



Fire Engineering in High Rise Buildings

Expanding horizons

This paper was drafted after the IFE Netherlands workshop “Fire engineering in High Rise Buildings”, on March 28 2012. Fire Safety in high rise buildings is an important issue, several parties are working on codes and good practices. Objective of the workshop was to expand our knowledge and share experiences of professional fire engineers and fire fighters leading to better understanding of fire safety in high rise buildings. Main topic was comparing our Netherlands building codes and practices with the practical lessons learned in others countries, where they already experienced serious high rise fires.

The workshop was attended by some 40 fire engineers, members of the fire service, consultants, teachers and students.

Introduction

The Netherlands have had no significant high rise fires in residential or hotel buildings. Only one significant office fire in 1978 (Leuvehavenflat) and the Faculty of Architecture fire in Delft in 2008. So, our designs are not based on actual experience, leading to the assumption that our designs are “fire safe”.

The building code for the Netherlands is valid for buildings up to 70 meters. It requires only compartmentation and separate egress routes. For buildings above 70 meters the legal framework is vague. So the results depend merely on the “taste” of the architect and local building officials. Fire safety is thus subject to the balance of powers between the design team and the building authorities, without actual experience or a good concept and consensus on best practises. Often without any input from qualified fire engineers.

The 70 meter limit has no scientific or experience based background, though some explanations exist, one of them based on the average ‘travel speed’ of evacuating persons. Nevertheless this has led, according to one of the attendees of the workshop, to a remarkable skyline in some cities: most buildings reach up to 69 meters, and the rest go over 150 meters, with nothing in between (...).

Topics

During the workshop three topics were addressed:

- How should fire engineers contribute to the development of fire safety in high-rise buildings?
- What is a high-rise building with respect to fire safety and how do we expect a building to perform during fire?
- What requirements do the fire services need to effectively fight fires in high rise buildings?

Introduction “Fire engineering” by Mr. José Torero, Professor in Fire Safety Engineering, University of Edinburgh

Prof. Torero gave an introduction on the development of tall buildings, and the evolution of space, construction and building materials. Based on the general perception of legislators and the public that tall buildings are usually safe, there is barely a justification for any change in our approach on the fire safe design and operation of high rise buildings.

However, the prescriptive design (for buildings up to 70 meters) is based on the concept of “*one size fits all*”. Therefore both a 21 meter and a 69 meter building have similar building code requirements. Consequently professor Torero explained convincingly, the lower building must unavoidably be too expensive.

So, looking at this economic downside of “one size fits all” change is justified: performance based design, based on competent, good and sound engineering, will lead to a better understanding and “fit for purpose” fire safe design. Prof. Torero described performance based fire design as “*A dialogue between competent professionals*”, though always keeping the *intention* of the building code in the mind, assuming the building code is based on good fire engineering practices..



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Introduction “High rise buildings” by the IFE International President IFE , Mr. HG.Tay

HG Tay discussed the definition of high rise buildings and came straight to the essence: basically any building where exterior fire fighting is impossible should be considered a high rise building (...). The consensus is that any building with a floor above about 20 to 30 meters should practically be considered “high rise”.

The fire safety concept for high rise buildings was discussed, and several examples were given of “best practices”. A remarkable example of this was the practical education of design engineers in a fire service training centre, to increase awareness of the effects of fire.

Introduction “Fire service response” by Toronto Fire Chief and past IFE president, Mr. Bill Stewart.

Chief Bill Stewart gave an overview of the challenges Toronto’s many high rise buildings present to the fire service. Toronto has many older high rise buildings for e.g. social housing. High rise fires occurring almost every day, Chief Stewart presented the high rise operational procedures as practised by the Toronto fire services, with impressive footage.

Workshops

The attendees were randomly divided into two working groups. The current practices and the building codes in the Netherlands were compared against the views, experiences and lessons learned presented by the speakers. After lively discussion the working groups presented the topics that, in their opinion, have to be addressed during the further development of building codes and fire service operational procedures.

Conclusions and recommendations

Based on the presentations of the international experts, and the discussions during the workshops the following conclusions were derived and recommendations presented:

- Review the definition of “high rise”: the consensus being that buildings above 25 - 30 meters have to be considered as such.
- Improve smoke control measures and procedures.
- Review operational procedures for the fire service, for attack, rescue and heat and smoke management.
- Require self closing doors for residential occupancies.
- Recommend the use of staircases and elevator shafts separated by both distance and fire rating.
- Improve the education of design professionals and fire engineers as well as fire fighters.
- Consider a ‘shelter in place’ strategy where mass-evacuation is not feasible.
- Improve public awareness and education.
- Use non flammable building materials for facades.
- Develop a system of performance based design for high rise buildings, based on a clear fire safety strategy adopted by fire engineers and the fire service.

The board of IFE Nederland will distribute this paper to the stakeholders involved in the design and fire safety of high rise buildings.

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