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AEROSPACE RECOMMENDED PRACTICE

ARP 503B

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EMERGENCY EVACUATION ILLUMINATION

1. INTRODUCTION

The purpose of this Aerospace Recommended Practice is to provide criteria which will lead to standards of illumination for emergency evacuation in passenger or cargo transport aircraft such that the emergency illumination will facilitate egress under emergency conditions.

2. PURPOSE

2.1 Definition: Emergency illumination is that illumination which is required when normal illumination is unavailable. Emergency illumination must be adequate to permit aircraft occupants to locate, proceed to, operate, and use cabin exits, both normal and emergency, escape slides, life jackets, life rafts, and special survival equipment.

2.2 Scope: This Aerospace Recommended Practice provides criteria for design and location of power supplies, controls, light fixtures, and associated equipment which are used to provide emergency illumination in transport aircraft.

3. DETAIL RECOMMENDATIONS

3.1 General Provisions:

3.1.1 Emergency illumination shall be designed so that no beam of light is directed into occupants' eyes in such a way as to compromise their ability to escape.

3.1.2 Emergency illumination shall be provided independent of the normal electrical system power source.

3.1.3 The emergency illumination system shall be designed, installed and located in such a manner that will minimize damage to or loss of any portion of the emergency illumination as a result of ditching or emergency landing.

3.1.4 Break-up of the fuselage shall not render any portion of the emergency illumination inoperative, except those lights directly destroyed by the break.

3.1.5 Emergency illumination shall be maintained above minimum levels for no less than 15 minutes, under emergency conditions.

3.1.6 Emergency illumination shall be either continuously lighted or automatically energized when an emergency occurs.

3.1.7 If an automatically energized system of emergency illumination is used, provision shall be made for alternate manual operation of the cabin portion of the system from a single location easily accessible to flight crew member or cabin attendant.

3.1.8 Illuminated signs and other portions of the emergency illumination may be used under normal conditions, provided that depletion of the emergency illumination power supply is not possible, beyond the requirement of Paragraph 3.1.5.

3.1.9 The emergency illumination system and associated equipment shall be designed and installed so that functional tests of the system can be readily performed.

3.1.10 The emergency illumination system and equipment shall be designed and qualified for ease of maintainability and highly reliable operation under the applicable aircraft environments.

3.2 Interior Provisions:

3.2.1 General Emergency Illumination:

3.2.1.1 ø Sufficient general emergency illumination shall be provided throughout the passenger cabin and flight deck area to permit occupants to don life jackets, to operate escape devices, and to avoid obstacles while moving toward exits.

3.2.1.2 ø Not less than 0.05 foot candles of white flood light shall be provided on passenger and cargo aircraft as follows:

(a) Seat arm rest height at exit door in flight deck.

(b) Average illumination along the center of the main passenger aisle. This average shall be determined from measurements made every 40 in. along the center of the main passenger aisle at seat arm rest height.

(c) At exit doors and in center of aisleways leading to exit doors at seat arm rest height.

3.2.2 Exit Illumination:

3.2.2.1 All exit signs, including arrows and placards, shall be illuminated.

3.2.2.2 Under ambient light, the contrast ratio between the intelligence and background of all exit signs, arrows and placards shall be no less than 3.0.

NOTE: Contrast "C" is defined as:

$$C = \frac{B_2 - B_1}{B_1} \geq 3.0$$

where B_1 is the brightness of either the background or intelligence whichever is dimmer and B_2 is the brightness of either the background or intelligence whichever is brighter.

3.2.2.3 ø Lettering of the word "EXIT" on exit signs is recommended to be 1-1/2 in. high with a stroke width to letter height ratio of approximately 0.17.

3.2.2.4 ø The brightness of lighted areas of exit signs, whether electrically lighted or self-luminous, shall be no less than 400 microlamberts (0.38 foot lamberts).

3.2.2.5 Instruction placards having letters not less than 5/16 in. high shall be provided for the operation of all exits. The brightness of lighted areas, whether electrically lighted or self-luminous, shall be no less than 100 microlamberts (0.095 foot lamberts).

3.2.2.6 Life raft and evacuation slide stowage locations shall be marked by illuminated signs, with instructions as to how to operate the compartment doors. All letters shall be no less than 5/16 in. high and the brightness of lighted areas, whether electrically lighted or self-luminous, shall be no less than 100 microlamberts (0.095 foot lamberts).

3.2.2.7 On cargo aircraft with an overhead hatch, emergency illumination, whether electrically lighted or self-luminous, should outline the overhead hatch at a minimum of four points around the hatch ring or Ø at least 200 microlamberts (0.19 foot lamberts). Components, such as bunks or seat backs, used to approach the hatch should be lighted by markers of no less than 100 microlamberts (0.095 foot lamberts).

3.3 Exterior Provisions:

Ø 3.3.1 Over-Wing Exits: Lighting shall be provided which will:

3.3.1.1 Attract occupants to the normal egress route off the wing.

3.3.1.2 Show up any obstructions on the normal egress route which should be avoided.

3.3.1.3 Illuminate the route to the ground.

3.3.1.4 Provide a minimum of 0.03 footcandles of illumination on the ground surface (horizontal plane) in the vicinity of the escape route. Applied to aft evacuations, this would be measured from a point projected from the upper surface of the fully lowered flap as to the ground to point at least 5 ft aft and laterally 2-foot minimum width; if the escape route is other than aft, equivalent ground lighting shall be provided for that route. The lighting in this area must be at least the minimum value but may extend beyond these limits. The lighting shall cover at least the last 30% of the surface of the wing in the normal exit direction and a minimum of 2-foot width to cover the normal escape route. The lighting in this area shall be at least 0.05 footcandles when measured normal to the direction of the incident light. The lighting in this area does not necessarily have to extend inboard to the side of the airplane. Compliance with these lighting requirements can be demonstrated by the application of candlepower distribution curves of the lighting fixture to the airplane geometry with the airplane parked at normal ground attitude and the flaps lowered to the maximum position.

3.3.1.5 In addition to the lighting described above, have 0.03 foot-candles' minimum illumination in a 2-square-foot area where the egressing person will make his first step outside the over-the-wing exit(s). This light source may be inside the airplane. The 2-square-foot area may include any steps that are installed to decrease the height of the first step from the exit to the wing, and the lighted area on the wing surface shall be considered to begin at the inboard edge of the shadow of the step, if the lighting is installed above the door and inside the airplane.

3.3.1.6 This light or lights may be controlled by the same switching techniques that control the interior emergency lights.

3.3.1.7 The operating duration of this light or lights shall be at least as long as for the interior emergency lighting.

Ø 3.3.2 Side Exits other than Over-Wing: The escape devices provided to assist the occupants in descending to the ground shall be externally illuminated and/or self-illuminated, so that device is visible from the airplane.

3.3.2.1 If external illumination is provided, it shall be installed to produce the lighting defined as follows: The illumination shall be 0.03 footcandles at the end of the escape device. This same illumination level shall be provided over a spherical surface 10 deg to either side of the center of the escape device, and from 30 deg above to 5 deg below the 45 deg position of the escape device.

3.3.2.2 The light or lights shall be installed higher than the escape device. These lighting requirements are specified so that compliance may be demonstrated by the use of candlepower distribution curves applied to geometric layouts of the aircraft.