ANSI/IES RP-3-20

Illuminating Engineering Society

RECOMMENDED PRACTICE:
LIGHTING EDUCATIONAL FACILITIES

AN AMERICAN NATIONAL STANDARD

Approved American National Standard ANSI

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Foreword

This Foreword is not part of ANSI/IES RP-3-20. It is provided for informational purposes only.

This Recommended Practice (RP) does not provide general lighting information that is included in other IES documents. If the reader does not already have this information, it may be obtained as needed from the following IES Standards.

The Lighting Science Series:

- *ANSI/IES LS-1-20, Lighting Science: Nomenclature and Definitions for Illuminating Engineering*
- *ANSI/IES LS-2-20, Lighting Science: Concepts and Language of Lighting*
- *ANSI/IES LS-3-20, Lighting Science: Physics and Optics of Radiant Power*
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- *ANSI/IES LS-5-20, Lighting Science: Color*
- *ANSI/IES LS-6-20, Lighting Science: Calculation of Light and Its Effects*
- *ANSI/IES LS-7-20, Lighting Science: Vision – Eye and Brain*
- *ANSI/IES LS-8-20, Lighting Science: Vision – Perceptions and Performance*

The Lighting Practice Series:

- *ANSI/IES LP-1-20, Lighting Practice: Designing Quality Lighting for People and Buildings*
- *ANSI/IES LP-2-20, Lighting Practice: Designing Quality Lighting for People in Outdoor Environments*
- *ANSI/IES LP-3-20, Lighting Practice: Designing and Specifying Daylighting for Buildings*
- *ANSI/IES LP-4-20, Lighting Practice: Electric Light Sources – Properties, Selection, and Specification*
- *ANSI/IES LP-6-20, Lighting Practice: Lighting Control Systems – Properties, Selection, and Specification*
- *ANSI/IES LP-7-20, Lighting Practice: The Lighting Design and Construction Process*
- *ANSI/IES LP-8-20, Lighting Practice: The Commissioning Process Applied to Lighting and Control Systems*
- *ANSI/IES LP-9-20, Lighting Practice: Upgrading Lighting Systems in Commercial and Industrial Facilities*
- *ANSI/IES LP-10-20, Lighting Practice: Sustainable Lighting – An Introduction to the Environmental Impacts of Lighting*
- *ANSI/IES LP-11-20, Lighting Practice: Environmental Considerations for Outdoor Lighting*

1.0 Introduction and Scope

1.1 Introduction

Lighting is a critical element in the school environment. Lighting can influence behavior, satisfaction, psychological responses to a space, task performance, communication and interest, visual comfort, and safety and security, while defining space and architecture.

Learning environments have changed dramatically over the past several decades. Not only have teaching methods and technologies evolved, so too has our understanding of what makes good lighting, which has to be delivered within tightening code constraints.

Classroom lighting should support the educational experience by providing a comfortable, attractive environment for students and instructors. While target illuminance on task surfaces is important, so are other factors such as glare and control of the lighting.

Educators are increasingly incorporating new technology into their classrooms. Lighting originally designed for black chalkboards and a single horizontal task plane is clearly inadequate for modern learning environments.

In the U.S., education buildings ranked third among U.S. commercial building types in 2012 for energy use, just behind mercantile, with offices ranking first.[1] As of 2012, lighting was the largest single end use of electricity in commercial buildings, accounting for 17% of all electricity consumption, down from 38% in 2003.[2] Electricity consumption for lighting is expected to continue to decrease with the continued adoption of advanced LED and controls technology.

A significant number of schools are being built according to sustainable design principles as defined by green building rating systems, such as LEED and CHPS. Energy standards are restricting lighting power allowances and mandating a growing list of lighting controls in schools and universities.

This Recommended Practice was developed to enable architects, engineers, lighting designers, and other lighting decision makers to ensure that their lighting criteria are consistent with good current practice; to assist school and university staff in understanding the importance of the role that lighting plays in educational environments; and to facilitate conversations about lighting between school and university staff, architects, engineers, lighting designers and other designers. It addresses all levels of education, from preschool to university facilities.

1.2 Scope

The scope of this Recommended Practice is restricted to learning and study activities and associated circulation areas. Other IES Recommended Practices (RPs) and Lighting Practice (LP) documents should be consulted for guidance on lighting for other, related spaces, such as administration and sports, and for strategies for daylighting, commissioning, and maintenance practices. The LPs are listed in the Foreword. Some of the applicable Recommended Practices include:

- *ANSI/IES RP-1-20, Recommended Practice: Lighting Office Spaces*[3]
- *ANSI/IES RP-4-20, Recommended Practice: Lighting Library Spaces*[4]
- *ANSI/IES RP-6-20, Recommended Practice: Lighting Sports and Recreational Areas*[5]
- *ANSI/IES/NALMCO RP-36-20, Recommended Practice: Lighting Maintenance*[6]

Because of the diversity of educational activities, it is not possible to provide comprehensive recommendations for every learning and study situation. In addition to classrooms and corridors, the many types of spaces in grade schools, high schools, and colleges include assembly halls, theaters, wet and dry labs, trade shops for woodworking or auto repair, and social spaces such as cafeterias and student and faculty lounges. While this Recommended Practice seeks to explain the principles of good lighting, it will always be necessary for the lighting designer to be cognizant of the educational process and individual facility needs.

This Recommended Practice is organized into three general parts:

- **Sections 1** through **7** – General, foundational information upon which the lighting design is based.
- **Sections 8** through **10** – Principles and recommendations for lighting educational facilities.
- **Annexes** and **References**

2.0 Principles of Quality Lighting

Quality lighting satisfies a variety of human needs. Lighting affects many other aspects of well-being, including comfort, social communication, mood, health, safety, and aesthetic judgment. These various human needs should be balanced along with economic and environmental concerns, as well as architectural considerations. **Figure 2-1** illustrates that lighting quality is achieved when the lighting design satisfies all three of these concerns. As an example, the lighting in a classroom may be deemed of high quality if it enables students and instructors to see visual tasks easily and comfortably, renders faces so that verbal communication is enhanced, stays within the administration's budget, is easy to maintain, uses energy responsibly, meets codes and standards, and pleases the eye by complementing the interior design.

Achieving quality lighting involves more than simply specifying the illuminance level to make a given task visible. Design issues such as glare, shadows, light patterns, light distribution, flicker, and color appearance may affect the student's comfort, social interactions, aesthetic perceptions, environmental comfort, and task performance. Of interest to education staff is the fact that these effects can all be linked, directly or indirectly, to learning and productivity. (For more extensive information on lighting quality for many other space types, refer to ANSI/IES LP-1-20; see **Foreword**).