FIRE EQUIPMENT SYSTEM IN UNDERGROUND TUNNELS OF KEPCO

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ABSTRACT

The underground tunnel is an important infrastructure for stable power supply essential to homes, society and industries; however, if fire would break out in underground tunnel, it is difficult to extinguish early due to difficulty in early detection and fire extinguishing operation. It leads to serious confusion in city functions including power failure in downtown and paralysis of IT facilities. Since the damage is so serious even with small fire, installation of fire service equipments in underground is an important subject to detect, prevent and fight fire.

KEYWORD

Fire equipment system; Underground tunnel; Fire service act; Fire regulation; comprehensive monitoring system; Automatic surveillance system.

INTRODUCTION

Korea Electric Power Corporation, the KEPCO, is a Korea's state-owned enterprise, which handles the biggest portion of domestic power supply, boasting 123 years' history. As a result of rapid industrialization and urbanization, underground installation of power facilities has also increased so fast in Korea that the weight of nationwide underground installation is 9.7% of total installation as of the March of 2011. The total length of underground power cable (with more than 154kV) is 3,010 c-km, and underground tunnel length is 400km.

The underground tunnel is usually long and narrow, so it is very difficult and takes lots of time to extinguish fire. That's why fire equipment system which can detect a sign of fire is needed.

This paper first describes fire related regulations in Korea applicable to underground tunnel. Then it states the installation status of fire service systems in underground tunnels of KEPCO including new technologies.

THE FIRE SERVICES ACT REGARDING UNDERGROUND TUNNEL

Approval of the building permit

Any underground tunnels with the length of more than 500m are designated as 'specific target for the Fire Services' in Korea. The Fire Services Act states that; when local government gives the building permit on 'specific target for the Fire Services', the head of local government should get the advance consent of the head of fire services in the relevant jurisdiction before issuing the building permit. The Fire Services office checks the properness of fire equipment installation plan in advance in accordance with this procedure.

Legally required fire equipment

All cables in tunnels are fireproof

All low voltage power cables for lighting and pumping in tunnels should be fire-resistant cables. There had been a fire-resistant test to EHV cables in accordance with international fire-resistant test IEEE 383 in 2001. It had been found that PVC jacket is self-fire-resistant while the fire-resistant performance of PE jacket had not been verified. Therefore, all EHV cables with PE jacket installed in underground tunnels should secure fire-resistant performance by installing fire-resistant tapes or fire-resistant coating.

Automatic fire extinguishing device in panels

There should be automatic fire extinguishing device in the control panels and power receiving panels installed in tunnels. KEPCO applies Fire Extinguishing System that automatically works at the internal temperature of 93℃ using the solid aerosol which is the environment-friendly material. The solid aerosol has the fire extinguishing capacity 5 times more than that of Halon gas. It is environment-friendly fire extinguishing material that does not destroy ozone layer and accelerate global warming, either.

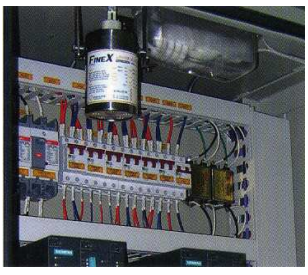

Fig 1 : Solid aerosol fire extinguishing device

Automatic fire detecting device

Automatic fire detecting device should be installed in the underground tunnels as a part of fire alarm facilities. The range for one fire detecting device should be less than 700m. The fire alarm receiving panel should be located at a place that should be manned at all times.

Fire spreading prevention device

Fire spreading prevention device should be installed in underground tunnels as a part of fire extinguishing facilities. One water sprinkling device will be installed at