



AEROSPACE RECOMMENDED PRACTICE

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Exterior Lighting Recommendations for Urban Air Mobility and Electric Vertical Takeoff and Landing Aircraft

RATIONALE

This SAE Aerospace Recommended Practice (ARP) provides guidance on exterior lighting design for Electric Vertical Takeoff and Landing (E-VTOL) and Urban Air Mobility Aircraft.

1. SCOPE

This document covers external lighting for Electric Vertical Takeoff and Landing (E-VTOL) and Urban Air Mobility (UAM) vehicles. It discusses lights that may be installed both to meet regulatory requirements as well as for customer comfort and aircraft recognition. It also discusses the differences between UAM vehicles and other aircraft and how those differences impact the lighting.

1.1 Purpose

The purpose of this document is to provide recommendations to aircraft designers, lighting suppliers, and others involved in the design, specification, and certification of E-VTOL and UAM aircraft. Specific recommendations for each light can be found in the SAE documents referenced herein. This document will concentrate on the differences between traditional fixed-wing aircraft, helicopters, and E-VTOL and UAM aircraft and how those differences will impact the lighting design and installation.

2. REFERENCES

2.1 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.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

ARP503 Emergency Evacuation Illumination

ARP1283 Cargo Compartment Lighting for Transport Category Aircraft and Rotorcraft

ARP4087 Wing Inspection Lights - Design Criteria

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Full document details: SAE ARP7216

For more information on this standard, visit
<https://www.sae.org/standards/content/ARP7216/>

Documents

Standard, visit Sharing Hub

- ARP6402 LED Landing, Taxiing, Runway Turnoff, and Recognition Lights
- ARP60494 Touch Interactive Display Systems: Human Factors Considerations, System Design and Performance Guidelines
- AS8017 Minimum Performance Standard for Anticollision Light Systems
- AS8037 Minimum Performance Standard for Aircraft Position Lights

2.1.2 EASA Publications

Available from European Union Aviation Safety Agency, Konrad-Adenauer-Ufer 3, D-50668 Cologne, Germany, Tel: +49 221 8999 000, www.easa.europa.eu.

- CS-23 Normal, Utility, Aerobatic, and Commuter Category Aeroplanes
- CS-25 Large Aeroplanes
- CS-27 Small Rotorcraft
- SERA 3215 Lights to be Displayed by Aircraft

Innovative Air Mobility (IAM) Hub

2.1.3 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

- 14 CFR Part 23 Airworthiness Standards: Normal Category Airplanes
- 14 CFR Part 25 Airworthiness Standards: Transport Category Airplanes
- 14 CFR Part 27 Airworthiness Standards: Normal Category Rotorcraft
- 14 CFR Part 91 General Operating and Flight Rules
- 14 CFR Part 121 Operating Requirements: Domestic, Flag, and Supplemental Operations

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

- ARP693 Landing and Taxiing Lights - Design Criteria for Installation
- ARP991 Position and Anticollision Lights - Fixed-Wing Aircraft
- ARP6253 LEDs and Aircraft Applications
- ARP6621 Predicting Photometric Degradation of Exterior Aircraft Lights

2.2.2 Other Publications

Advanced Air Mobility in Japan 2021

Study on the Societal Acceptance of Urban Air Mobility in Europe

United Kingdom Department for Transport, Future of Flight Action Plan

2.3 DEFINITIONS

E-VTOL (Electric Vertical Takeoff and Landing): An electrically powered aircraft that takes off and lands vertically.

UAM (Urban Air Mobility): An air transportation system for passengers and cargo in and around urban environments. This may drive lighting design as conspicuity in an environment with many land-based lights will need to be balanced with the need to control glare for urban residents. While many of these aircraft may be E-VTOL aircraft, conventionally powered aircraft such as helicopters may also be part of a UAM system.

3. GENERAL RECOMMENDATIONS

3.1 While E-VTOL and UAM aircraft share many characteristics with traditional airplanes and helicopters, there are also important differences in the design and intended use of these aircraft that affect their lighting needs.

- They generally fly at lower altitudes than typical passenger-carrying airplanes.
- They typically fly in cluttered urban environments.
- Many will transition from vertical flight for takeoff to level flight and back to vertical flight for landing.
- They may be remotely piloted or autonomous.

3.2 It is recommended that actuation of lights have automatic features to reduce pilot workload or to allow for remote or pilotless operation.

3.3 Some lights are often installed in the same location with other lights, such as forward position lights and wingtip anti-collision lights. In such cases, the two lights may share a housing, cover lens, and other common components. Each light in a common location must function independently without impairing the function of the other lights. For example, a rear position light mounted in the same location as a white anti-collision light must present a steady white light that does not flash. If the anti-collision light is turned off, the position light must continue to function. This generally precludes sharing LEDs between the two lights.

3.4 Touch screens may be used to activate lights. Refer to ARP60494 for guidance on the design and use of touch screens.

4. LANDING AND TAXI LIGHTS

4.1 General Provisions

4.1.1 Refer to the latest version of ARP6402 for detailed landing and taxi light guidance.