

# SprinklerScene

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## Range of Sprinkler Views at 6<sup>th</sup> Performance-Based Conference

The 6<sup>th</sup> International Conference on Performance-Based Codes and Fire Safety Design Methods, held in Tokyo, Japan on 14-16 June 2006, included a wide range of views on water-based fire suppression systems, although with fewer presentations on the topic than the previous biannual events. The sponsors of this year's conference were the Society of Fire Protection Engineers (SFPE) and its Japan Chapter, the Japan Association of Fire Science and Engineering, and the International Council for Research and Innovation in Building and Construction (CIB). The proceedings will soon be available for purchase at the [www.sfpe.org](http://www.sfpe.org) website. Some highlights:

**Dual Sprinkler System for Steel Protection in Canada** – A presentation by LMDG Building Code Consultants of Vancouver, British Columbia, Canada, dealt with the proposed design of the Vancouver Convention Centre Expansion Project, using the objective-based provisions of the National Building Code of Canada. The prescriptive code specification of a 2-hr fire resistance rating for steel roof/floor assemblies will be eliminated on the basis of protection provided by the fire sprinkler system. The sprinkler system will be a “dual system” based on recommendations included in the NIST report of the World Trade Center collapse. Two independent sprinkler subsystems will be used, with overlapping staggered sprinklers, multiple/redundant water supplies, and enhanced design density/area of operation. The lower portions of steel columns will be encased in concrete up to 6 m above the floor to guard against direct flame impingement.

**Single Exit with Sprinklers in New Zealand** - Geoff Thomas of Victoria University reported their experience with a performance-based code since 1991 has resulted in reduced fire fatalities and steady property losses. The presentation included the fact that the Acceptable Solutions of 1991 allowed a single stair in an apartment building serving four levels if nonsprinklered or six levels if the building were sprinklered, without restriction on location within the building. In 2001 limits were set for the height of the highest such floor as 10 m in a nonsprinklered building or 25 m in a sprinklered building. However, a specific design determination issued in 1993 by the Building Industry Authority permitted a single stair to serve 9 floors of a 10-story building equipped with sprinklers, smoke detection and stair pressurization, and became the de facto standard. Additional determinations have now allowed up to 18-level single stair buildings.

**Radial Atrium Sprinklers in Hong Kong** - A case study cited in a presentation by the Hong Kong office of Ove Arup Engineers included a special configuration of sprinklers used in the atrium lobby of the Langham Place project in Mongkok, Hong Kong. The British Loss Prevention Council (LPC) endorsed a design arrangement in which “long-throw” sprinklers were arranged in a radial pattern on 0.5 m centers 3 m above the floor so as to spray 8 m outward in a 30 to 45-degree pattern toward the perimeter and achieve a 5 mm/min density.



**Retrospective Sprinklers in Shared Accommodations in Australia** – A presentation by Greg du Chateau of Philip Chun and Partners on *Performance Based Codes and Regulations in Australia* listed “retrospective installation of sprinklers in shared accommodations” as one of only three exceptions by which regulators have overcome political and economic difficulties in enacting legislation affecting existing buildings. The other two exceptions have been for smoke detectors in residential occupancies and swimming pool fences in residential occupancies.

**Role for Sprinklers Recognized in Japan** – In *Selection of Design Fire Scenarios in Performance-Based Fire Safety Design of Buildings*, presented by representatives of the Obayashi Corporation and Kyoto University, sprinklers were listed as a fire control technique affecting fire control within the room, fire floor, and the building. Sprinkler performance could be classified as “ineffective”, in which the rate of heat release is smaller than the heat release rate required for sprinkler operation, or “effective”, resulting in the options of “success”, a gradual diminishment of the rate of heat release, or “failure”, in which the heat release rate is held steady for some period, followed by continued growth.

**Full-scale Sprinkler Tests in China** – A presenter from Hong Kong Polytechnic University discussed full-scale office fire tests conducted with and without sprinklers at a new burn facility in Lanxi, about 150 km from Harbin, Heilongjiang, China. Without sprinklers, the peak heat release rate was about 1.8 MW at 800 s, and the fire burned for half an hour. With sprinklers providing 60 lpm at a pressure of 0.52 bar (approximately 15 gpm at 7 psi), sprinklers activated at 1 MW and limited the peak heat release rate to about 1.5 MW. On this basis, they proposed an assumption that the peak heat release rate for a scenario with sprinkler protection should be estimated as 50% higher than the value at sprinkler activation. With a low-pressure water mist system configured to operate at a 12 bar pressure and flow rate of 12 lpm (approximately 3 gpm at 175 psi), the fire reached 1.8 MW but burning stopped at 720 s. With a clean agent (FM 200 system) the fire was extinguished but the rate of heat release increased to 1.5 MW, and re-ignited once the agent was depleted.

**USA Study of Draft Stops at Floor Openings** – the only paper presented with the word “sprinklers” in the title was *An FDS Analysis of Sprinklers and Draft Stops* by Dan Gemeny of the San Francisco, California office of Rolf Jensen and Associates. Fire modeling showed that the removal of draft stops from around the perimeter of small floor openings did not significantly affect the response time of sprinklers near the fire or the sprinkler activation sequence. This study played a role in changes to the 2007 edition of NFPA 13.

