

Joint Code of Practice for the Installation of Automatic Sprinkler Systems in Schools

A. Introduction

This Code of Practice has been drawn up by the British Automatic Sprinkler Association and Zurich Municipal Insurance in the wider public interest. It is intended to ensure that where sprinkler systems are designed and installed in schools and related occupancies the system will provide an optimum level of protection should a fire breakout. The Code of Practice takes into account the higher risks of deliberate fire in such premises. A number of organisations and bodies have been consulted during the drafting of this code and have agreed to endorse its contents - their names are shown on the cover.

B. Definitions

alarm test valve valve through which water may be drawn to test the operation of the water motor fire alarm and/or of any associated electric fire alarm

alarm valve non-return valve, of the wet, dry or composite type that also initiates the water motor fire alarm when the sprinkler installation operates

AMAO *assumed maximum area of operation* the maximum area, over which it is assumed, for design purposes, that sprinklers will operate in a fire

authorities/authorities having jurisdiction organisations responsible for approving sprinkler systems, equipment and procedures, e.g. the fire and building control authorities, the fire insurers, the local water authority or other appropriate public authorities

automatic transmission of an alarm the remote alarm signalling of the operation of the sprinkler system by use of the installation control valve pressure switch linked to a NACOSS/NSI Central Alarm Receiving Station or other Central Alarm receiving Station approved by the insurers. The signalling to be by BT RedCARE or other approved method which is acceptable to the insurers

booster pump automatic pump supplying water to a sprinkler system from a gravity tank or town main

client the school, LEA, organisation, company or other person(s) upon whose instructions the sprinkler system is being installed

control valve set assembly comprising an alarm valve, a stop valve and all the associated valves and accessories for the control of one sprinkler installation

design density the minimum density of discharge, in millimetres per minute of water, for which a sprinkler installation is designed, determined from the discharge of a specified group of sprinklers, in litres per minute, divided by the area covered, in square metres

distribution pipe pipe feeding either a range pipe directly or a single sprinkler on a non-terminal range pipe more than 300 mm long

distribution pipe spur distribution pipe from a main distribution pipe, to a terminal branched pipe array

drop vertical distribution pipe feeding a distribution or range pipe below

fire (resistant) compartment enclosed volume capable of maintaining its fire integrity for a minimum specified time

fully calculated term applied to an installation in which all the pipework is sized by hydraulic calculation

hanger assembly for suspending pipework from elements of building structure

inexhaustible sources natural and artificial water sources such as rivers, canals and lakes which are virtually inexhaustible for reasons of capacity and climate etc.

installation (sprinkler installation) part of sprinkler system comprising a control valve set, the associated downstream pipes and sprinklers

installation, wet (pipe) installation in which the pipework is always charged with water

jockey pump small pump used to replenish minor water loss, to avoid starting an automatic suction or booster pump unnecessarily (sometimes known as a jacking pump)

life safety term applied to sprinkler systems forming an integral part of measures required for the protection of life

looped configuration pipe array in which there is more than one distribution pipe route along which water may flow to a range pipe

LPC Loss Prevention Council (now part of BRE Risk Sciences Ltd)

LPCB Loss Prevention Certification Board (now part of BRE Certification Ltd)

Maximum Flow Demand (Q_{max}) the flow at the point of intersection of the pressure-flow demand characteristic of the most favourable area of operation and the water supply pressure-flow characteristic with the suction source at its lowest level

MJC multiple jet control

multi-storey building building comprising two or more storeys, above or below ground

NACOSS/NSI National Council for the Approval of Security Systems/National Security Inspectorate

pre-calculated term applied to an installation in which the pipes downstream of the design point(s) have been previously sized by hydraulic calculation. Tables of diameters are given

range pipe pipe feeding sprinklers either directly or via arm pipes

riser vertical distribution pipe feeding a distribution or range pipe above

sprinkler (automatic) nozzle with a thermally sensitive sealing device which opens to discharge water for fire fighting

sprinkler, ceiling or flush pendant sprinkler for fitting partly above, but with the temperature sensitive element below, the lower plane of the ceiling

sprinkler, concealed recessed sprinkler with a cover plate that disengages when heat is applied

sprinkler, fusible link sprinkler which opens when a component provided for the purpose melts

sprinkler, recessed sprinkler in which all or part of the heat sensing element is above the lower plane of the ceiling

sprinkler rosette plate covering the gap between the shank or body of a sprinkler projecting through a suspended ceiling, and the ceiling

