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Structural Design for Fire Safety

By Andrew H. Buchanan



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Presenting a comprehensive overview of the fire resistance of building structures, this key text brings together a large volume of material from many sources on this increasingly important topic. Starting with the fundamentals of fires and fire safety, the book gives an introduction to real fire exposure and the response of structures to such fires, outlining the important contribution of structural fire resistance to overall fire safety. Methods of calculating fire severity and achieving fire resistance are described, including fire performance of the main structural materials including structural steel, reinforced concrete and timber construction. Particularly valuable elements of the book are its design sections (incorporating international methods), where the earlier material is synthesised and recommendations are made for rational design of building structures exposed to fires.

Structural Design for Fire Safety provides expert guidance on:

- ? Interpreting code requirements for fire safety
- ? Understanding the concepts of fire severity and fire resistance
- ? Estimating time-temperature curves for fully developed compartment fires
- ? Understanding the behaviour of structural elements and buildings exposed to fires
- ? Designing steel, concrete and timber structures to resist fire exposure
- ? Assessing the fire performance of existing structures

In addition, the book includes valuable calculations and worked examples, unavailable elsewhere.

This is an essential book for structural engineers who wish to improve their understanding of buildings exposed to severe fires. It is also an ideal textbook for introductory courses in fire safety in a civil or structural engineering degree programme, and is vital reading for final year students in fire protection and fire safety engineering. Furthermore, it successfully bridges the information gap between fire safety engineers, structural engineers and building inspectors, and will be of significant interest to architects, code officials, building designers and firefighters.



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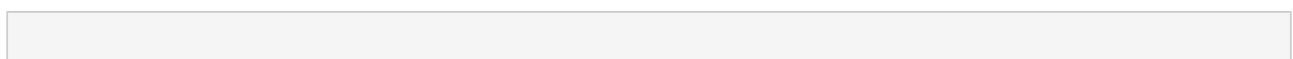
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Editorial Review

Review

The first word that springs to mind on thinking about this book is "clarity". The overall approach is carefully crafted to lead the reader, whether novice or well-informed, through a logical development and exposition of the subject. The book brings together under one title a range of thinking which would normally be found in disparate publications. This simplifies hugely the task of thinking about fire effects on building structures.

The book opens with six chapters on the physics and fundamentals of fire. Structural engineers with limited knowledge of fire will I believe experience a number of "Aha!" moments as concepts which might previously have been vague mysteries are now made clear. In particular the chapters on post-flashover fires and fire severity will be enlightening.

An excellent feature is the extensive use of simplified worked examples. As an aid to understanding I have always found that actually putting numbers into the formulae is like putting flesh on the bones. By following a worked example you can both tell that you have interpreted the formula correctly and also acquire a quantitative feeling for the attributes being assessed.

Moving into the actual material design sections, structural engineers will be on more familiar territory. Firstly an overview chapter provides a link between the fire physics and general structural philosophies, with a review of limit state and other approaches. Again simplified worked examples are usefully given. The real meat of the book then follows, with discursive chapters on steel, concrete and timber. Concepts are enlivened by case studies, including photographs of fire disasters.

Overall, I would regard this as an essential book for all structural engineers, on the basis that performance based fire design is progressively becoming the norm world-wide. Reliance on rote based prescriptive design must now be relegated to the dust-bin of history, as understanding advances. For fire engineers, this book gives insights into the problems facing structural engineers as they grapple with the fire discipline.

For student and university use the book will also clearly be of great value.

Reviewed by J. A. (Tony) Gibson. President, Institution of Professional Engineers New Zealand for the Journal of the Structural Engineering Society New Zealand

From the Back Cover

Presenting a comprehensive overview of the fire resistance of building structures, this key text brings together a large volume of material from many sources on this increasingly important topic. Opening with the fundamentals of fires and fire safety, the book gives an introduction to real fire exposure and the response of structures to such fires, outlining the important contribution of structural fire resistance to overall fire safety. Methods of calculating fire severity and achieving fire resistance are described, including fire performance of the main structural materials including structural steel, reinforced concrete and timber construction. Particularly valuable elements of the book are its design sections (incorporating international methods), where the earlier material is synthesised and recommendations are made for rational design of building structures exposed to fires.

Structural Design for Fire Safety provides expert guidance on:

- interpreting code requirements for fire safety

- understanding the concepts of fire severity and fire resistance
- estimating time-temperature curves for fully developed compartment fires
- understanding the behaviour of structural elements and buildings exposed to fires
- designing steel, concrete and timber structures to resist fire exposure
- assessing the fire performance of existing structures

In addition, the book includes valuable calculations and worked examples, unavailable elsewhere. This is an essential book for structural engineers who wish to improve their understanding of buildings exposed to severe fires. It is also an ideal textbook for introductory courses in fire safety for a civil or structural engineering degree programme, and is vital reading for final year students in fire protection and fire safety engineering. Furthermore, it successfully bridges the information gap between fire safety engineers, structural engineers and building inspectors, and will be of significant interest to architects, code officials, building designers and firefighters.

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