Advisory Circular

Superseded by -1A 5/27/87

Subject: FLOOR PROXIMITY EMERGENCY ESCAPE PATH MARKING

Date: 9/30/85 **Initiated by:** ANM-110

AC No: 25.812-1 **Change:**

1. PURPOSE. This advisory circular provides guidance material for use in demonstrating compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) requiring floor proximity emergency escape path markings. Like all advisory circulars, it is not regulatory but is to provide guidance for applicants in demonstrating compliance with the objective safety standards set forth in the rule.

2. RELATED FAR SECTIONS.

a. Section 25.812 of Part 25 of the FAR - Emergency Lighting.

b. Section 121.310 of Part 121 of the FAR - Additional Emergency Equipment.

3. BACKGROUND.

a. As part of the Federal Aviation Administration's (FAA) continuing efforts to upgrade aircraft cabin safety and improve occupant survivability in aircraft accidents, the agency has examined numerous factors which may affect the ability of passengers to quickly and safely evacuate airplanes in emergency situations. One factor which has been shown to be significant is that smoke in a post crash fire can obscure overhead emergency lighting, making cabin evacuation difficult. The FAA has conducted research, testing, and design studies, and undertaken rulemaking, relating to the concept of placing additional sources of emergency lighting at a lower level, in the relatively clear air near the cabin floor.

b. Following public rulemaking, Amendments 25-58 and 121-183 (49 FR 43182; October 26, 1984) were issued, establishing requirements for floor proximity emergency escape path marking which will provide visual guidance for emergency cabin evacuation when all sources of cabin lighting more than 4 feet above the aisle floor are totally obscured by smoke. These amendments make the standards applicable to future type certification of transport category airplanes and require that airplanes type certificated after January 1, 1958, and operating under Part 121 (air carrier) of the FAR be equipped with a system meeting these standards by November 26, 1986.

4. OBJECTIVE OF THE RULE.

a. Research and studies conducted by the Federal Aviation Administration prior to the issuance of the rule included analyses of a number of systems utilizing point lighting, flood lighting, strip lighting, markers, signs, reflective materials, and other marking methods. Since no system was shown to be so clearly superior to the others that it warranted establishment through regulation as the single standard, an objective performance standard was developed, rather than a standard which would require a particular type of system.

b. Floor proximity marking is intended to allow passengers who have become familiar with the cabin layout during the period of general overhead illumination prior to an accident to find their way to exits unassisted, should the general overhead illumination become obscured by smoke. This objective is stated in the rule as two separate requirements. The first is that the emergency escape path marking will enable each passenger to visually identify the emergency escape path along the cabin aisle floor after leaving the cabin seat, and the second is that the marking will enable each passenger to readily identify each exit from the emergency escape path by reference only to markings and visual features not more than 4 feet above the cabin floor. In both cases it is assumed that all sources of illumination more than 4 feet above the cabin aisle floor are totally obscured and that it is dark.[1]

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[1] The applicable portions of Section 25.812 of the FAR read as follows:

§ 25.812 Emergency lighting.

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(e) Floor proximity emergency escape path marking must provide emergency evacuation guidance for passengers when all sources of illumination more than 4 feet above the cabin aisle floor are totally obscured. In the dark of the night, the floor proximity emergency escape path marking must enable each passenger to --

(1) After leaving the passenger seat, visually identify the emergency escape path along the cabin aisle floor to the first exits or pair of exits forward and aft of the seat; and

(2) Readily identify each exit from the emergency escape path by reference only to markings and visual features not more than 4 feet above the cabin floor.

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5. DEMONSTRATING COMPLIANCE WITH THE RULE. While the rule does not preclude a single system or installation meeting both requirements (§§ 25.812(e)(1) & (2)), the requirements should be evaluated separately in finding compliance with the rule and are discussed separately below.

a. Section 25.812(e)(1).

(1) Section 25.812(e)(1) requires that the marking enable each passenger to visually identify the emergency escape path along the cabin aisle floor; it does not require visual guidance to enable a passenger to move from the seat to the aisle. While the standard does not preclude compliance by the use of conspicuous lighting or marking near the ends of the aisle or at other critical points along the aisle, it does specifically require that the passenger be able to visually identify the emergency escape path along the cabin aisle floor. Different approaches to meeting this requirement could be used including, for example, systems which illuminate the floor and seat areas along the escape path, or systems which mark the escape path through point sources of light. No specific number, spacing, or location of light sources is required; and acceptable designs may vary depending on factors such as aisle length or interior configuration, as long as the required visual identification of the emergency escape path along the cabin aisle floor is provided. This requirement would not be met by a system which merely provides a distant light at the exit, where the escape path remains essentially dark. The fact that a light located in the vicinity of an exit may be partially visible from the point where a passenger enters the aisle after leaving the seat would not constitute compliance with the requirement that the passenger be able to "visually identify the emergency escape path along the cabin aisle floor."

(2) While the rule does not require that the escape path marking indicate a particular direction, forward versus aft, in which the passenger should move in an emergency, the system should not tend to lead a pasenger toward an end of the cabin where there are no exits. This will be a concern in a limited number of cabin configurations. In most configurations, there are emergency exits (including some classified as "excess" exits) both forward and aft of most passenger seats, and the direction which the passenger chooses to move in an actual emergency will depend on conditions in the cabin, such as crowding, existence of fire or smoke, or usability of different exits.

