

Fire Protection Panel for Bridges

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Summary

In order to protect a bridge against the fire attack mainly due to the turning over accident of a tank lorry vehicle, a Fire Protection Panel has been developed by the authors, because it can see some serious damaged examples of viaduct and bridge by fire accident in USA, Germany, Japan and so on in a last decade. Some of those bridges had fall down by fire attack and self-weight of bridge. The developed standard external dimension of the fire protection panel has 500mm wide, 2000mm long and 80mm thickness. The panel consists of a steel frame, meshed bars and fire protecting materials of Ceramic Fiber Blanket and Autoclaved Lightweight aerated Concrete plate. The fire test of this panel was carried out to confirm the fire resisting performance by using the Hydrocarbon curve given by Eurocode. This paper shows the applicability of the Fire Protection Panel based on the test results and its construction details.

Keywords: fire accident, fire resisting material, fire protection panel, fire test

1. Introduction

In Germany (near Cologne, August 2004 and Regensburg, 2008) and U.S.A (San Francisco, April 2007 and Detroit, July 2009), the viaduct or the bridge have been seriously damaged by the big fire due to turning over of the tank lorry vehicle and so on [1] - [4]. The representative example of such accident in Japan occurred in Ikebukuro line of Metropolitan Expressway at the beginning of August in 2008 as shown in *Fig.1 (a)* [5]. In this case, this urban expressway was closed about two and half months for repairs of reinforced concrete pier and replacement of superstructure over the two spans. On the other hand, 9-Mile Overpass located near Detroit had a most serious damage, that is, the steel-concrete composite girder bridge fell down as shown in *Fig.1 (b)* [4].

To avoid a serious damage due to fire attack, the authors have been proposed the use of Fire Protection Panel (hereafter referred to as FPP) for the viaduct or bridge only where they have high occurrence possibility of the fire accident.

The authors carried out the fire test of the proposed FPP. In this paper, the outline of the fire test and the experimental results of the deformation and temperature distributions of the frame are reported.

2. Selection of fire protection material

Fire protection materials for buildings have been commercialized in various products. However, a temperature by vehicle fire in tunnels and bridges is very high with compared to the fire in building. So it was decided that the Ceramic Fiber Blanket (hereafter referred to as CFB) can be used in high temperature conditions, such as a fire in the tunnel. However, since the lightweight, it has a possibility that the CFB is blown off by hot air generated by the fire. Therefore, when the single use