

### Further Notes on Open Type Cabin Concept

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### Open Type Cabin Concept

The cabin concept was raised again in the fire safety field recently [1]. There are misunderstandings that the cabin is enclosed as a well-sealed submarine compartment [2]. In fact, the term ‘open type cabin concept’ has already appeared in the new requirements on railway system, which was released by the Fire Services Department in January 2013 [3]. ‘Open type’ cabin can provide more protection against fire in identified areas of higher fire load and fire risk, with more details on the geometry described. The heat release rate of a fire has to be limited to 2 MW [3].

### Concerns

Open type cabin can be problematic in retail areas with large amount of combustibles:

- High air intake rate to give big fires, the heat release rates can be very high.
- A normal sprinkler system [4] might not be able to control the fire within 2 MW.
- Smoke, flame and even hot steam emitted from sprinkler systems might spread from the cabin to the outside, as demonstrated by preliminary experimental studies [5-8].

Consequently, the performance of smoke exhaust in the cabin or the big hall as in the Chinese design guide such as for those Olympic Halls [9] should be evaluated by further experimental studies. The results can be applied to work out appropriate firefighting strategies for existing constructions with low heat release rate.

### Adequate Fire Safety Provision in New Projects

The author often used a ‘bare cabin’ fire, as shown in Fig. 1a, in atrium hot smoke tests [10]. It was observed that a large amount of smoke would come out of the room, as shown in Fig.

1b. Therefore, the smoke spread out of the cabin, as shown in Fig. 2, is a good indicator evaluating the performance of smoke control systems of the cabin. In fact, the smoke and flame spread from the cabin to the big, crowded hall is an important concern. During inspections, officers are strongly recommended to conduct hot smoke test in new projects that use open type cabin design.

Further, full-scale burning tests must be carried out to demonstrate that the fire can be controlled under the specified value of 2 MW [3] without smoke and flame spread to the crowded areas of the station circulation areas. Appropriate active systems, such as using water mist, can be installed to suppress the fire or control it to a certain heat release rate, and these options [8] should be considered.

### **Existing Big Halls**

Preliminary experiments [5-8] on open type cabin indicated that smoke, flame and hot steam can spread to the hall in a small fire with a less than 2 MW heat release rate. Fire safety provisions in all existing projects with open cabin should demonstrate their functionalities. The installation of a suppression system, such as long-throw sprinkler outside [11] the cabin, might be a solution.

Appropriate fire safety management scheme for facilitating firefighting must be formulated. Effort should be made to ensure that the heat release rate is less than 2 MW, as a measure to guarantee minimum protection. The amount of combustibles must be kept within the code limit and checked regularly with a better inspection system.

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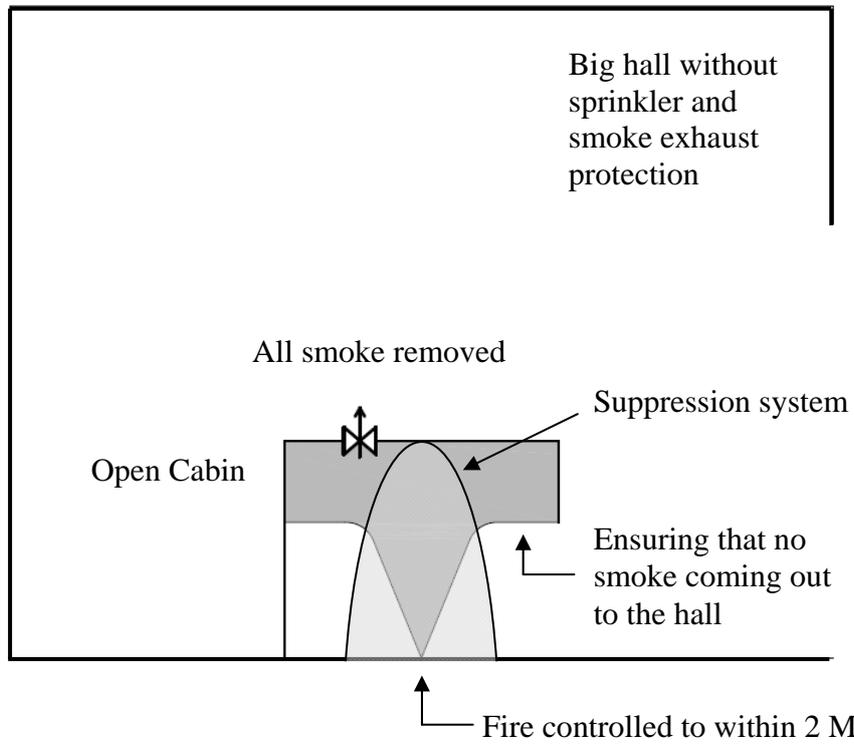


(a) The cabin



(b) Smoke spread to hall

**Fig. 1: Cabin**



**Fig. 2: Performance evaluation of smoke exhaust system in an open cabin**