(3) The escape path markings, coupled with the exit markings discussed below, should be designed so that they will not tend to lead passengers past available exits.

b. Section 25.812(e)(2). Section 25.812(e)(2) requires that the floor proximity emergency marking enable each passenger to readily identify each exit from the emergency escape path by reference only to markings and visual features not more than 4 feet above the cabin floor. The requirement to "readily identify" would be met by a system which enables a passenger to make positive visual identification of the exit itself, without hesitation or delay. It is not sufficient for a passenger to recognize that he or she is in the vicinity of an exit, as by increased

general illumination, nor is it sufficient for a passenger to be able to identify only the fore and aft location of the exit along the cabin floor. The exit itself must be sufficiently identifiable to enable a passenger to proceed immediately to it, whether it is in the open or closed position.

6. CONDUCT OF EVALUATIONS.

a. Evaluations should be conducted under conditions of darkness. If they are conducted during daylight hours, each window, door, emergency exit (open and closed), and other openings should have provisions to prevent light from entering the passenger cabin. Each internal door and curtain should be in the takeoff configuration. During the evaluation, only the floor proximity escape path marking system being evaluated should provide light.

b. These evaluations are intended to verify the efficacy of floor proximity markings when all lighting more than 4 feet above the cabin aisle floor is totally obscured by dense smoke. In an actual fire, illumination from the floor proximity system would be confined to the area beneath the overlaying smoke and would not illuminate or reflect throughout the cabin in general. In a demonstration in which there is no overlaying smoke, illumination from the floor proximity system might reflect into the upper cabin and produce unrealistic illumination for the cabin and escape path. Unrealistic reflections and illumination should be accounted for in demonstrations, either through a rational determination that they do not change the validity of the demonstration results or through the use of shielding or shrouding, if necessary, to minimize or eliminate their effects.

c. While in an actual fire the obscuring layer of smoke might vary along the length of the cabin above and below 4 feet, this figure is used as a nominal design height for purposes of the rule, and the air below this is deemed clear for purposes of floor proximity marking design.

d. The evaluation should account for passengers who are either alone or in nearly vacated sections of the cabin, who must find their way to the exit without benefit of crewmembers, queues of passengers, human voices, or other cues to aid them.

e. Since the evaluation is to determine the effectiveness of a system which is to provide visual reference and orientation, and is not a test of egress performance and evacuation rate, the distribution of articles to create minor obstructions in the aisle, as is done for full-scale evacuation demonstrations, is not essential. However, if the design of the floor proximity marking system is such that its performance may be compromised by the presence of a limited amount of carry-on baggage, blankets, pillows, and other similar articles in the aisles or in the vicinity of the emergency exits, then the evaluation should account for this situation. The same holds true for carry-on baggage stowed under seats. The evaluation should be done with baggage under the seats representative of what would be there in a fully occupied airplane. While

this may not be necessary for all systems, it would be particularly critical in a system where illumination is provided from light sources which project under the seats.

f. Evaluations should also account for conditions which can be reasonably anticipated to occur in emergency evacuations which might compromise the effectiveness of the floor proximity escape path marking system. For example, passengers bunching at the exits or flight attendants assisting in the evacuation may tend to block light sources near the exits. This may be critical for systems relying on a minimum number of light sources, particularly when those sources are located where they are likely to be blocked during an emergency evacuation.

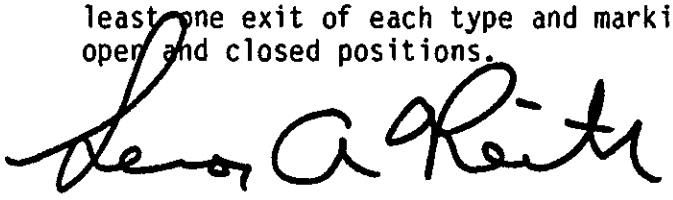
g. While the rule does not require a demonstration of the system using test subjects representative of airline passengers, this may prove useful in some cases for identifying strengths or weaknesses of particular systems, which may not be apparent to engineering personnel familiar with the system and the aircraft layout. The following guidance should be used in demonstrations with test subjects and should also be considered during engineering evaluations done without test subjects. The test subject acting alone and without assistance should be able to:

(1) Leave the passenger seat or seat row and enter the walkway area immediately adjacent (visual reference to the escape path marking need not be used to assist the test subject in locating the walkway area immediately adjacent to the seat or seat row);

(2) Standing or stooping in the adjacent walkway area, identify from visual reference to the floor proximity marking system the direction(s) of the first exit or pair of exits forward and aft and indicate to the observer the means by which identification is made;

(3) Traverse to those exits without significant hesitation, delay, or evidence of confusion; and

(4) Make positive identification of the exits by visual reference to features not more than 4 feet above the cabin floor and indicate to the observer the means by which identification is made. The exits may be open or closed for the demonstration. Identification should be made for at least one exit of each type and marking system in the cabin, in both the open and closed positions.



LEROY A. KEITH
Manager, Aircraft Certification Division, ANM-100