

## **Subcommittee (270) on fire protection technology for concrete in tunnel structures**

A tunnel is a closed space. When a fire breaks out in a tunnel, the people inside the tunnel must be able to safely evacuate. For this purpose, fire-extinguishing equipment, water spray and/or mist facilities, evacuation facilities, and an evacuation system are essential. These facilities and systems must be fully functional at all times in order to ensure that the people inside can safely evacuate. When the tunnel body is damaged or collapses, however, evacuations can be hindered and secondary disasters can occur. Moreover, a tunnel that has been damaged by fire is extremely expensive to repair. Finally, road closures and traffic restrictions can affect economic activity in the region and inconvenience transportation activities. Despite the importance of ensuring the safety of a tunnel in a fire and the safety of the people inside a tunnel, there is no unified fire-protection concept for protecting tunnels from damage and collapse. Not even the Japan Society of Civil Engineers guidelines addresses the design and construction of fire-protected concrete for tunnel structures.

Against this backdrop, A subcommittee on fire protection technology for concrete in tunnel structures was commissioned by the following ten companies: the A&A Material Corporation, Obayashi Corporation, Kajima Corporation, KFC Ltd., Shimizu Corporation, Taisei Corporation, Taiheiyo Materials Corporation, Fujikawakenzai Kogyo Co., Ltd., Nippon Steel & Sumitomo Metal Corporation, and AJUMO Handels und Verwaltungsgesellschaft GmbH.

Subcommittee (327) led by the chairman Junichro NIWA was active for about two years from September 2002 to study the fire protection technology for concrete. Based on the results of the study and the latest researches as well as the recent experience of tunnel design and construction activities, the committee drafted a design guideline for protecting concrete in tunnel structures from fire. .

Because deep underground tunnels continue to be used by the public and large tunnels are increasingly constructed, in the future, the need for fire protection will increase. Therefore, fire-protected tunnel structures must be properly designed, constructed, and maintained. We sincerely hope that this guidelines draft will be widely used by engineers involved in the design, construction, and maintenance of tunnels.

One of the functions in fire protection is to prevent significant failure such as explosive spalling of concrete due to fire as shown in Figure 1. To design a fire protection, the protection should secure the safety of concrete structures against the assumed fire. Figure 2 shows the design temperature curves used in countries around the world. A fire protection should be selected with consideration of

several factors including physical, environmental and traffic condition of the tunnel.

An English version of the guidelines has been created for committee members. To obtain the English version, please consult with the Chairman through the JSCE.



Figure 1: Explosive spalling

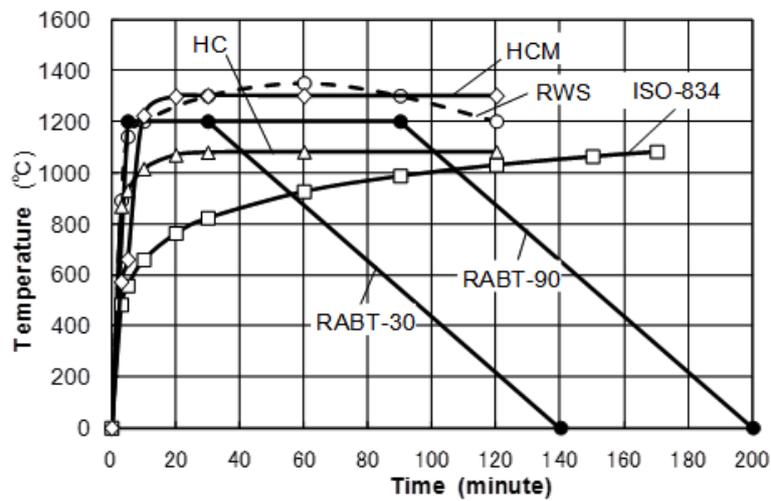


Figure 2: Fire temperature–time curves used around the world

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