



AEROSPACE RECOMMENDED PRACTICE

ARP1048™

REV. C

Issued 1968-11
Reaffirmed 2016-11
Revised 2023-06

Superseding ARP1048B

(R) Instrument and Cockpit Illumination
for General Aviation Aircraft

RATIONALE

ARP1048C has been updated based on the SAE Five-Year Review policy. Use ARP4103 for new designs.

1. SCOPE

This document establishes acceptable design criteria for instrument and cockpit illumination for general aviation aircraft.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

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.

ARP4103 Flight Deck Lighting for Commercial Transport Aircraft

ARP4256 Design Objectives for Liquid Crystal Displays for Part 25 (Transport) Aircraft

2.1.2 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-STD-1472 Human Engineering

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<https://www.sae.org/standards/content/ARP1048C/>

2.1.3 Other Publications

Woodson, W. and Conover, D.W. (1965). Human engineering guide for equipment designers. *University of California Press*, ISBN: 978-0520013636.

IESNA. (2000). IESNA lighting handbook (9th edition). *Illuminating Engineering Society of North America*, ISBN: 978-0879951504.

DeCusatis, C. (1997). Handbook of applied photometry. *Optical Society of America, American Institute of Physics*, ISBN: 978-1563964169.

2.2 Definitions

2.2.1 FOOTLAMBERT (LUMINANCE)

Photometric brightness, from IES, a measure of luminous intensity per unit area; units are candela per square meter (cd/m²) or fL (foot-Lamberts). 1.000 fL = 3.426 cd/m².

2.2.2 FOOT-CANDLE (ILLUMINANCE)

A unit of measure of illumination. 1 foot-candle is the illumination on a surface 1 foot from a uniform point source of 1 cd.

2.2.3 REFLECTANCE

The ratio of the amount of light reflected from a surface to the amount of light incident on a surface. This is usually given as a percentage.

$$\% \text{ Reflectance} = \frac{\text{Light reflected from a surface}}{\text{Light incident on a surface}} \times 100 \quad (\text{Eq. 1})$$

If the surface were a perfect white reflector, this would be 100%. For example, white paint will reflect about 80 to 95% of the light that hits it. Medium gray has a reflectance of around 50%, dark blue about 8%.

2.2.4 CONTRAST RATIO

The ratio of the amount of light coming from an object to the amount of light from the area surrounding the object.

$$\text{Contrast ratio} = \frac{\text{Amount of light from object}}{\text{Amount of light from surrounding area}} \quad (\text{Eq. 2})$$

Example: If we put a white instrument (reflectance 90%) on a dark blue panel (reflectance 8%) we will get a 90:8 (11:1) reflectance ratio. The same instrument on a dark gray panel (reflectance 30%) would have a 3:1 contrast ratio.

Note that this ratio could work with an internally illuminated instrument or a flood-lighted panel.

3. METHODS OF LIGHTING

Any lighting method which meets the recommendations should be considered satisfactory. White lighting should be considered the basic illumination.