ANSI Standardization of UV-C Measurements

Workshop on Ultraviolet Disinfection Technologies & Healthcare Associated Infections
National Institute of Standards and Technology

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Illuminating Engineering Society

About the Illuminating Engineering Society

- Founded 1906
- An accredited Standards Development Organization (SDO) under American National Standards Institute (ANSI) approved procedures
- Publisher of American National Standards (ANS)
  - Methods of Measurement
  - Recommended Practices
  - Design Guides
  - Technical Memoranda
- Many IES standards incorporated by reference into federal energy regulations
- Some standards serve as *de facto* international standards

Jointly Published Standards

Many of these standards have been and are the basis for our lighting quality and energy efficiency advocacy to the federal and state governments. For example, Federal legislation references Standard 90.1 as the preferred standard for energy efficiency in commercial buildings. Many States have adopted some version of 90.1 as their official building energy efficiency standard. Others are also devoted to a reduction in energy consumption.

American Lighting Association	
RP-11-17	Recommended Practice for Lighting for Interior and Exterior Residential Environments

Screenshot

Audiovisual and Integrated Experience Association (AVIXA)

ANSI/IES RP-16-17, Nomenclature and Definitions for Illuminating Engineering

The IES defines illumination engineering terms in ANSI/IES RP-16, which is available here online. You can search terms by their first letter using the categories listed in the Categories window, by the first letter of the term in the alphabetical list below, or by typing the term in the search window. You can find the Introduction material for RP-16 on these pages:

- Copyright, Disclaimer, and American National Standards Statement
- Foreword, Nomenclature Committee members, Introduction, and Scope
- Spectral Parameters Used in Illumination Engineering
- RP-16 Addenda

Search: SEARCH (clear)

All Categories

ALL 0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Abbe's law

absolute luminance

absorptance, α

light

15 June 20

[3.1] Radiant energy that is capable of exciting the retina and producing a visual sensation. The visible portion of the electromagnetic spectrum extends from about 380 to about 770 nanometers.

Notes:

- The subjective impression produced by stimulating the retina is sometimes designated as light. Visual sensations are sometimes arbitrarily defined as sensations of light, and in line with this concept it is sometimes said that light cannot exist until an eye has been stimulated. Electrical stimulation of the retina or the visual cortex is described as producing flashes of light. In illuminating engineering, however, light is a physical entity — radiant energy weighted by the luminous efficiency function. (See **spectral luminous efficiency of radiant flux** and **values of spectral luminous efficiency for photopic vision**.) It is a physical stimulus that can be applied to the retina.

- Symbols for radiometric terms are identified by the subscript e, and those for photometric (luminous) terms by the subscript v. In the event that no confusion will occur, the subscripts may be omitted. A table summarizing the units, Symbols, and defining equations is given in **Table T.2**.

IES Technical Committees

- Aged and Partially Sighted Lighting Committee
- Assembly and Performance Lighting Committee
- Aviation Lighting Committee
- Building Information Management Committee
- Color Committee
- Computer Committee
- Daylight Metrics Committee
- Daylighting Committee
- Discomfort Glare in Outdoor Nighttime Environments Committee
- Education/Library/Office Lighting Committee
- Energy Efficiency Lighting Programs Committee

IES Technical Committees

- Healthcare Facilities Committee
- Horticulture Lighting Committee
- Hospitality Facilities Committee
- Industrial Lighting Committee
- Internet of Things Committee
- Light and Design Committee
- Light and Human Health Committee
- Light Sources Committee
- Lighting Commissioning Committee
- Lighting Control Systems Committee
- Lighting Maintenance Committee

IES Technical Committees

- Lighting Upgrades Committee
- Luminaire Design Committee
- Museum and Art Gallery Lighting Committee
- Nomenclature Committee
- Outdoor Environmental Lighting Committee
- Outdoor Public Spaces Committee
- Photobiology Committee
- Port Terminals Lighting Committee
- Residential Lighting Committee
- Resilience Committee
- Retail Lighting Committee

IES Technical Committees

- Roadway Lighting Committee
  - Roadway Intersection Task Group
  - Roadway Measuring & Calculating Task Group
  - Roadway Maintenance Task Group
  - Roadway Obtrusive Light Subcommittee
  - Roadway Off-Roadway Task Group
  - Roadway Outdoor Controls Task Group
  - Roadway Research & Visibility Task Group
  - Roadway Signs Task Group
  - Roadway Toll Plaza Task Group
  - Roadway Tunnel Lighting Control Design Task Group
  - Roadway Tunnels & Overpasses Task Troup
  - Roadway Work Zone Task Group

IES Technical Committees

- Security Lighting Committee
- Skyglow Committee
- Sports and Recreational Area Lighting Committee
- Sustainable Lighting Committee
- Testing Procedures Committee 
- Videoconference and Presentation Lighting Committee
- Vision Science Committee

IES Testing Procedures Committee

Chaired by Dr. Cameron Miller, NIST

TPC Subcommittees:

- Science & Source Measurements
- Life Measurement & Projections Over Time
- General Measurement Methods
- Light Distribution Measurements

Working Group (WG) to be formed within the TPC to develop **ANSI / IES / IUVA** measurement standards for UV-C devices.

