

Performance evaluation of fire resistance of complex penetration sealing systems

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Abstract

Buildings are required to have passive fire protection systems such as fire doors, sandwich panels, and penetration sealing systems to prevent fire spread. It has been observed that the configuration of the passive fire protection systems used in construction sites are often different from the configuration of those that were tested for accreditation. Among the passive fire protection systems, the penetration sealing systems at the time of installation at construction sites typically have different configurations from those at the time of accreditation, which pose challenges in quality management of the passive fire protection system.

In this study, the fire resistance performance of complex penetration sealing systems is evaluated which are frequently installed at construction sites. The evaluation is to build a database which will form a basis for the development of a quality management guideline.

In order to evaluate the fire resistance performance of complex penetration sealing systems, the penetration sealing systems installed at construction sites were investigated. Then, specimens with similar configuration were made and tested in accordance with related standards. It was observed from the field study that there exist many cases where several penetrating materials (pipe, cable, duct, etc.) are installed in a single large opening. In most cases, a round shaped penetrating material such as a pipe is installed in a circular opening at the time of accreditation test. However, at construction sites, a rectangular opening is often used. Accordingly, four penetration sealing systems were selected and their fire resistance performance was evaluated by testing specimens as follows :

- Complex penetration sealing system in a large opening in a floor (cable tray, pipe)
- Single penetration sealing system in rectangular shaped opening in a floor (steel pipe, PVC pipe)
- Complex penetration sealing system in a large opening in a wall (cable tray, pipe)
- Single penetration sealing system in a rectangular shaped opening in a wall (steel pipe, PVC pipe)

The test results show that the fire resistance performance does not meet expectations which may pose fire safety issues. Flames appeared in most of the specimens in the case of the penetration sealing system in a floor. The temperature increase exceeded required performance criteria in the complex penetration sealing system in a wall. The result of study is expected to be utilized as a basis for the development of a quality management guideline.

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Keywords: *Fire Resistance Performance, Complex Penetration Sealing System, Passive Fire Protection System, Quality Management*

References

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Biography

Mr. Seo has worked for Fire Insurers Laboratories of Korea since 2002. He is in charge of the research and the test related to fire resistance of building constructions. He served as a committee member of ISO TC92 (Fire Safety) and SC2 (Fire Containment) and an expert advisor in Fire Safety Committee administered by KATS. He received his M.S. from Hanyang University in 2000. He has been enrolled in a Ph.D. program at the Disaster Science Department in the University of Seoul since 2016.