) to ensure that the user is fully conversant with the checks and tests necessary to keep the system in full working order.

6.01.02 This training should be repeated at appropriate intervals and upon change of responsible personnel.

6.02.00 MAINTENANCE SPECIFICATIONS

6.02.01 All cyclical maintenance, inspection and testing must be carried out in strict accordance with the manufacturer's and/or installer's recommendations and requirements.

Cont'd

Best Practice Guide to Sprinkler Protection
PART 6 – MAINTENANCE

6.02.00 MAINTENANCE SPECIFICATIONS (Cont'd)

- 6.02.02 The CLAW Maintenance Module 46 – Specification for Sprinkler Maintenance, specifies a minimum standard for maintenance of sprinkler systems.
- 6.02.03 Appropriate maintenance will include a minimum of service visits every 3 months for systems designed to BS EN 12845 and every 12 months for systems designed to BS 9251.
- 6.02.04 Where systems use concealed sprinkler heads, it is essential that a clause is included within the maintenance specification to include an inspection ensuring that head sprinkler performance has not been compromised by painting or re-decoration works.
- 6.02.05 A comprehensive inspection and test of the system is required every 25 years. Further guidance is included within BS EN 12845:2004.
- 6.02.06 Further guidance is available. Refer to the Appendix for further information.

6.03.00 APPOINTMENT OF SPECIALIST CONTRACTORS

- 6.03.01 It is essential that all maintenance, testing and inspection works are carried out by suitably qualified, experienced and competent contractors.
- 6.03.02 The LPS 1048 scheme (see Parts 4 & 5 of this guide) lists contractors considered to be suitable for the maintenance of sprinkler systems.
- 6.03.03 The CLAW Maintenance Module 46 – Specification for Sprinkler Maintenance, specifies a minimum standard for certification of the maintenance contractor.

6.04.00 REPORTS

- 6.04.01 Copies of maintenance reports should be retained within the system log book.
- 6.04.02 Maintenance reports should present a comprehensive report of all maintenance works including:
- visual inspections;
 - test results;

Cont'd

Best Practice Guide to Sprinkler Protection
PART 6 – MAINTENANCE

6.04.00 REPORTS (Cont'd)

- replacement items;
- system condition;
- recommendations.

6.05.00 REVIEW

6.05.01 It is essential that systems and applications are regularly reviewed to ensure that the degree of protection is appropriate to the hazard classification.

6.05.02 Any material changes (for instance in stored materials or methods of storage) should be reported to the maintenance contractor (or original designer/installer).

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APPENDIX 1 – FURTHER INFORMATION

There are many sources of useful information which should be consulted when considering installing sprinkler systems.

Amongst the more useful are the following:

BS 9251:2005 Sprinkler systems for residential and domestic occupancies – Code of practice.

BS EN 12845:2004 Fixed firefighting systems – Automatic sprinkler systems – Design, installation and maintenance

LPC Technical Bulletins

CIBSE Guide E Fire Engineering 2003

Department for Children, Schools and Families.
Building Bulletin100: Design for fire safety in schools 2007

There are a number of websites which are worthy of reference, e.g.:

www.basa.org.uk

www.fireservicecollege.ac.uk

www.firesprinklers.info