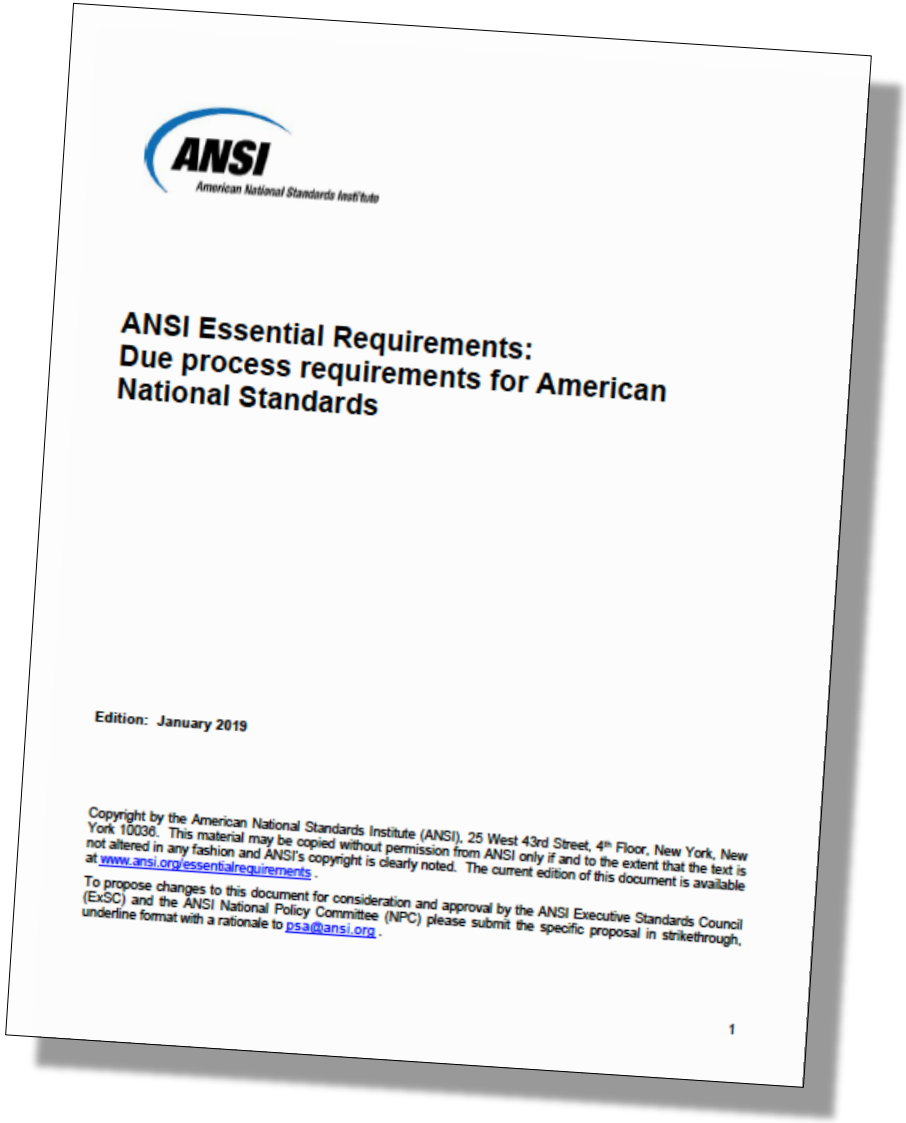
ANSI Standardization

- American National Standards Institute (ANSI) is administrator and coordinator of the United States private sector voluntary standardization system for more than 100 years
- Founded in 1918 by five engineering societies and three government agencies
- ANSI is a private, nonprofit membership organization supported by private and public sector organizations
- IES is an ANSI-Accredited Standards Developing Organization (SDO)
- American National Standards (ANS) are the pinnacle of the U.S. standardization system
- ANS can serve as the basis for international standards development
  - International Electrotechnical Commission (IEC)
  - International Organization for Standardization (ISO)
  - International Telecommunication Union (ITU)

