The Process of Fire Safety Design—
Development of Fire Engineering Guidelines in Australia

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Abstract
Australia is quickly moving toward adopting performance-based regulations for building fire safety. This approach offers owners and designers more flexibility, greater opportunity for innovation, and more cost-effective construction.

To help introduce a performance approach, the Fire Code Reform Centre has developed Fire Engineering Guidelines, which document an agreed methodology for performance-based design and draws on earlier Australian research and similar developments in a number of countries.

The guidelines are the first step in a broader research program to develop a full risk assessment methodology as the basis for fire safety design in Australia.

Introduction
Watts\(^1\) indicates that to implement performance-based building regulations properly, the degree to which fire safety regulatory objectives have been met must be measured. To do this, Watts identifies three essential measurement components: acceptable level of performance, unit of measure, and measurement tool(s).

While much research\(^2\) has been done to develop equations, formulae, models, and other measurement tools, less emphasis has been placed on the units of measure and the acceptable levels of performance.

If time is the unit of measurement, for example, what safety margin between time required for escape and available time is appropriate in any design situation? Magnusson\(^3\) was one of the first to investigate this important issue.

What is required above all else is a more closely defined process or methodology that draws together the issues of objectives, acceptable performance, measures of safety, and measurement tools into a unified-systems approach to building fire safety design.

This paper addresses some recent research in Australia that culminated in the development of the Fire Engineering Guidelines by the Fire Code Reform Centre (FCRC) based in Sydney.

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Key words: fire, safety, design, regulations, performance, guidelines, risk assessment, evaluation, criteria, technology transfer.
Fire Code Reform Centre Program

The national building regulations in Australia are written by the Australian Building Codes Board (ABCBC), which is planning to introduce performance-based building regulations in Australia in early 1997. A draft of the *Performance Building Code of Australia* (BCA) is currently out for public comment.\(^4\)

The FCRC was created in 1994 to manage a five-year, A$7 million research program\(^5\) to provide the technical basis to underpin the introduction of the *Performance BCA*. A secondary aim was to examine the current BCA prescriptive provisions and provide different design options and more flexibility for those designers choosing to continue using "deemed-to-satisfy" prescriptive solutions.

A first project of the FCRC was the so-called "5A" project, which involved the development of *Fire Engineering Guidelines*, essentially a code of practice for performance-based fire engineering design.\(^6\)

Building surveyors (certifying officials in Australia) will use the *Guidelines* to accept performance-based analyses to support modifications and variations to the current prescriptive regulatory requirements. Another use will be to accept full building designs undertaken to meet the *Performance BCA*.

The *Guidelines* were developed cooperatively with researchers from all organizations participating in the research consortium, including Victoria University of Technology; BHP Melbourne Research Laboratories; CSIRO Division of Building, Construction, and Engineering; Scientific Services Laboratory; and University of Technology, Sydney.

Close liaison with the ABCB, state building regulators, the fire service, and the general fire engineering community was essential to accept the *Guidelines*.

Source Documents

As Meacham and Lucht\(^2\) have indicated, much worldwide research is being done to develop the measurement tools and design-process documents. In particular, the *Guidelines* refocused attention on the earlier *Draft National Building Fire Safety System Code*,\(^7\) in which the subsystem approach to fire safety analysis and evaluation was first developed in Australia.

Other source documents influential in the development of the *Guidelines* were the *Draft British Standard Code of Practice for the Application of Fire Safety Engineering Principles to Fire Safety in Buildings*\(^8\) and the *New Zealand Fire Engineering Design Guide*.\(^9\)

Another source of great assistance was ISO/TC92/SC4 (on performance-based fire engineering) contacts, particularly the United Kingdom delegation, which is working on its British *Standard Code of Practice*. The international exchange of ideas and draft documents has helped develop the *Guidelines*, as did collaboration with Brian Meacham, technical director of the Society of Fire Protection Engineers, who is keeping a brief on all international efforts in this field.