



**PROPOSED**

**DESIGN FREEDOMS**

**USING**

**RESIDENTIAL**

**SPRINKLER SYSTEMS**

Recent years has seen the introduction of residential sprinkler systems to the UK. These systems are designed to improve the likelihood of occupants of protected building to survive a fire. Because residential sprinklers are so new to the UK they are not currently covered by existing Building Regulations or fire safety legislation.

The RSA, in consultation with a wide variety of organisations concerned with fire safety, has therefore produced this proposal describing the design freedoms that may be accepted by Building Control and/or Authorities Having Jurisdiction, in lieu of provision in Approved Document “B”.

All of the suggestions here are based on real situations and have been accepted by Building Control and/or Authorities Having Jurisdiction. It is intended to support this document by the inclusion of case histories in due course.

Comments are invited on these proposals. Please write in the first instance to the address given at the end of the document.

Guidance with regard to fire safety under the Building Regulations is found in Approved Document B (ADB). This has been updated regularly, the most recent published in 2000. Additional guidance is given in BS 5588part1.

The risk of death or injury in a fire is limited by a number of measures

- Strength of the structure to prevent early collapse
- Fire resistance of walls and doors to prevent fire spread
- Limitation on choice of wall and ceiling linings to slow fire spread
- Limitation on maximum escape distance to a safe place
- Provision of an alternative exit where height exceeds 7.5m
- Provision for smoke (sometimes heat) detectors and audible alarms to provide warning of fire
- Provision of manual means of controlling/extinguishing fire with fire extinguishers/fire blankets in certain situations.
- Provision of access for fire service appliances

Sadly, whilst the ongoing revisions to the ADB have had some impact, there are still some 600 deaths and over 18000 injuries caused by fire each year.

The USA followed a similar path of steadily developed building codes, but this still left a significant number of deaths and injuries, which led to the introduction of residential sprinkler protection some 20years ago. Now, some 4 million residential sprinklers being installed annually in the USA, with very encouraging results. (ref.1)

The publication of the British Standard DD251 in April 2000 has given the opportunity to consider the introduction of residential sprinklers in a regulated way.

Sprinklers are installed throughout the building (1). Each sprinkler covers a predetermined floor area, at maximum set distances from walls etc. Pipes permanently charged with water, which comes from the domestic mains or is fed by pump from a tank, feed the sprinklers. Each

sprinkler is an independent unit, only releasing water if its thermal element is activated by heat from the fire. The thermal element is set to operate at a fixed temperature, not less than 30°C above ambient temperature, which makes it very unlikely indeed to operate other than in fire conditions.

Sprinklers provide a significantly different form of protection to any of those means included in the introduction above. The nature of the protection is as follows

- It is automatic
- It detects the fire in its early stages, before the fire itself, or the resulting smoke production, become life threatening. The sensitivity of the sprinklers is equivalent to that of fixed temperature heat detectors
- It operates at the moment of detection, sounding an alarm internally throughout the building, and externally to indicate fire location, and discharging water at a predetermined rate over a defined area.

The effect of the water discharge is to

- Immediately cool the atmosphere, reducing the buoyancy of any smoke and hot gases produced prior to the operation of the sprinkler
- Directly reduce the rate of burning of the ignited material
- Directly reduce the production of smoke and hot gasses
- Wet surrounding materials limiting fire spread

Such statistical information that is available suggests that in the majority of fires in sprinkler protected properties in the USA, control/extinguishment has been achieved with a single sprinkler operating, and only in a very few cases has a second sprinkler needed to operate.

In 2001, some 3500 sprinkler systems were installed throughout the UK in compliance with BS DD251. Some were in buildings where the guidance of ADB was fully met, but many were installed to provide alternative means of protection to some aspect of ADB recommendations.

In the latter cases, Building Control officers – guided by the Fire Service, judged that the protection afforded was at least equivalent to that of ADB. A few cases have been brought to the Building Regulations unit of the DTLR (now ODPM). One of these used a fire engineering approach to compliance with ADB, which was accepted, although the use of the specific type of sprinkler was disputed.

Examples of types of applications accepted by various building control officers are given below:

Infill developments of houses and blocks of flats, where the access widths and turning areas and for appliances does not meet ADB recommendations, and where cul-de-sacs of excessive lengths. Developments allowed where sprinkler protection provided to BS DD251.

Recommendation for a second means of escape waived where occupied space at height of over 7.5m. Unusual example a seven-story high lighthouse conversion (Burnham on Sea). Also where provision of external staircase not possible, or not desirable, for instance for security reasons. (Women's refuge, Oxford). Where 4 story town houses depend upon single stairway for egress. (Lancaster)

Where new floor formed at more than 4.5 m above ground level. Sprinkler protection viable alternative (East Herts ... several others). No need, for instance, to upgrade floor to 30-minute fire resistance where sprinklers provided.

Conversion to private flats. (Bath)

Relaxation of 30-minute fire resistance for walls, floors and doors. (However, all must be of sound construction.) Herts, HMO refurbishment.

Stairways open to ground floor lounge area from new second floor accommodation – acceptable with sprinkler protection. DTLR.

Travel distance in bed-sit or open plan apartments. Current limit 9m, expended to 18m where sprinklers installed.

Acceptable for inner rooms to open into an open plan living space where sprinklers installed.

Currently restricted to 9m in length, extend to 18m where sprinklers installed.

Relaxation of requirements for heat detectors in bedrooms/bed-sits with cooking facilities, and in kitchens. Herts

Reduced levels of fire resistance between different purpose groups (e.g., shops with flats above) provided whole building sprinkler protected.

Relaxation for common areas and escape routes

Relaxation for fire extinguishers, but not fire blankets where required in bed sits.

Relaxation on need to provide intumescent door seals for doors leading to escape routes.

Where sprinklers are installed in buildings in strict compliance to DD251, most of the requirements of Approved Document B will be fully met, and sprinklers will provide dramatically improved life safety protection.

In many cases the use of sprinkler systems designed and installed to DD251:2000 will actually provide a higher level of life safety in the event of a fire, than would strict adherence to Approved Document B.

If you have any comments on these proposals or information on specific applications of sprinkler please write to :

.....or email us at [info@firesprinklers.org.uk](mailto:info@firesprinklers.org.uk)