

Exit Operation and Location: Evaluation of Type III Exit Dimensions

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Historical Background



1985, British Airtours Flight 28M, Manchester International Airport



In 1989, a notice of proposed rulemaking (NPRM) was issued to address passenger briefings for those seated in an exit row.

On April 5, 1990, the FAA enacted the Final Rule for exit row seating which required all Part 121 and 135 operators to screen and brief passengers assigned seats in exit rows, effective October 5, 1990. This rule provided general guidance on how operators could comply with the rule by stating, “Airlines must take steps to inform passengers sitting in exit rows about what may be required of them in an emergency evacuation.”





1991, USAir Flight 1493 and SkyWest Airlines Flight 5569, Los Angeles



The NTSB recognized that there were similarities between the Manchester and Los Angeles accidents. Their report stated, “. . . many passengers attempted to exit from an overwing exit [Type III] in a very limited period of time”. The NTSB report also stated, “The size of the Type III exit is a limiting factor during an evacuation.”

In response to the research in the late 80s, the FAA issued an NPRM proposing increased access to Type III exits on April 9, 1991, followed on May 4, 1992 by a Final Rule to address such issues.



McLean, G.A., Chittum, C.B., Funkhouser, G.E., Fairlie, G.W., Folk, E.W. (1992). *Effects of Seating Configuration and Number of Type III Exits on Emergency Aircraft Evacuation*. Federal Aviation Administration Office of Aerospace Medicine Report DOT/FAA/AM-92/27.

McLean, G.A., George, M.H., Chittum, C.B., Funkhouser, G.E. (1995). *Aircraft Evacuations Through Type III Exits I: Effects of Seat Placement at the Exit*. Federal Aviation Administration Office of Aerospace Medicine Report DOT/FAA/AM-95/22.



A report in 2008, by the European Aviation Safety Agency (EASA), stated, “Studies have determined that in accidents to aircraft configured with Type III exits, 50% of passengers that evacuate through exits use the overwing exits. While this proportion reduces to approximately 30% in high fire intensity accidents, it illustrates the importance of Type III exits to the evacuation system.”



The FAA has a long-standing history of receiving requests to alter the dimensions and surroundings of the Type-III overwing exit. These alterations may have unknown effects on the established exit ratings, which in turn could have consequences for aircraft certification and passenger **safety**.



Type III Exits

The Code of Federal Regulations (CFR) describes type III exits as “a rectangular opening of not less than 20 inches wide by 36 inches high with corner radii not greater than seven inches, and with a step-up inside the airplane of not more than 20 inches”. Additionally, “If the exit is located over the wing, the step-down outside the airplane may not exceed 27 inches” (14 CFR 25.807, 25.813, & 135.117).



Experimental Design

Equipment and Facilities: Flexible Aircraft Cabin Simulator (FlexSim), a modular narrow body aircraft simulator designed for airplane cabin evacuation research. All exits will be simulated using the FlexSim floor level exits with inserts to achieve the desired control and experimental type-III exit door dimensions.



Study Population: This project will use 16 groups of 10 participants (160 total). The study will run two groups once a week for 8 weeks. Each participant group will be comprised of approximately half females and half males, and range in age from 18 to 60 years, with no more than 40% of the participants in any given group shall fall into a single decade category.



Type III Exits

- A. Type III (20Wx36H) with a step up of 20” and a step down of 27”
- B. Type III+ (20Wx41H) with a step up of 15” and a step down of 22”
- C. Type III+ (30Wx48H) with a step up of 8” and a step down of 15”
- D. Experimental Type III+ (20Wx48H) with a step up of 8” and a step down of 15”
- E. Experimental Type III+ (30Wx36H) with a step up of 20” and a step down of 27”
- F. Experimental Type III+ (30Wx41H) with a step up of 15” and a step down of 22”



Test Matrix

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 st run exit type	A	B	C	D	A	B	C	E	A	B	C	F	A	D	E	F
2 nd run exit type	B	C	D	A	B	C	E	A	B	C	F	A	D	E	F	A
3 rd run exit type	C	D	A	B	C	E	A	B	C	F	A	B	E	F	A	D
4 th run exit type	D	A	B	C	E	A	B	C	F	A	B	C	F	A	D	E



Phase I: This phase will collect data on how individuals traverse through the Type III exits. Body movements and egress techniques will be recorded and evaluated. This phase will also be used to train the participant on how to egress through Type III exits in order to prepare them for phase II of the study where they will egress with a group of other participants.

Phase II: For individual egress times, there will be a total of 640 individual evacuation performance data points. For group egress times, there will be a total of 64 group evacuation performance data points.



Questions

