In addition to the new standard for access to Type III exits, § 25.813 also requires placards stating or illustrating the proper method of opening the exit. In the case of removable hatches, the placards must also state the weight of the hatch and indicate an appropriate location to place the hatch after removal. Unlike the requirements for access, the placarding requirements apply regardless of the passenger capacity of the airplane in which the exits are installed.

As discussed in the preamble to Amendment 25–76, these new standards were based on testing conducted at the FAA Civil Aeromedical Institute (CAMI) and were adopted to improve the ability of occupants to evacuate the airplane under emergency conditions.

Amendment 25–76 applies primarily to transport category airplanes for which the application for type certificate is made on or after the effective date, June 3, 1992. Since that amendment would not apply directly to airplanes in air carrier service for at least several years, Amendments 121-228 and 135-43 were also adopted at the same time to require other airplanes operated under the provisions of parts 121 and 135 to meet these standards. (Because the access requirements pertain only to airplanes with 60 or more passengers, part 135 operators are only required to comply with the placarding requirement.)

It was recognized that special circumstances may make full compliance of existing airplanes with the new standards for access to Type III exits impractical. Section 121.310(f)(3)(iv) was, therefore, adopted to permit the FAA to authorize deviation from these standards when such special circumstances do exist. These include, but are not limited to, the following conditions when they preclude achieving compliance without a reduction in the total number of passenger seats: emergency exits located in close proximity to each other; fixed installations such as lavatories, galley, etc.; permanently mounted bulkheads; an insufficient number of seat rows ahead of or behind the exit to enable compliance without a reduction in the seat row pitch of more than one inch; or an insufficient number of such rows to enable compliance without a reduction in the seat row pitch to less than 30 inches. The operator must, of course, bear the burden of providing credible reasons as to why literal compliance is impractical and a description of the steps taken to achieve a level of safety as close to that intended by the new standards as practical.

Section 121.310(f)(iii) requires compliance with the new standards after December 3, 1992; however, the FAA recognized that there may be unusual circumstances in which an operator could not achieve 100% compliance of its fleet by that date. Section 121.310(f)(3)(v) was, therefore, adopted to provide relief when such unusual circumstances do exist. When supported by credible reasons showing that compliance can not be achieved by that date, relief may be granted in the form of a deviation allowing fleet compliance in incremental stages.

Note that the provisions of \$ 121.310(f)(3) (iv) and (v) for relief apply only to the new standards for access to the exits; no provision has been made for relief from the new placarding requirements.

Discussion

During the public comment period preceding the adoption of Amendment 25–76, one commenter stated that there were too few tests on which to base the proposed rulemaking. In the preamble to the Amendment, the FAA concurred that additional testing would improve the accuracy of the tests results; however, it was noted that there was a practical limit to the number of tests that could be conducted considering financial resources, time and the availability of test subjects. In view of the safety benefit that could be realized, the FAA decided not to delay the final rule to obtain a larger test data base. Subsequent to the adoption of Amendment 25-76, time and resources for additional testing did become available. Accordingly, CAMI conducted another, more comprehensive, series of evacuation tests during the weeks of September 7 and 14, 1992 (referred to herein as the "recent CAMI testing"). Various configurations with three-seat rows were tested to obtain a more comprehensive understanding of effects of passageway widths and offsets from the exit opening. The test fixture utilized for this test series was the same as that used by CAMI for the tests conducted prior to the adoption of Amendment 25-76. It consisted of the fuselage of a Douglas C-124 airplane with seats and other equipment installed to represent an airline airplane in all aspects relevant to the tests. In addition to measuring the elapsed time from the start of the test until the last subject was clear, observers monitored the tests from a qualitative standpoint. Video cameras were also placed at various locations inside and outside the

test fixture, thereby supplementing the quantitative test results with a qualitative analysis of the subjects' use of the passageway.

It should be noted that the configurations used in the recent CAMI testing are defined in terms of seat-row encroachment rather than centerline offset. An encroachment of 10 inches, for example, means the forwardmost edge of the seat row is placed 10 inches forward of the aft edge of the exit. (This refers to the forwardmost edge of the seat bottom, which is below the exit; no portion of the adjacent seat may interfere with the exit opening.) Assuming the exit is 20 inches wide (the minimum for a Type III exit), a 10 inch encroachment places the forward edge of the seat row at the centerline of the exit. A 10 inch encroachment, therefore, translates to an offset of 10 inches with a 20 inch passageway, 71/2 inches with a 15 inch passageway, 61/2 inches with a 13 inch passageway, etc.

The sole purpose of this test series, insofar as this notice is concerned, was to evaluate, on a comparative basis, the effects of seat pitch and centerline offset on total time for egress through Type III exits. The first set of tests was conducted with a group of 35 test subjects consisting of approximately 45% males and 55% females ranging from 20 to 40 years in age. (Their mean age was 27 years.) The research protocol was based on a repeated measures design, where all subjects completed egress trials in every condition. A flight attendant was positioned just forward of the exit to generate a consistent, high level of subject motivation.

From this first set of tests, it was found that the total egress times with 13-, 15-, and 20-inch passageways were nearly identical. In contrast, the total egress times for the narrower 10- and 6inch passageways, were much greater.

With passageway widths between 13 and 20 inches, an encroachment of 10 inches was shown to provide a possible improvement in egress capability compared to no encroachment. With these same passageway widths, an encroachment of 17 inches was shown to result in a significant degradation of egress capability. As noted above, an encroachment of 10 inches translates to a centerline offset of $6^{1/2}$ inches with passageways 13 inches wide; a 17-inch encroachment translates to a centerline offset of $13^{1/2}$ inches with such passageways.

The results of these tests are shown in Figure 3.

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