

# Fire safety engineering – where next?

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## ABSTRACT

There have been functional regulations supported by prescriptive guidance for UK buildings for more than 10 years. Recently there have been important developments in documentation for the fire safety engineering design of buildings, both nationally and internationally. A new British Standard Draft for Development has been prepared and should be published in mid-1997. Similar documentation is being prepared by ISO TC92/SC4.

The purpose of this paper is to review these developments and examine what further work has to be done to achieve the full implementation of fire safety engineering.

## BACKGROUND

Over the past two decades there has been a welcome move in the United Kingdom from comprehensive prescriptive regulations to brief functional regulations supported by comprehensive technical guidance. It is generally accepted that the regulations and guidance has served the country well – the UK has a good record for safety of life in fires in buildings. It is also accepted that buildings are becoming more complex and larger, placing more people at risk from fire than before.

It is recognised that present guidance (such as the Approved Document B and the supporting series of BS 5588 Fire Precautions in Buildings codes which apply to new buildings and alterations to existing buildings in England and Wales) does not, except in a few instances, allow calculations of fire safety to be made based explicitly on engineering principles. It is, for instance, very difficult to assess the effect on life safety of changing active or passive fire precautions since the basic principles and calculation methods have not been written down.

In 1989 a format and list of contents for a comprehensive Code of Practice on the application of fire engineering principles to fire safety design of buildings was placed before the British Standards Institution (BSI). It was intended that the code would cover general principles, life safety considerations, property safety considerations, mitigation of socially unacceptable events, and reduction in economic loss. Towards the end of 1990 a small group of fire safety engineers undertook a 3 year contract, administered by BSI and funded by the Department of Trade and Industry to prepare a draft Code of Practice confined to life safety. This resulted in a framework and a number of design sub-systems which has, through BSI committee work, been further refined and extended, and now includes an independent assessment of the sub-system equations. This will be published as a Draft for Development (DD) of more than 200 pages and will be reviewed every two years because of rapid developments in the field.

## WHERE NEXT?

We shall start from the assumption that the principles, methodology, and calculation tools for FSE design contained in the documentation mentioned above is adequate. What remains to be done?

### Culture Change

At present most designers use prescriptive guidance and they, like the approving authorities (building control officers and fire preventative officers in the brigades), feel secure in the knowledge that they are likely to be immune from claims of professional negligence if they have followed the official guidance. They are also some designers who are unfamiliar with the prescriptive guidance and, desiring a quiet life and speedy approval, will say to the approving authority 'Tell me what you want and I'll do it'. Perhaps the biggest incentive for following the prescriptive route is that the design will be approved with certainty within a short time and without spending fees on FSE specialists.

A cultural change is needed. All members of the design and approval team need to:

- recognise the benefits of FSE particularly as they apply to large and complex buildings where the prescriptive guidance may be inappropriate;
- invest time and effort to understand and become familiar with the methodology and underlying principles;
- accept the discipline of a structured approach to fire safe design;
- think in terms of risk and hazard and become familiar with risk assessment methods
- accept that a qualitative approach is unavoidable (hence the QDR) and the engineering judgement is needed when identifying hazards and selecting a limited number of fire scenarios for later quantitative analysis;

- recognise that the framework approach simplifies the total design process through the use of the design sub-systems, each sub-system having a number of clearly identified inputs and outputs;
- invoke a common language since it is essential, when introducing a new approach to fire safe design, to agree at the outset, and adopt, a common means of communication. For instance, terms used should be clearly defined and units for design parameters agreed preferably at an international level;
- aim for a clear presentation so that there is no room for ambiguity in statements concerning the design objectives, the underlying assumptions and the conclusions;
- recognise that the DD is not a design code but simply a framework and set of principles within which FSE can proceed. There are many gaps in our knowledge which will be filled as the DD is used and the important gaps are identified;
- resort to the use of sensitivity analyses to check the effect of changing the value of important variables. Examples are: changes in the value of fire load density to allow for changes in use of the building; and assuming that a fire suppression system does not operate for some reason.

## REFERENCES

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