



AEROSPACE INFORMATION REPORT

AIR5670™**REV. A**

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Superseding AIR5670

Issues in Stairway Design Aboard Transport Category Airplanes

RATIONALE

This document is being revised to update formatting and references.

1. SCOPE

- 1.1 This document contains information that can be used by the air transportation industry to evaluate the design of airplane interior stairways with respect to the safety of passengers and crew in normal operating conditions and emergency evacuations.
- 1.2 This document addresses only design issues related to interior stairways meant for use by passengers and not stairways meant to be used exclusively by crew members or maintenance workers.

2. REFERENCES

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

- AIR512 Aircraft Cabin Illumination
- AIR6133 Design and Safety Criteria for Passenger Boarding Stairways
- ARP503 Emergency Evacuation Illumination

2.2 Other Publications

- 2.2.1 Proceedings of the Very Large Transport Aeroplane Conference, Noordwijkerhout, The Netherlands, 13-16 October 1998.

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Documents
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- 2.2.2 Crashed on a partially closed runway during takeoff. Singapore Airlines Flight 006, Boeing 747-400, 9V-SPK, CKS Airport, Taoyuan, Taiwan, October 31, 2000. ASC-AAR-02-04-001.
- 2.2.3 Templer, J., Archea, J., and Cohen, H. (1985). Study of factors associated with risk of work-related stairway falls. *Journal of Safety Research*, Volume 16, Issue 4, 183-196.
- 2.2.4 Archea, J., Collins, B., and Stahl, F. (1979). *Guidelines for Stair Safety*. NBS Building Science Series 120. WA: National Bureau of Standards, (now National Institute of Science and Technology). WA: U.S. Department of Commerce.
- 2.2.5 Coconut Grove Fire. (1942, Dec. 7). *Newsweek*.
- 2.2.6 Templer, J. (1992). *The Staircase: Studies of Hazards, Falls and Safer Design*. Cambridge, MA: MIT Press.
- 2.2.7 *Life Safety Code Handbook*. (2003). Quincy, MA: National Fire Protection Association.
- 2.2.8 Joint Aviation Authorities, JAA Research Paper 2003/x. Very Large Transport Airplane (VLTA) Emergency Requirements. Research Evacuation Study (VERRES) - A Project Summary.
http://fseg.gre.ac.uk/fire/verres_WP4%20.pdf
- 2.2.9 NIST NCSTAR 1. (2005). *Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers*. Chapter 7. WA: National Institute of Standards and Technology, U.S. Department of Commerce.
- 2.2.10 ICC/ANSI A117.1-2003. (2004). *Accessible and Usable Buildings and Facilities*. International Code Council. IL: Country Club Hills.
- 2.2.11 *Human Factors Design Standard (HFDS)* (2016). HF-STD-001B. U.S. Department of Transportation, Federal Aviation Administration Technical Center, Atlantic City International Airport, NJ 08405.
- 2.2.12 *International Building Code*. International Code Council. IL: Country Club Hills.
- 2.2.13 Pauls, J.L., Fruin, J.J., and Zupan, J.M. (2007). *Minimum Stair Width for Evacuation, Overtaking Movement and Counterflow — Technical Bases and Suggestions for the Past, Present and Future*. *Pedestrian and Evacuation Dynamics 2005*.
- 2.2.14 Maki, B.E., Bartlett, S.A., and Fernie, G.R. (1984). Influence of Stairway Handrail Height on the Ability to Generate Stabilizing Forces and Moments. *Human Factors*, 26(6), 705-714.
- 2.2.15 ASTM F1166. *Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities*. West Conshohocken, PA: ASTM International.

3. CONSIDERATIONS AND RECOMMENDATIONS

3.1 Multi-Deck Airplanes

For purposes of this document, multi-deck airplanes are those having one passenger deck located above another with a stairway intended for passenger use connecting the two.

3.2 More Stair Use on Multi-Deck Airplanes

Stairs are commonly used by many passengers during normal embarking and disembarking. They have also been used during emergency evacuations (Reference 2.2.2). Because they can be expected to be used on future multi-deck airplanes, stairway design will be of greater importance in the future aviation field than in the past.