



CUNDALL
fire engineering

Engineering Fire Protection in Schools

Steve Cooper
B.Eng(Hons) C.Eng MIFireE
Partner, Cundall Fire Engineering

Are sprinklers the only real solution for schools?

Fire Safety

Fire Protection

Business continuity



Provision/Omission of automatic sprinklers in any building should be determined following an objective assessment of risk, either to people, property or both.

Not in response to political or economic agendas.

“If the only tool you have is a hammer, every problem will look like a nail”



**BRE/DCSF Fire
analysis tools.**

**One method, but not the only one (better than nothing, -
probably!)**



Risk assessment is only part of the equation

Any solution must be demonstrably cost-effective.

Cost benefit analysis - reasonably practical – Test

Cost should not be disproportionate



Equally effective, but more cost-efficient solution may be found in:-

- **Passive fire protection – judicious use of FR walls, floors, glazing etc.**
 - **Automatic fire detection**
 - **Security measures/arson prevention**
 - **Perimeter protection – (Defensible perimeters)**
 - **Surveillance – active/passive, visual access**
 - **Smoke ventilation/smoke containment**
 - **Natural/mechanical**
 - **Depressurisation**
 - **Pressurisation**
 - **Smoke clearance**
 - **Smoke dilution**
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More importantly.....

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Ventilation/Sprinkler Interaction

“The downward momentum of sprinkler sprays...can have a deleterious effect on the efficiency of smoke ventilation can also delay the activation of the suppression system.”

“The combined effects of entrainment of smokey gases into the downward directed sprays as well as buoyancy reduction due to the cooling effect need to be considered:-

“Where smoke is collected within a balcony reservoir adjacent to sprinklered rooms, operation of sprinklers under balconies will lead to increased heat loss reducing buoyancy of smoke, which can in turn contribute to loss of visibility under the smoke layer.”

“The operation of sprinklers in an adjacent smoke reservoir outside the room of fire origin, will not assist in controlling the fire. If too many sprinklers operate outside the fire room, a sprinkler in the room could become less effective as the water supply approached its limits”



“Sprinklers mounted in the roof of an atrium will only be of benefit if there is a fire on the atrium floor itself. However, due to the height ... the fire will be of considerable proportions and therefore the sprinkler will be of limited benefit.”

“If a smoke layer is just above the operating temperature of the sprinklers , it will be reasonably stable. The action of the roof sprinklers actuating will rapidly cool the layer and cause it to become unstable.”

“The research indicates that, prior to control of the fire by the sprinklers, the hot gases in the smoke layer can be entrained by the sprinkler spray, resulting in the smoke layer penetrating into the cold lower layer. However, if the temperature of the induced gas is flow is above the temperature of the cold layer, it will experience a buoyant force, resulting in a reversal of the downward flow. Thus, if the convective cooling by the sprinklers is small relative to the heat content in the hot upper layer, the hot layer will remain buoyant. However, once the sprinklers gain control of the fire, the temperature in the upper layer decreases, leading to a deepening of the smoke layer. With further decreases in temperature, the buoyancy of the upper level will decay and the smoke will be transported to the floor and eventually dispersed throughout the test volume (Heskestad 1991).”