

Baseline Designs - Fire safety & protection strategy

This document describes the approach that has been taken to ensure the baseline designs comply with the functional requirements B1 to B5 of Schedule 1 to the England and Wales Building Regulations 2010. It also describes the additional measures that have been included to reduce the damage that may result from a fire in the building. However, where the risk of arson is considered to be significant, extra loss prevention measures may be required. The fire safety measures detailed below are based on the risk-appropriate approach in British Standard 9999:2008 *Code of practice for fire safety in the design, management and use of buildings*.

The risk profile for school buildings will generally be A1 (i.e. occupants who are awake and familiar with the building and a slow rate of fire growth) where an automatic sprinkler system is provided, and A2 (i.e. occupants who are awake and familiar with the building and a medium rate of fire growth) in all other cases. Areas used by members of the public (such as the hall, and sports hall) may be treated as B1 (i.e. occupants who are awake and unfamiliar with the building and a slow rate of fire growth) or B2 (i.e. occupants who are awake and unfamiliar with the building and a medium rate of fire growth), and the fire safety measures are designed accordingly.

Arguably, the single largest risk to schools is from arson, or malicious fire-setting. Often, arson attacks on schools evolve from vandalism to school premises and so any steps taken to reduce the potential for vandalism will consequently reduce the risk of arson. Correctly designed security measures can significantly reduce the potential for vandalism and vandalism-related arson in and around school buildings, and the fire safety and protection measures in a school should be considered in conjunction with the security and safeguarding strategy.

Fire Detection and alarm systems

In order to provide an acceptable level of protection to the baseline designs, a system of automatic fire detectors is assumed throughout the buildings. This system would be an L2 system, as defined in BS5839-1 *Fire detection and fire alarm systems for buildings — Code of practice for system design, installation, commissioning and maintenance*, and will comprise, as a minimum: optical smoke detectors throughout all staircases, corridors and

escape routes, all rooms that are accessed directly from these routes and in areas of high fire risk or areas containing sensitive or expensive equipment. Type A manual call point devices are assumed adjacent to every exit from the buildings with sufficient alarm sounders to meet the school's requirements. Any rooms that contain naked flames, or within which smoke, steam, dust or aerosol can be expected as part of the normal ambient conditions, would be provided with heat detectors in lieu of smoke detectors. However, heat detectors are not suitable for use within escape routes, circulation routes and staircases.

One of the key design characteristics of the secondary school baseline designs is the inclusion of a number of voids in the upper floors. These voids are an inherent part of the daylighting and ventilation strategies, but may provide a pathway by which the products of combustion, i.e. smoke, fire gases and flames, can spread from storey to storey more rapidly than in an equivalent building without voids in the floor. An enhanced level of automatic fire detection and an automatic life-safety sprinkler system has therefore been provided in the secondary baseline designs. This is to ensure that the fire alarm is raised whilst the fire is in its incipient growth stage, the fire can be suppressed and controlled by the sprinkler system and the potential for smoke spread between floors can be mitigated.

Where there are large atria such as the dining rooms, the sprinkler system will control and suppress the fire and the provision of smoke vents within the roof will assist in maintaining tenable conditions within the space.

In the primary baseline designs there are no voids between floors for ventilation and daylighting as the classrooms are less deep and can be daylit from the external façade; there are also no large atrium spaces with balcony escape. It is therefore possible to comply with Regulations without sprinkler or smoke extract systems. Coats and bags stored in circulation areas are classed as a high fire risk. Where these occur in the primary designs there are fire doors at each end of the relevant section of corridor. These would be of the magnetic hold-open type that close on activation of the fire alarm to make circulation easier.

An L2 automatic detection system has been specified for the primary baseline designs.

Means of Escape

The evacuation strategy in the baseline designs is based on simultaneous evacuation, whereby the actuation of the fire detection and alarm system will result in the immediate evacuation of the building.

In calculating horizontal escape requirements from the large spaces or halls, the largest exit was discounted and the remaining exits made wide enough to accommodate the maximum expected occupancy. A similar approach was taken when determining the capacity of storey and final exits from the building. Exit widths in the baseline designs are based on 3.3 mm/person in the secondary schools (with sprinklers) and 3.6mm/person in the Primary schools (without sprinklers). The exits from public areas are based on an allowance of 3.6mm/person in sprinkler-protected schools and 4.1mm/person without sprinklers. No door is less than 800 mm in width irrespective of the number of people it serves.

Horizontal travel distances should not exceed those in the table below; these have been applied to the baseline designs.

Risk profile	A1	A2	B1	B2
Single direction escape	26m	22m	24m	20m
Escape available in two or more directions	65m	55m	60m	50m

Where a corridor provides access to alternative escape routes, and is more than 12 metres in length, it is sub-divided by self-closing fire doors approximately mid-way between the two exits. This is necessary to prevent smoke from a fire in a classroom from spreading through the corridor and making both escape routes impassable.

Emergency lighting is only assumed in those areas used after school hours.

Vertical escape has been designed by applying the relevant escape factor in BS9999, with no stair being less than 1100mm wide.

A refuge for use by disabled people, at least 900 mm x 1400 mm, is provided within each of the protected stairs. Each refuge should be provided with an emergency voice communication facility that terminates in a receiver station located in the main reception area, or in another suitably protected space, as agreed with the stakeholders.

The Regulatory Reform (Fire Safety) Order 2005 and BS9999 make recommendations that school buildings should have a policy and procedures for the fire safety management of the premises. For these baseline school buildings, a management level 2 as defined in BS9999 is considered appropriate.

Protection of the building fabric

In general, the structural elements of schools, including floors, require at least 60-minutes fire resistance in terms of loadbearing capacity, integrity and insulation. However, this may be reduced in buildings provided with a life-safety sprinkler system, subject to approval from the building control body. There is therefore a possibility of reducing the structural fire resistance in the secondary school baseline designs.

The walls enclosing the protected stairs are provided with no less than 30-minutes fire resistance, the doors being FD30S fire doors.