



THE FIRE PROTECTION RESEARCH FOUNDATION

Aircraft Loading Walkways – Literature and Information Review

Executive Summary

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There are several manufacturers that build aircraft glass loading walkways, which are currently permitted in countries that have not adopted National Fire Protection Association (NFPA) standards. The Technical Committee for NFPA 415, *Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways* desired more information about the global experience of using glass loading walkways, including fire resistance of the loading walkways, fire test methods, use of alternate/additional escape routes from the plane, passenger behavior during actual emergency incidents, and psychology/sociology of occupants that might egress through a glass loading walkway with a large fire outside/below.

The Fire Protection Research Foundation (FPRF) responded to the NFPA 415 committee request by sponsoring a project to investigate the many factors associated with glass loading walkways. This involved a literature search/information gathering project performed by a student intern. This intern was mentored by a senior engineer familiar with aviation safety and fire protection. A technical panel, comprised of professionals in the field of aviation safety and fire protection, was formed to provide input as well as review the results.

Currently, NFPA 415 Section 6.1.2 requires walkways to be fire resistant, as demonstrated by a fire exposure test specified in Section 6.4. An alternative to a fire resistive enclosure is the installation of an automatically operated deluge water spray or foam fire suppression system. For all walkways, there may be no transparent or translucent walls, windows, or surfaces other than those windows located in the ramp access door and in the cab area, for the purpose of operating the aircraft loading walkway.

The sense of the committee to date, as reflected by the current requirements, is that:

- 1) A safe egress path must be available at the terminal gate in the event of a fuel spill fire;
- 2) A fire resistive loading walkway (or walkway with the area protected by an automatic suppression system) is the appropriate means to provide the necessary safe exit; and,
- 3) Passengers will be afraid or reluctant to exit through a path where they can see a fire (even though it may provide protection against heat and smoke). Therefore, glass should be prohibited as a primary walkway construction material.

The objective of this research was to gather pertinent information and provide insight on the fire safety aspects of glass loading walkways. The overall objective is the safe evacuation of passengers and crew from a fire engulfing an aircraft at or near an airport terminal. The information from this project is intended to provide guidance to the NFPA 415 Technical Committee on the use of glass loading

walkways and may be used as the technical basis for the continued prohibition or future inclusion of glass loading walkways in the standard. Ultimately, the information was gathered to support or disprove the following null hypothesis: Current requirements which restrict the use of glass in constructing aircraft loading walkways do not significantly impact the probability of safe evacuation from the aircraft. Aircraft and airport operations are considered, along with the impact of building and fire codes applicable to airports.

The scope of this project provides information directly related to the construction of both traditional and glass loading walkways, a review of fire history, a discussion of the loading walkway as a means of egress, and the psychological impacts occupants may experience while using the loading walkway as a means of egress during a fire event. A literature search of relevant information that addresses these topics was performed.

The following findings were the result of this project:

- 1) The NFPA 415 committee is concerned that emergency evacuation will be impeded if exiting passengers can see a fire, if glass is used in a loading walkway.
- 2) A performance based approach can be applied to this situation. The current NFPA 415 provides much of the basis for this performance (5-minute fire resistance). The missing information is the reaction of passengers to visible fire when evacuating an aircraft.
- 3) In current NFPA 415 fire test requirements, the fire threat to wall assemblies is non-conservative, and there are no criteria for explicitly limiting smoke obscuration.
- 4) Glass loading walkways are widely available and used throughout the world. They can be designed to meet the NFPA 415 fire test requirements.
- 5) Fire loss events of aircraft at or near the gate were identified. Except where fire/smoke has penetrated the fuselage, all occupants in identified incidents involving aircraft at or near the gate have successfully evacuated the aircraft, using the primary walkway or secondary exits (overwing or slide exits).
- 6) There is no US building/fire code, FAA, or other regulatory provision to require fire resistive loading walkways in accordance with NFPA 415. It is believed that most enclosed walkways in the US comply with NFPA 415.
- 7) Some operators intentionally discharge passengers directly to the ramp area via unprotected stairs/walkways. There is no regulatory prohibition for this. The fire resistive integrity of walkways are routinely compromised by airport operations. There is no consistency in the level of protection provided to aircraft passengers boarding or deplaning an aircraft.
- 8) A minimum of one exit pathway, staffed by a trained flight attendant, must be available any time passengers are on board an aircraft. Should the loading walkway be blocked, secondary exits are available through overwing door exits (passenger-operated) or floor level exits (requiring flight attendant assistance to re-arm the evacuation slide).
- 9) The FAA requires flight attendant/crew training for emergency evacuation situations. Crew response, instructions, and assertiveness is important.
- 10) Timely ARFF response is an important element to passenger safety for aircraft parked at the gate.

- 11) Occupant evacuation behavior differs depending on the perceived threat:
 - a. Where there is no fire or the threat has not penetrated the enclosure, passengers were able to evacuate. They followed crew directions, or used a path they perceived as better. This is the case even where fire is plainly visible.
 - b. Where fire/smoke has penetrated the fuselage, passengers tend to be insubordinate to crew instructions. Self-preservation may apply, even if it conflicts with crew evacuation instructions.

These findings, derived almost entirely from passenger behavior within parked aircraft, would appear to apply for the glass loading walkway element of the evacuation path.

- 12) The overall findings would seem to support the null hypothesis: current requirements which restrict the use of glass in constructing aircraft loading walkways do not significantly impact the probability of safe evacuation from the aircraft.

About the Fire Protection Research Foundation

The [Fire Protection Research Foundation](#) plans, manages, and communicates research on a broad range of fire safety issues in collaboration with scientists and laboratories around the world. The Foundation is an affiliate of NFPA.

About the National Fire Protection Association (NFPA)

NFPA is a worldwide leader in fire, electrical, building, and life safety. The mission of the international nonprofit organization founded in 1896 is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education. NFPA develops more than 300 codes and standards to minimize the possibility and effects of fire and other hazards. All NFPA codes and standards can be viewed at no cost at www.nfpa.org/freeaccess.