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AEROSPACE STANDARD

SAE AS8037 | REV. A

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Superseding AS8037

Minimum Performance Standard for Aircraft Position Lights

1. SCOPE:

1.1 Scope:

This SAE Aerospace Standard (AS) establishes minimum performance standards for new equipment position lights for nighttime operation. It is intended to describe suitable means for compliance with current Federal Aviation Regulations defining minimum position light requirements.

This Aerospace Standard defines minimum light intensity in terms of candelas in vertical and horizontal directions about the longitudinal, vertical, and lateral axes of the aircraft. It also defines color tolerances in terms of limiting chromaticities for the light emitted from the position lights. It is not intended that this standard require the use of any particular light source such as quartz-halogen, incandescent, or any other specific design of lamp.

2. APPLICABLE DOCUMENTS:

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 RTCA Publication:

Available from RTCA Inc., 1140 Connecticut Avenue, NW, Suite 1020, Washington, DC 20036.

Radio Technical Commission for Aeronautics (RTCA) Document No. 160, Environmental Conditions and Test Procedures for Airborne Equipment

2.2 U.S. Government Publication:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-C-7989 Covers, Light-Transmitting, for Aeronautical Lights, General Specification for

3. GENERAL STANDARDS:

3.1 Dihedral Angle Coverage, Forward Position Lights, Types I and II, and Rear Position Lights, Type III:

When mounted on the aircraft in accordance with manufacturer's instructions, the forward and rear lights shall show unbroken light within the dihedral angles specified in Figure 1, and defined in 3.1.1.

Position Light Type	Dihedral Angle
Type I (forward, red)	L (left)
Type II (forward, green)	R (right)
Type III (rear, white)	A (aft)

FIGURE 1 - Dihedral Angle Coverage, Forward and Rear Position Lights

3.1.1 Definitions of Dihedral Angles:

a. Dihedral Angle L (Left): The dihedral angle formed by two intersection vertical planes, one parallel to the longitudinal axis of the airplane, and the other at 110° to the left of the first when looking forward along the longitudinal axis.

b. Dihedral Angle R (Right): The dihedral angle formed by two intersection vertical planes, one parallel to the longitudinal axis of the airplane, and the other at 110° to the right of the first when looking forward along the longitudinal axis.

c. Dihedral Angle A (Aft): The dihedral angle formed by two intersection vertical planes making angles of 70° to the right and 70° to the left, respectively, looking aft along the longitudinal axis, to a vertical plane passing through the longitudinal axis.

3.2 Position Light Intensity Distribution:

3.2.1 General: The intensities specified in this section shall be provided by new equipment, with all light covers and color filters in place, when mounted on aircraft in accordance with the manufacturer's instructions. Intensities shall be determined with the light source operation at the minimum operating voltage of the aircraft (see 5.4).

3.2.2 Minimum Intensities in the Horizontal Plane: The intensities in the horizontal plane shall not be less than the values given in Figure 2. The horizontal plane is defined as the plane containing the longitudinal axis of the airplane and is perpendicular to the plane of symmetry of the aircraft.

Position Light Considered	Angle (x) from Right or Left of Longitudinal Axis measured from dead ahead (0°)	Minimum Intensity (candelas)
Type I (forward, red)	0° ≤ x ≤ 10°	40
Type II (forward, green)	10° < x ≤ 20°	30
	20° < x ≤ 110°	5
Type III (rear, white)	110° ≤ x ≤ 180°	20

FIGURE 2 - Minimum Intensities in the Horizontal Plane, Forward and Rear Position Lights

3.2.2.1 Minimum Intensities Above and Below the Horizontal Plane: The intensities in any vertical plane shall not be less than the appropriate value given in Figure 3 when I is the minimum intensity specified in Figure 2 for the corresponding angles in the horizontal plane. Vertical planes are defined as planes perpendicular to the horizontal plane.