Sprinkler Rules the combined requirements of BS 5306 Part 2 (1990) and the LPC Technical Bulletins

sprinkler, sidewall pattern sprinkler that gives an outward half-paraboloid pattern discharge

sprinkler system the entire means of providing sprinkler protection in the premises comprising one or more sprinkler installations, the pipework to the installations and the water supply/supplies

suitable for sprinkler use term applied to equipment or components accepted by the authorities as suitable for a particular application in a sprinkler system, either by conforming to EN product standards where available or if not by compliance with specified criteria

supply pipe pipe connecting a water supply to a trunk main or the installation control valve set(s); or a pipe supplying water to a private reservoir or storage tank

suspended open cell ceiling ceiling of regular open cell construction through which water from sprinklers can be discharged freely

towns main connection a water supply taken directly from public water distribution system (*the service main*) either to feed a sprinkler system directly or to fill a sprinkler system tank

zone sub-division of an installation with a specific flow alarm and fitted with a monitored subsidiary stop

C. Design Standard

All systems installed in compliance with this Code of Practice shall comply with British Standard 5306:Part 2 and the series of Technical Bulletins published by the Loss Prevention Council (the Sprinkler Rules) and its successor bodies so long as these documents are current and valid. From a date to be agreed, systems will comply with prEN12845 and any new Technical Bulletins which may be published.

D. Equipment Standards

All components used in systems installed in accordance with this Code of Practice must also be LPCB-listed and where necessary, covered by an Attestation of Fitness under the Construction Products Directive. From a date or dates to be specified all components shall comply with the appropriate part of EN 12259:1999 (Fixed fire fighting systems - Components for sprinkler and water spray systems).

E. Installation

The Company undertaking the installation must be listed by the LPCB in the appropriate category of its list of Certificated and Registered installers. Registered companies shall not install systems other than those with direct towns mains connections.

A full list of the LPCB inspected companies can be found in: the LPCB/BRE Certifications annual publication: List of Approved Fire and Security Products and Services; the Sprinkler Rules and on the web in <http://www.brecertification.co.uk>.

F. Design Criteria

(a) Systems shall be designed having regard to a properly undertaken fire risk assessment which shall be used to inform all decisions regarding the hazard grouping for the risk. While in many schools, the requirements of Ordinary Hazard Group 1 may be adequate, higher levels may be specified by the insurers or the authority having jurisdiction. No systems in premises covered by this standard shall be installed to Light or Extra Light specifications.

(b) All systems can either be to tables or be fully hydraulically calculated. Evidence of the calculations shall be submitted on request to the authorities having jurisdiction and/or the insurer.

(c) The following specific system requirements should be noted and complied with:

(i) Sprinkler heads operating temperature shall be 68°C ~~rated~~ unless otherwise agreed by the relevant insurance company or the authority having jurisdiction.

(ii) LPCB approved concealed type sprinkler heads using 15mm orifice heads may be utilised.

(iii) All parts of the school must be protected in accordance with 2.4.1 of BS5306 Part 2 and the TB5 (2000) and TB 11 (1990) of the LPC Technical Bulletins. (See Part G below). (With the consent of the insurer small outbuildings may be excluded with appropriate space separation from protected premises).

(iv) The Installation Control Valves must be located in a secure area to minimise the risk of tampering and a stop valve indicator switch should monitor whether the main valve is open or closed. The valves will need to be readily accessible to the fire service from an external door.

(v) Provision should be made for the remote alarm signaling of the operation of the sprinkler system by use of the installation control valve pressure/ flow switch or unauthorised closing of the main stop valve monitoring device.

(d) Specification for sprinkler heads

(i) Generally, where the sprinklers could be subject to malicious damage the sprinkler heads are to be LPC approved and of the adjustable concealed type

where only the white cover plate appears on show on the underside of the ceiling with the sprinkler head outlet immediately above. Where applicable the cover plate shall be arranged to drop down at the required pre-determined temperature.

(ii) In areas where the heads are at high level or where only maintenance staff are granted access (halls, boiler rooms, lofts etc.) sprinklers shall be LPC approved brass finish, pendant or upright spray, fully tested and approved. Where such sprinklers are likely to suffer mechanical damage (i.e. gyms, halls where ball games are permitted, the boiler-house, tank rooms etc) the sprinklers shall be fitted with an ~~LPC approved~~ wire guard.

(iii) The operating temperature of the sprinkler heads shall be to suit the application and location. (But see also F(c)i.

(iv) In the electrical switch room and other such areas an MJC system is to be installed.

