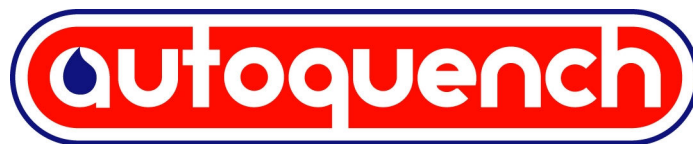


**PROPOSED  
DESIGN FREEDOMS  
USING  
RESIDENTIAL  
SPRINKLER SYSTEMS**



**Fire Protection Systems**  
[www.autoquench.co.uk](http://www.autoquench.co.uk)

**Proposals for design freedoms that may be allowed against the requirements of Approved Document B, where Residential Sprinkler Systems, designed and installed to BS 9251, are fitted.**

## **1. Introduction**

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 buildings to survive a fire. Although residential sprinklers are relatively new to the UK, they are now covered by Building Regulations within Approved Document B (Fire Safety).

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, within the provision of Approved Document "B".

All of the suggestions 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.

## **2. General**

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 5588 part 1. This has now been included in a release published in April 2007.

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 20 years 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 BS9251 in 2005 has given the opportunity to consider the introduction of residential sprinklers in a regulated way.

## **3. Sprinkler protection**

Sprinklers are installed within the building. Each sprinkler covers a predetermined floor area, at maximum set distances from walls etc. Pipes are permanently charged with water, from either

the domestic mains, or fed by pump from a tank. 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 degC above ambient temperature.

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 rate of burning of the ignited material.
- Directly reduce 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.

#### **4. The use of sprinklers in relation to Approved Document B**

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:

##### **Fire Brigade access limitations.**

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 are of excessive length. Developments allowed where full sprinkler protection is provided to BS9251.

##### **Alternative means of escape.**

Recommendation for a second means of escape waived where occupied space at height of over 7.5m. Partial fire sprinkler systems are accepted.

### **Passive requirements for typical loft conversions.**

Where new floor formed at more than 4.5 m above ground level. Partial sprinkler protection viable alternative. No need, for instance, to upgrade floor to 30-minute fire resistance where sprinklers are provided.

### **In lieu of traditional escape routes.**

Conversion to private flats.

### **Fire Resistance requirements**

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

### **Open stairways.**

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

### **Travel distance.**

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

### **Inner rooms.**

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

### **Internal protected corridors or hallways.**

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

### **Compartmentation between different purpose groups.**

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

### **Internal linings.**

Relaxation for common areas and escape routes.

### **Fire fighting equipment.**

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

### **Intumescent door seals.**

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

**Proposals for adopting fire sprinklers in lieu of passive fire protection requirements are generally made during the planning process. These still require approval by Building Control and/or the Authorities Having Jurisdiction as part of the overall planning approval process.**

**Where sprinklers are installed in buildings in strict compliance to BS9251 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 BS9251 will actually provide a higher level of life safety in the event of a fire, than would strict adherence to Approved Document B.**

End