Angle (y) above or below Horizontal, in any Vertical Plane	Minimum Intensity (I)
0°	1.00 x I
0° < y ≤ 5°	0.90 x I
5° < y ≤ 10°	0.80 x I
10° < y ≤ 15°	0.70 x I
15° < y ≤ 20°	0.50 x I
20° < y ≤ 30°	0.30 x I
30° < y ≤ 40°	0.10 x I
40° < y ≤ 90°	0.05 x I

FIGURE 3 - Minimum Intensities in Any Vertical Plane, Forward and Rear Position Lights

3.2.3 Maximum Intensities in Overlap Regions, Forward Position Lights, Types I and II, and Rear Position Lights, Type III: The intensities in the overlap regions between any forward or rear position lights shall not exceed the values given in Figure 4. Area A includes all directions in the adjacent dihedral angle which pass through the light source and which intercept the common boundary plane at more than 10° but less than 20°. Area B includes all directions in the adjacent dihedral angle which pass through the light source and which intercept the common boundary plane at more than 20°.

	Maximum (Candelas)	
	Area A	Area B
Type I (fwd, red) in dihedral angle R	10	1
Type I (fwd, red) in dihedral angle A	5	1
Type II (fwd, green) in dihedral angle L	10	1
Type II (fwd, green) in dihedral angle A	5	1
Type III (rear, white) in dihedral angle L	5	1
Type III (rear, white) in dihedral angle R	5	1

FIGURE 4 - Maximum Intensities in Overlaps Between Forward and Rear Position Lights

3.2.3.1 When the peak intensity is greater than 100 candelas, the maximum overlap intensity may exceed the values given in Figure 4, provided the overlap intensity in Area A is not greater than 10% of the peak position light intensity and the overlap intensity in Area B is not greater than 2.5% of the peak position light intensity.

3.3 Position Light Colors:

The colors of the position light shall be in accordance with Figure 5 and shall conform to 3.3.1.

Type	Dihedral Angle
Type I (forward, red)	Aviation Red
Type II (forward, green)	Aviation Green
Type III (rear, white)	Aviation White

FIGURE 5 - Position Light Colors

3.3.1 Position Light Color Specifications: The colors of the position lights shall have the International Commission on Illumination chromaticity coordinates as follows:

a. Aviation Red

Purple Boundary	y = 0.980 - x
Yellow Boundary	y = 0.335

b. Aviation Green

Yellow Boundary	x = 0.360 - 0.080y
White Boundary	x = 0.650y
Blue Boundary	y = 0.390 - 0.171x

c. Aviation White

Yellow Boundary	x = 0.500
Red Boundary	y = 0.382
Purple Boundary	y = 0.047 + 0.762x
Blue Boundary	x = 0.285
Green Boundary	y = 0.150 + 0.640x
and	y = 0.440

3.4 Light Covers and Color Filters:

For all position lights, the light covers or color filters used shall not readily support combustion and shall be constructed so that they will not change shape or permanently change color or shape or suffer any appreciable loss of light transmission during normal use.

3.4.1 Red Filters: Red color filters commonly used have a characteristic where the color saturation increases and luminous transmission decreases with temperature rise. Therefore, both the color and intensity distribution testing shall be performed under standard ambient temperature conditions of 25 °C ± 10 °C. This requirement is intended to produce results which will be more representative of actual aircraft installation and in-flight temperature environment.

3.5 Multiple Installations:

If the lighting distribution for any one type of position light is supplied by two or more lights which are located immediately adjacent to each other (generally 2 ft or less), the intensity distribution shall be determined with both lights operating and mounted in the same relationship to each other as they would be on the aircraft. If the lights are not located immediately adjacent to each other, intensity distributions shall be determined individually for each light and the minimum intensity in any direction shall be provided by either one or the other light. Additive intensity cannot be used to demonstrate compliance with the minimum required intensity.

4. PERFORMANCE STANDARD UNDER ENVIRONMENTAL CONDITIONS:

4.1 Unless otherwise specified herein, the test procedures called out in 4.2 are those set forth in Radio Technical Commission for Aeronautics (RTCA) Document No. 160.

4.1.1 The order of the tests must be in accordance with DO-160. The test procedures specified or referenced are satisfactory for use in determining the performance of position lights under normal and extreme environmental conditions. Alternate approved test procedures that provide equivalent results may be used.

4.2 Environmental Tests:

4.2.1 Temperature and Altitude Tests: When lights are subjected to the tests of DO-160 as appropriate, they must operate electrically and show no significant lighting degradation.

4.2.2 Humidity: When subjected to the tests of DO-160 standard humidity environment, the system must operate electrically and show no degradation in lighting. Optical parts may be cleaned if necessary.

4.2.3 Vibration: When the system is tested in accordance with DO-160 standard vibration environment, there shall be no more than three light source failures during the test.