**Sprinklers Lower Fire Risk in Apartment Buildings in Iceland and Norway** – A joint presentation by speakers from Iceland and Norway described a “Fire Risk Index Method for Multi-story Apartment Buildings” in which one of 17 parameters affecting risk is suppression systems, with subparameters on type of sprinkler (apartment vs. ordinary) and whether sprinklers are located within apartment, within escape routes or both. A case study of an apartment building in Akureyri, Iceland showed the same level of risk for a concrete frame building and a sprinklered timber frame building. A case study of an apartment building in Namsos, Norway showed that a timber frame building with residential sprinklers had a lower risk index than a concrete frame building or a timber frame building divided into fire sections.

## Case Studies Continue to Split on Use of Sprinklers

The highlight of the biannual performance-based conferences is the case study comparison among teams from various countries for the fire safety design of a particular occupancy. This year's study involved a 30-story building housing over 800 senior residents. A brief comparison of reliance on water-based fire suppression systems:

**France** – A joint effort of four French authorities, four French laboratories and the French SFPE chapter led to a building design in which safety of occupants and firefighters, prevention of structural collapse and minimization of fire spread were listed as fire safety objectives. Although the proposed protection focused on smoke control, structural fire resistance, compartmentation, and detection, the “implementation of a water-based fire suppression system (sprinklers), particularly in old people parts of the building” was listed as a measure that would warrant a detailed analysis concerning cost/effectiveness ratio.

**Australia** – Students from Victoria University in Melbourne chose a “protect in place” strategy. A “risk to life” value was selected as 50% of the historical statistical average. Various trial designs were evaluated, and the most cost effective was selected. Automatic sprinklers were specified throughout. Wall wetting sprinklers were placed at external openings to an outdoor terrace. A 2-source water supply and parallel pumps were also specified. A value of 0.04 was used as the probability of “sprinklers fail to operate” scenario in which sprinklers would fail to control a developing fire to the room of fire origin, based on CSIRO fire data for residential fires cited in *Australian Fire Statistics 1989 to 1993* by I.R. Thomas.

**Switzerland** – Jerzy Respondek of the Institute of Safety & Security made a submission noting that a 30-story building housing the elderly would immediately become the highest structure in Switzerland and would require full sprinkler protection. In his opinion “the same approach would be unquestionably implemented in other countries.” However, he also noted that the fire safety records for existing Swiss hospitals and nursing homes, which are not equipped with sprinkler systems, are considered to be satisfactory.

**Japan** – A 29-person working group comprised of representatives from various universities, corporations, fire departments and research institutes collaborated to produce a design aimed at resident safety, firefighter safety, and prevention of building collapse. Each floor was proposed to be divided into three fire compartments for immediate refuge, and a system of intermediate refuge floors was proposed to avoid outside evacuation, with elevators to be used for both evacuation and fire fighting. Although detection and smoke control systems were proposed and a fire standpipe system was to be provided for use of responding firefighters, there was no mention of fire sprinkler or other automatic fire suppression systems.

**USA** – Koffel Associates proposed a building protected throughout with an NFPA 13 sprinkler system as part of the base fire protection design. They then considered three trial designs with modifications related to smoke compartmentation, protect in place, and enhanced evacuation features, but in none of the trial designs was consideration given to eliminating the sprinklers.

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## **Victaulic Company Joins IFSA as Governing Member**

The Victaulic Company has joined the International Fire Sprinkler Association as a Governing Member, bringing the total number of Governing Members to thirteen. Victaulic joins Anvil International, Globe Fire Sprinkler (USA), Globe Sprinkler Europa S.A., Job GmbH, Marrioff Corporation Oy, Minimax GmbH, Noveon, Inc., Potter Electric Signal, the Reliable Automatic Sprinkler Company, Tyco Fire and Building Products, Tyco Fire and Security, and the Viking Corporation as a primary supporter of IFSA programs. Mr. John Perry will represent Victaulic on the Board of IFSA.

## **World Sprinkler News**

**U.S. Occupational Safety Manual Explains Fire Sprinkler Systems** – The Occupational Safety and Health Administration (OSHA) in the United States has released a booklet 3256 entitled Fire Service Features. Chapter 3 provides a primer on sprinkler systems, with emphasis on issues such as proper signage and coordination with building alarm systems. The manual, intended to help employers improve the effectiveness of responding firefighters, is in the public domain and can be downloaded at <http://www.osha.gov/pls/publications/pubindex.list>

**ISO Fire Safety Engineering Group Publishes Three New Standards** – The International Standards Organisation subcommittee assigned to fire safety engineering (ISO/TC92/SC4) has published three new 2006 standards: ISO 16734 – Requirements governing algebraic equations – Fire plumes, ISO 16736 - Requirements governing algebraic equations – Ceiling jet flows, and ISO 16737 - Requirements governing algebraic equations – Vent flows.

## **Upcoming Meetings, Seminars and Exhibitions of Interest**

7-9 March 2007 – SCI 2007 Fire Safety Conference, Madrid, Spain ([www.SCI2007.org](http://www.SCI2007.org))

3-5 May 2007 – NFSA Annual Seminar and Exhibition, Las Vegas, Nevada, USA ([www.nfsa.org](http://www.nfsa.org))

3-7 June 2007 – NFPA World Fire Safety Congress and Exposition, Boston, MA, USA ([www.nfpa.org](http://www.nfpa.org))

24-25 June 2008 – IFSA 7<sup>th</sup> International Fire Sprinkler Conference and Exhibition, Copenhagen, Denmark ([www.sprinklerworld.org](http://www.sprinklerworld.org))

For additional information, visit the IFSA website at [WWW.SPRINKLERWORLD.ORG](http://WWW.SPRINKLERWORLD.ORG)