IES Standards Development Process

IES standards process per ANSI Essential Requirements:

1. ANSI Project Initiation Notification System (PINS) → publication in ANSI Standards Action
2. IES working group is formed with a balance of:
   - Producers
   - Specifiers
   - Affected
   - Public Interest
   - Academic Research
   - Government Regulatory
   - Organizational Member
   - Test Equipment User
   - Test Equipment Manufacturer



ANSI
American National Standards Institute

ANSI Essential Requirements: Due process requirements for American National Standards

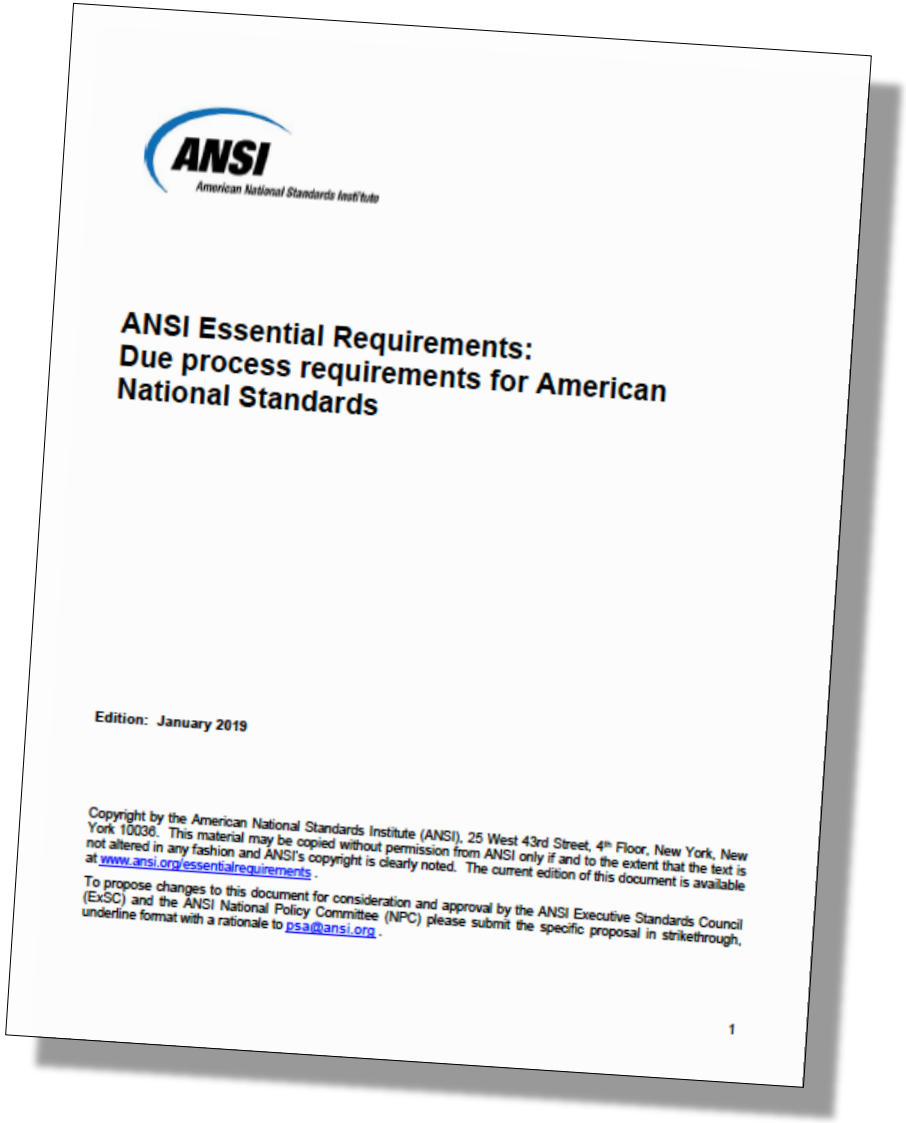
Edition: January 2019

To propose changes to this document for consideration and approval by the ANSI Executive Standards Council (ExSC) and the ANSI National Policy Committee (NPC) please submit the specific proposal in strikethrough, underline format with a rationale to psa@ansi.org.