(v) Sprinklers shall be placed so as to cover a maximum of 9m² per head and where possible, the placing of heads shall take into account the presence of open cell, grid and other ceiling types. Where possible sprinkler heads installed in ceiling tiles shall be fitted in the centre of the tile. Sprinklers shall not be installed more than 900mm above open cell ceilings.

(vi) Where operation of automatic smoke ventilators is based on the use of heat sensitive elements, then such devices will be specified to operate at a higher temperature than that of nearby sprinkler heads.

(vii) The design of the sprinkler installation is to be co-ordinated with all fixtures and fittings i.e. high level shelving, suspended light fittings etc to ensure correct locations of sprinkler heads in accordance with current regulations, The Sprinkler Rules.

(e) Heating

(i) Where it can be guaranteed that the premises will be maintained at or above an ambient temperature of 4°C or more then no special precautions need to be taken, however it is the responsibility of the sprinkler installers to confirm this with their Client and the authority having jurisdiction and/or insurers.

(ii) Trace heating and lagging may be required in certain areas where pipe-work will be exposed to frost. The sprinkler company should clarify this point with the Client. Where trace heating and lagging is required, these will need to conform to BS 6351:1983:Parts 1-3, BS 5422:1977 and BS 5970:1981 respectively. (Note:- only non-combustible lagging will be permitted).

(iii) Where there is to be a pump-house the heating requirements within will be discussed with the Client who will be responsible for installing any heating.

G. Extent of Sprinkler Protection

(a) The school buildings are to be provided with a wet sprinkler system to provide full coverage to the whole of the building including roof voids etc. The whole of the premises to be protected in accordance with the Sprinkler Rules except as specifically mentioned or specified in this document.

(b) The sprinkler installer should provide the Client with information detailing the extent of the sprinkler system requirements/interactions in respect of :-

(i) Duct Work where protection may be required.

(ii) Mezzanine floors.

(iii) Voids which may need protection.

(iv) Roof-lights.

(v) Suspended Ceilings and Lights.

H. Water Supplies

Notwithstanding the water supply requirements as detailed within the LPC Rules and BS 5306 Part 2, it may be permitted by either the authority having jurisdiction and/or the insurer to install a reduced capacity storage tank. The storage tank should not be dependent on infill to achieve the capacity requirements.

(i) Capacity to be based on the Q_{max} of the system demand for 30 minutes. Where the AMAO of the protection is less than the nominal designed AMAO (ie the physical boundary of the largest area being protected) then the maximum number of sprinklers in this area is to be used for the calculations.

(ii) The use of such a reduced capacity tank is in all cases wholly dependent upon the sprinkler system activation monitoring device being connected to a NACOSS/NSI approved monitoring Central Alarm Receiving Station via BT RedCARE or other constantly monitored secure line signalling system approved by the insurers. by monitored line method.

(iv) Facilities for refilling the tank must be provided to the satisfaction of the insurers.

(b) Pumped Systems:

- (i) Where an electrical pump is proposed, due account should be taken of all likely demand for power to ensure that the available power supply requires to be is adequate.
- (ii) The electrical connection for power to the electric pump-set needs to be taken from the live side of the premises main breaker. Further, both the main breaker and any isolating switch to be suitably labeled, as specified in the Sprinkler Rules.
- (iii) The use of butterfly valves on the suction branch to a pump is not permitted.
- (iv) Pressure gauges to be used for carrying out the full load tests on the pumps, must be located so as to have not less than 2 diameters of straight uninterrupted pipe either side of the gauge tapping.
- (v) Pressure Loss Calculations (including static elevation changes) must be submitted for the section of pipe between the pump delivery branch, pump test return line branch and the pressure gauge to be used for site testing. Where full hydraulic calculations are being utilised then node points must be introduced for the pump delivery branch, pump test return line branch and the pressure gauge to be used for site testing.
- (vi) Only purpose-made rag bolts may be used as holding down bolts for pump bed-plates. The use of all threaded rod systems and other substitutes is not acceptable.

(vii) Contents gauges fitted to pump suction tanks must be capable of registering the actual contents level, for all levels above the pump suction pipe.

(viii) The pump suction tank drain valve requires to be trace heated and lagged. In order to reduce the cost of the trace heating, the drain valve requires to be located as close as practicable to either the tank infill pipe or the suction pipe.

