SAE Aerospace
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AEROSPACE RECOMMENDED PRACTICE

SAE ARP1283

REV. A

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Cargo Compartment Lighting for Transport Category Aircraft and Rotorcraft

1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) establishes design guidance for adequate and safe cargo compartment and cargo access lighting systems. The adoption of a standard set of illumination values, found appropriate for the performance of the task in specified areas, should expedite ground handling and improve flight and ground safety.

2. REFERENCES:

2.1 Applicable Documents:

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP881 Lamps for Aircraft Lighting

2.1.2 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

FAR 25.855 Part III of Appendix F

3. METHODS OF LIGHTING:

Human factors studies of cargo compartments indicate that a general illumination level of 8 ft candles (86 lx) is adequate for inspection of tie down nets, bulk carrier latches, etc., when the loading personnel are sufficiently adapted to low level ambient illumination. In the current state of the art, an area of about 20 ft^2 (4.5 x 4.5) (1.4 m x 1.4 m) can be illuminated to this level per pound of system weight by using incandescent

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3. (Continued):

lamps and a lens reflector system. In medium size or large aircraft, a sufficient number of lamps and fixtures should be used to reduce light blockage to a minimum and enable handling personnel in any of the various cargo loading possibilities to see each tie down and latch mechanism. Fluorescent lamps and some types of ballasts may be sources of radio noise (EMI). Lamp life per flight hour may be low and lamp maintenance may be high because the system remains illuminated on the ground most of the time. It is recommended that tungsten lamps in a low voltage system be of the long life type, preferably selected from SAE ARP881. Aircraft fluorescent systems are somewhat more efficient than tungsten for space illumination. While fluorescent lamp life is much greater, the long tubular shape makes the fluorescent lamp more vulnerable to damage. Fixture design must consider lamp protection. A protective shield/lens should be used where lamps can be broken by cargo handling.

Particular consideration must be given to fluorescent illuminating systems that are used in low ambient temperatures. Specially designed ballasts are needed to start cold lamps and appropriately designed fixtures are necessary for starting and operating at subfreezing temperatures. It has been found that specially designed systems can operate at reduced efficiency down to -40 °F (-40 °C). Some systems will not operate below 20 °F (-7 °C). At ambient temperatures below freezing, lamp efficiency is lower, and some lamps may not start at all.

Heaters may be added in close proximity to fluorescent lamps to raise their temperature so they may be started. Incandescent lamps should be used where reliable low temperature operation is required.

4. CARGO COMPARTMENTS:

Cargo compartments may be broken into two broad categories as follows:

a. Large main deck loads, restrained by tie downs, nets, and package containers mounted to the floor or rails.

b. Small subdeck loads, restrained in lined compartments such as used with suitcases, boxes, and mail bags.

5. CARGO COMPARTMENT LIGHTING:

5.1 Large Compartments or Main Decks:

Each cargo floor, latch, tie down, ring, or load holding device shall be illuminated to the levels as shown in Table 1. Lighting provided for fittings and latches may serve as dual function lighting. The illumination level at any latch, tie down, or device that is obscured by the cargo and not in use need not meet this requirement.

TABLE 1 - Recommended Average Illumination Levels

Cargo Areas Main Deck	Nominal Foot Candles	Nominal (lux) (lm/m^2)	Minimum Foot Candles	Minimum (lux) (lm/m^2)
Cargo Tie Locks	8-10	(86-108)	8 Unloaded	(86)
			2 Loaded	(22)
Entire Floor	8	(86)	5	(54)

5.1.1 Control Off-On Main Deck: Off-on controls shall be provided at the location where flight and loading crews would enter the compartment. Additional off-on controls may be provided at convenient locations in the cargo compartment near the loading areas.

5.1.2 Maintenance: Fixtures shall be designed to avoid damage by cargo loading or shifting in flight. Preferably the maximum protection should be obtained from the main structure but guards or shields may supplement the other structural protection. Ready access should be provided to facilitate lamp replacement. The lighting system for the cargo compartments shall be of a design that will preclude its being a source of ignition or fire propagation. To facilitate maintenance, the use of only one type of lamp throughout a compartment or compartments is highly desirable. Appropriate replacement lamp identification shall be placed in close proximity to the lampholder.

5.2 Cargo Compartment Lighting-Subdeck of Small Compartments:

Average illumination of 5 ft candles (54 lx) at the floor level may be provided with a minimum of 2 ft candles (22 lx).

6. AIRCRAFT LOADING RAMP AND/OR BAGGAGE CONVEYOR:

Average illumination levels of 8 ft candles (86 lx) and a minimum of 5 ft candles (54 lx) measured normal to the source are recommended at 20 ft (6 m) from the door threshold on the plane of the cargo compartment floor and across the width of the loading door on the side of the aircraft that is to be loaded (see Figure 1). Light spread shall be sufficient to read baggage tags at the end of the leading conveyor and 10 ft (3 m) laterally on either side of the loading door or ramp.

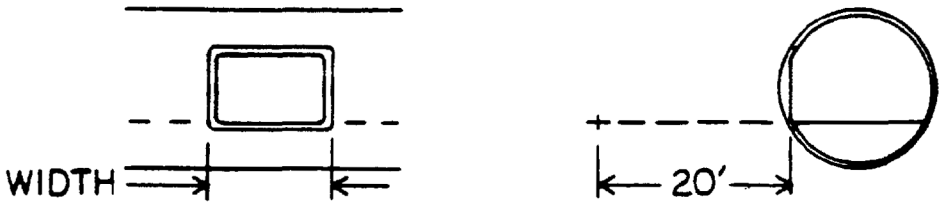

FIGURE 1 - Loading Ramp Illumination Area

6.1 Loading Door and/or Hatch Lighting:

Eight foot candles (86 lx) or more shall be provided for hatches and/or loading doors used for containerized baggage loading. Light fixtures shall be so located that they will not be blocked by the container or loading vehicle.

6.2 Maintenance:

Higher intensities and extended lamp life are desirable and may dictate the use of halogen lamps in a compatible fixture or even a sealed beam lamp in a suitable fixture. However, when incandescent lamps are used, an extended life standard incandescent lamp should be specified. Operating these lamps at 90% of rated voltage usually extends operating life. The requirements of Table 1 should be met at operating voltage.

6.3 Controls:

An off-on switch, readily accessible to the ramp loading crew, shall be provided adjacent to the loading door for loading ramp lights. Door mounted luminaries shall be controlled by a manual switch and a door actuated switch or touchdown actuated control which will operate in series with the manual switch. To ensure that cargo/compartment lighting circuits which are not needed during flight cannot be turned on until the cargo door is at the fully open position, consideration should be given to automatic de-energizing, via air-ground sensing controls. This is most significant in compartments which are inaccessible in flight and especially in compartments designed for bulk loading to ensure that displaced baggage cannot be damaged by heat from the lamps.