IES Standards Development Process

IES standards process per ANSI Essential Requirements:

3. Working Group develops Standard (years)
4. Draft standard is balloted in Testing Procedures Committee (months)
5. ANSI Public Review (weeks)
6. Standard is reviewed and approved by IES Standards Committee (weeks)
7. Standard is published (weeks)
8. Standard is incorporated by reference in federal regulations, normatively referenced in specifications and other standards (years)
9. The world is a better place



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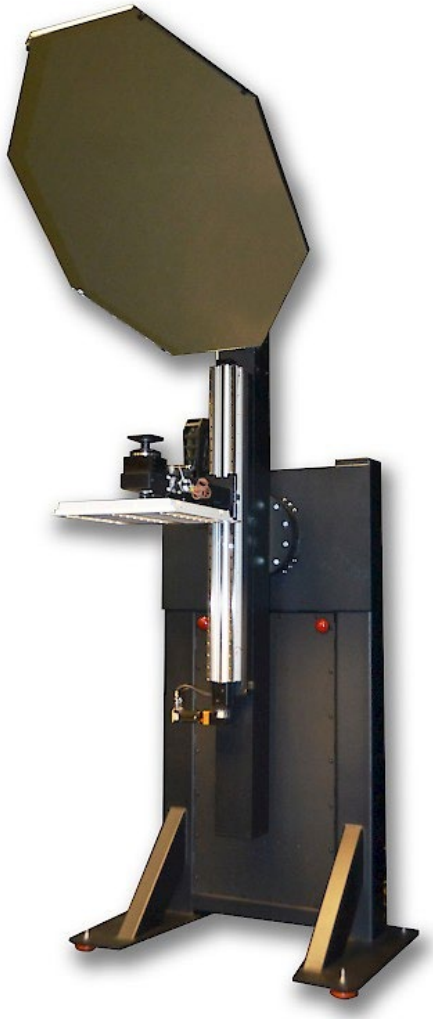
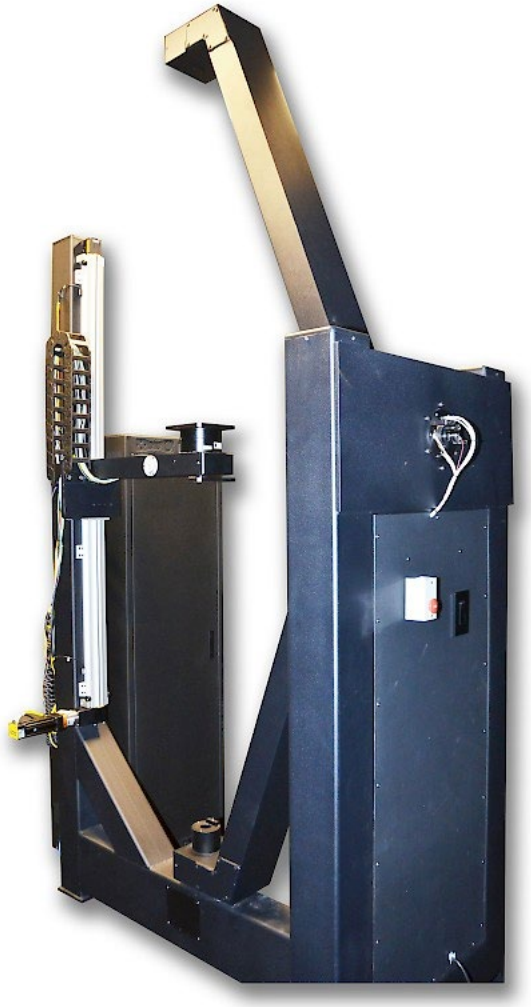
How We Measure Flux: Integrating Spheres