I. Maintenance

All sprinkler systems installed under this code of practice will be subject a maintenance programme which complies with the requirements of Section 7 of BS 5306 Part 2. In addition, the following measures will also be complied with:

(i) In the event of the water pressure recorded during a weekly check under 7.34.3 falling below the minimum acceptable pressure as laid down by the sprinkler installer then the owner will advise the sprinkler installer and the insurer forthwith.

(ii) Service and maintenance procedures carried out under 7.35 shall only be undertaken by a sprinkler installation company as specified in Section E above.

J. General Requirements

(a) The specification used to tender for the supply of sprinkler systems should include the details of the proposed suppliers of major components, i.e. towns mains, pumps, tanks, alarm valves, flow meters, etc where applicable.

(b) Full details of the location and type of flow measuring equipment to be clearly shown. Where Platon Mk2 flow meters are used, both upstream and downstream valves will require to be fitted.

(c) Sprinkler contractors to submit a full set of design drawings and supporting hydraulic calculations for approval by the authority having jurisdiction and/or the insurers. In addition the following information must be included :-

(i) Each drawing shall contain a key plan of the development marked to show the area covered by the drawing.

(ii) The issue reference number/letter must be clearly shown on each drawing.

(iii) 'Match' lines to be identified and the continuation drawing number marked alongside each 'match' line.

(iv) Hydraulic calculations to be submitted with relevant drawings. All pipe-work covered by the calculation must be detailed on the drawings. Non-receipt of calculations or drawings could delay approval of the design.

(v) Any drawing or hydraulic calculation returned and not approved by the client, the authorities or insurer to be modified and re-submitted for approval.

(d) Where it is necessary to install pipework in advance of drawing approval, the installation company should state this and provide a written undertaking to modify such work if necessary.

(e) If a hose reel system is to be installed in the sprinkler protected building then care should be taken to ensure that both the pumping and water supply requirements have been taken into account. If it is desired to interconnect the hose reel water supply system to the sprinkler system water supply then the water storage capacity and the pump capacity must be increased above the nominal duty required for the sprinkler system to reflect the anticipated demand from the hoses.

No hose reel system supplied by a sprinkler tank and/or pump(s) shall be permitted to be used for anything other than fire fighting.

(f) Unless otherwise specified or agreed all sprinkler systems in schools should be provided with a fire brigade pumping in point to permit the brigade to supplement the water supply in accordance with S 13.1.1.3 of the Sprinkler Rules. The fire authority and water company should be consulted as to the location and type of equipment to be provided. (Some water companies may require additional back flow prevention devices in respect of sprinkler systems with direct towns mains connections.)

(g) Given that the majority of sprinkler systems in schools are specified as a measure to protect the premises against arson attack consideration should be given to the need for protection of valve sets, pumps and other equipment. It may be considered appropriate to consult with the fire authority on the advisability of omitting signs normally required under S30 of the Sprinkler Rules. See also F.c.iii above

K. Testing and Commissioning

(a) Testing and commissioning shall be carried out in accordance with requirements of the Section 3, Part 10 and TB16 of the Sprinkler Rules

(b) Not less than fourteen days notice of all site tests shall be given to the contract administrator in order that the Insurer's representative may be present.

(c) When the entire system has been completed, tested and commissioned, the contract administrator, insurer and owner shall jointly carry out a full test prior to acceptance of the system.

(d) After completion, an LPCB Certificate of Conformity shall be issued listing any deviations or non-compliances. Sufficient copies of all tests and completion certificates shall be provided to the contract administrator for distribution to the insurer, owner and any other specified party. A copy of the certificate shall be included with the instruction manual and handed to the owner.

(e) Where a Certificate of Conformity cannot be issued, because, for example, the system tank size has been reduced, then a System Report will be issued in conjunction with copies of the relevant documentation including approvals provided by the authority having jurisdiction and/or insurers.

L. Suggested Contractual Procedures Prior to Installation of a Sprinkler System

It is suggested that many problems can be eliminated by following the procedures described below:

- (a) Consult your insurers/brokers and other interested parties (eg fire authority, water undertaking, building control department etc) Obtain your insurers' assistance in preparing a tender specification if necessary.

- (b) Issue tender documents to LPCB-listed companies. BASA maintains a list of its members who are active in school sprinkler installation.

- (c) Check returned tenders against the specification in consultation with your insurance company.

- (d) Enter into contract with successful bidder.

- (e) Verify that all drawings and hydraulic calculations have been approved by your insurers before installation work commences.

- (f) Commence installation work.

- (g) Following installation invite the insurers to carry out an inspection and witness the commissioning/acceptance tests. (Most insurers will also wish carry out intermediate visits during the installation).

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