

## 호주 전동차 2층 플로어 화재 저항 시험 결과 고찰

### A Study of the Fire Resistance for upper floor Test Result of Australia New Intercity Fleet

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**초 록** 본 논문에서는 호주 전동차 2층 플로어 화재 저항 시험(Fire Resistance test) 절차 및 결과에 대하여 고찰하고자 한다.

호주 프로젝트 사양에 따라 알루미늄으로 된 2층 플로어(Upper Floor) 시험용 시편을 제작하였다. 기존 전동차에 사용하던 단열재 대신 2층 플로어 하부에 방염 도료를 도포하여 사양에 규정된 절차에 따라 시험을 진행하고 화재 저항 성능을 만족하는지 확인하고자 한다.

**주요어** : 전동차, 알루미늄, 2층 플로어, 방염도료, 화재, 저항

## 1. 서 론

당사에서 제작한 기존 알루미늄 차량에는 화재 성능을 만족하기 위하여 알루미늄 프로파일 사이에 단열재가 들어가는 구조로 설계했다.

호주 간선형 전동차에서는 중량 및 구조 개선을 위하여 2층 플로어(Upper Floor)를 알루미늄으로 프로파일로 설계 하였으며, 단열재를 넣는 대신 방염 도료를 2층 플로어 하부에 도포하여 화재 성능을 만족하고자 했다.

본 논문에서는 호주 간선형 전동차의 2층 플로어 화재 저항 시험 절차 및 결과에 대하여 고찰하고자 한다.

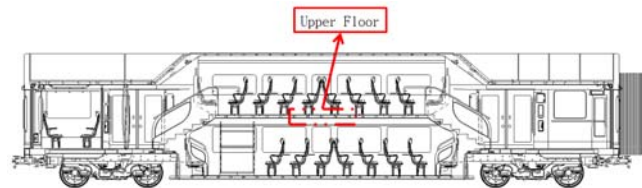
## 2. 본 론

### 2.1 Purpose

The purpose of this test is to determine if the upper floors would have a 15minutes fire resistance performance according to the requirement specified in AS 7529.3.

The upper floor assembly is required to have a minimum of 15 minutes integrity provide 15 minutes insulation and maintain

structural integrity for 15 minutes with a representative loading of passengers, train equipment and furnishings.



**Fig. 1** Location of Upper Floor

### 2.2 Test Criteria of Pass

During the entire 15 minutes of fire exposure, the following criteria shall be demonstrated to meet the fire resistance performance.

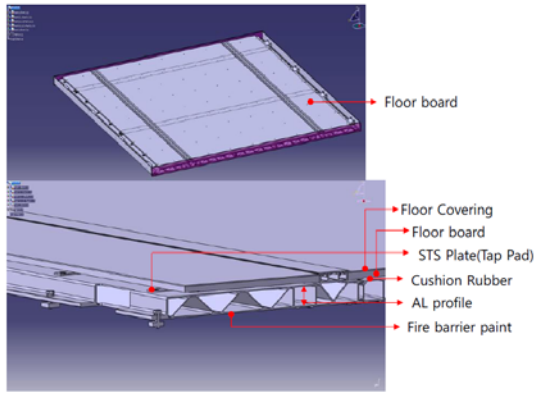
- a) Integrity
- b) Insulation
- c) Structural integrity

### 2.3 Construction of the test specimen

Upper Floor : 3500mm(L) X 2980mm(W)

No	Description	Material
1	Floor Covering	Synthetic Rubber, 2.5 mm thick
2	Floor Board	Plywood, 18 mm thick
3	Cushion Rubber	Neoprene Rubber, 2.5 mm thick
4	STS Plate(Tap Pad)	SUS304L, 4 mm thick
5	AL Profile	Aluminum(6005A-T6), 50 mm thick
6	Insulation	Fire Barrier Paint, 1 mm thick

**Table.1** Material Description of Upper Floor



**Fig. 2** Section view of Upper Floor

## 2.4 Test Procedure

- a) The test specimens were set on the light oil-fired horizontal furnace.
- b) The thermocouples were installed at locations on the unexposed surface.
- c) The representative load condition was applied to upper floor using weight blocks. The deflection gauge was installed at the centre of upper floor.
- d) The temperature of furnace was controlled by readings of nine thermocouples located in the horizontal furnace chamber. The furnace temperature was recorded over time.
- e) The unexposed surface temperatures of upper floor were recorded over time.
- f) The deflection at the centre of upper floor was measured over time.
- g) Observations were made on the behaviour of upper floor for compliance with the relevant criteria during test.

## 3. 결론

### 3.1 Test Result

The test specimen of upper floor has 15 minutes fire resistance performance. (integrity, insulation, structural integrity)

#### 3.1.1 Integrity

- There should be no sustained flaming on the unexposed surface in excess of 10s

duration.

- There should be no ignition of the unexposed surface of the test specimen from any openings or cracks.

#### 3.1.2 Insulation

- The average temperature of the unexposed face of the test specimen shall not exceed the initial temperature by more than 140°C.
- The temperature at any location on the unexposed face of the test specimen shall not exceed the initial temperature by more than 180°C.

#### 3.1.3 Structural Integrity

- No collapse of structure.

## 3.2 Observation for Test Specimen



**Fig. 3** Setup Test Specimen



**Fig. 4** End of Test (Time = 15min)

- No sustained flaming on the unexposed surface.
- No cracks, and openings of the test specimen.