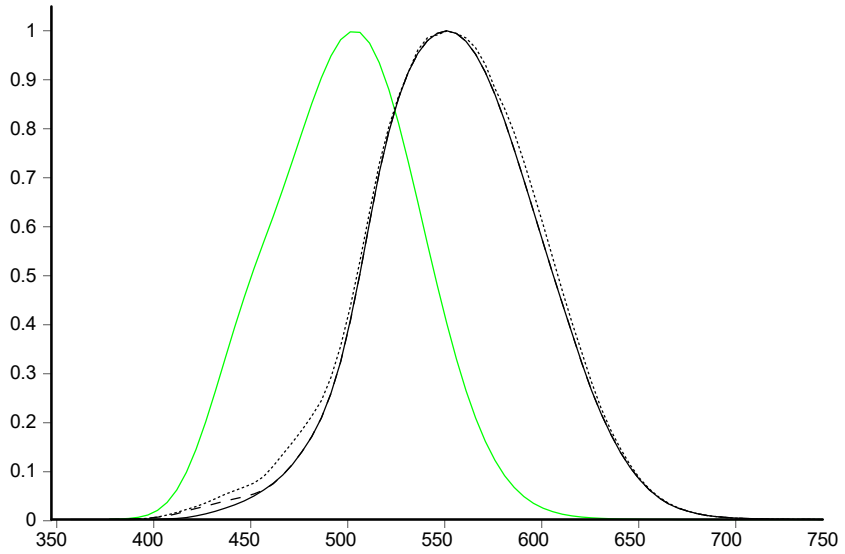
How We Measure Flux: Goniophotometers





Using Spectral Data

- For humans (380 to 780 nm):
  - Illuminating Engineering Society is the relevant SDO
  - **Radiant flux** measured per ANSI/IES method of measurement
  - Luminous efficacy function (e.g. CIE 1931) converts to **luminous flux**
  - **Photometric reports** are the outcome

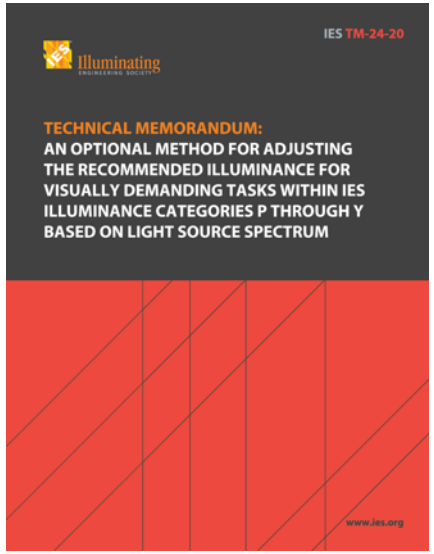


Using Spectral Data

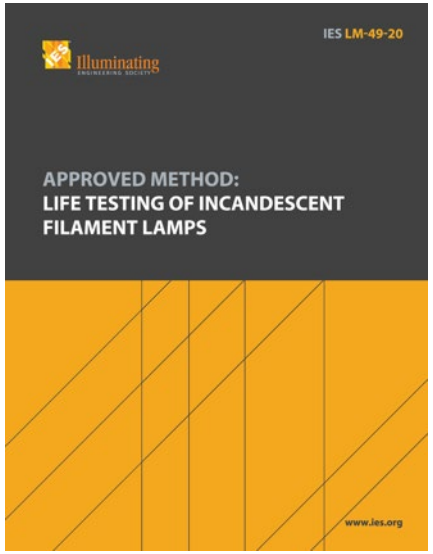
- For plants (280 to 800 nm):
  - The American Society of Agricultural and Biological Engineers is the relevant SDO
  - **Radiant flux** measured per ANSI/ASABE **S642** SEP2018 *Recommended Methods For Measurement And Testing Of LED Products For Plant Growth And Development*
  - … which normatively references the ANSI/IES LM-79-08 method of measurement

- For disinfection of pathogens? SDO is TBD

IES Standards: The Lighting Library

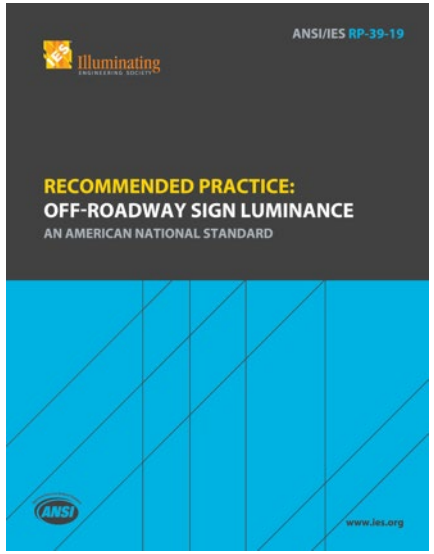


Lighting Science

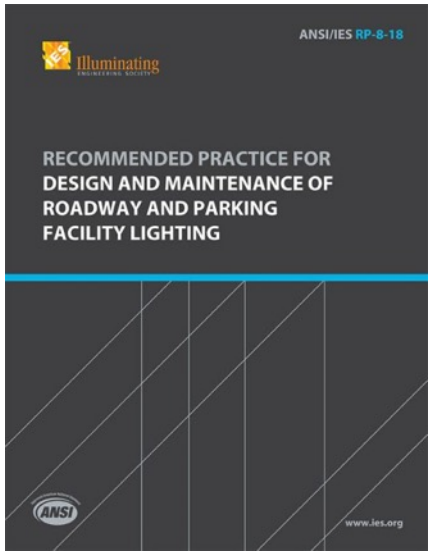


Lighting Measurement

Lighting Practice



Lighting Applications



Roadway Lighting

Contact Info

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Illuminating

ENGINEERING SOCIETY