ANSI/IES RP-7-20

Illuminating Engineering Society

RECOMMENDED PRACTICE:
LIGHTING INDUSTRIAL FACILITIES

AN AMERICAN NATIONAL STANDARD

Approved American National Standard

ANSI

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Prepared by
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Foreword

This Foreword is not part of ANSI/IES RP-7-20. 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*
- *ANSI/IES LS-4-20, Lighting Science: Measurement of Light – The Science of Photometry*
- *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

A well-designed lighting system can make an important contribution to the success of an industrial facility. The success of the well-lighted industrial environment can affect productivity, employee performance, safety, energy efficiency, health, maintenance costs, and the number of errors and lost-time accidents. Many features of a lighting system other than the quantity of light provided can make a significant contribution to the efficiency and safety of the industrial worker.

In the design of lighting for industrial environments, horizontal illuminance has commonly been the only consideration. However, many industrial tasks take place in planes with various orientations and in areas with overhead obstructions. Placement of the luminaires is critical to providing light of the proper quality, as well as quantity and direction, to allow fast, easy recognition of operations. These operations may be taking place at high speeds in areas of the production machinery or industrial products where ambient light cannot easily penetrate.

Selection of the luminaire and its photometric distribution can be important to rendering the visual task properly when that task is multidimensional rather than flat, and when the task occurs in a plane other than horizontal. The operation of the lighting system should be understood to ensure that the proper light sources are selected. Improper light source choice can result in difficult and potentially dangerous conditions caused by long warm-up periods, shadows, or stroboscopic effects created where rotating parts are involved. The ability of the light to render colors accurately can have an effect

on the recognition of colors, including safety colors, or product components. Many industrial operations take place in hostile environments, and the lighting products and hardware used in these locations should be designed and manufactured to survive in these conditions and be easy to maintain.

For these reasons, and many others, great care is required in order to provide an effective, efficient and readily maintainable lighting system for all industrial spaces, and to help modern industrial workers operate at the peak of their ability in a safe environment.

1.2 Purpose and Scope

Industrial facilities can at times be hazardous environments; special-case needs and considerations should be given in general for safety, general lighting, moving components, and supplemental, task, safety and emergency lighting. Emergency egress can at times be very time consuming due to workstation requirements. The primary purpose of this standard is to serve as a guide and educational tool for the design of permanently installed lighting systems for industrial facilities. This Recommended Practice deals entirely with lighting and does not give advice on the construction of a facility. The scope of this practice covers the design of new indoor and outdoor lighting systems for new industrial facilities as well as the redesign of lighting systems in existing industrial facilities. Recommendations are based on quality lighting practices, including: the safe movement of vehicles and people, enhancing the productivity and comfort of employees, conserving energy, and minimizing maintenance. Recommended minimum maintained lighting levels and maximum uniformity ratio guidelines are provided but are subject to variation for special circumstances when based upon sound engineering judgment.

This Practice does not include all information for mixed application areas such as parking lots, offices, outdoor environments, commercial facilities, or daylighting design. For these crossover applications, the associated Recommended Practice documents should be used in conjunction with this Practice to provide the lighting recommendations.

In short, this Recommended Practice will help the reader make intelligent choices to achieve the lighting goals with a minimum of expense of time and capital.

2.0 Lighting the Industrial Environment

Providing a successful lighting design for a modern industrial facility is a complex task. Much is known about lighting and its positive effects on the wellbeing of people. The goal of providing an efficient, reliable and easily maintainable lighting system, making use of all of the knowledge available to the designer today, is one that requires experience and considerable planning.

Industrial facilities include manufacturing areas, such as fabrication, assembly, sub-assembly, and finishing, as well as quality control, warehousing and logistics. Related areas can also be laboratories, pharmaceutical and/or chemical production facilities (including "clean rooms"), and vehicle maintenance and repair facilities.

2.1 General Design Considerations for Lighting Industrial Areas

The designer of an industrial lighting system should carefully consider all of the following design criteria, which could be important in planning a successful industrial lighting installation. (These criteria are not necessarily arranged in order of importance, since priorities will vary for different industries or locations within an industrial complex.)

- Determine the *quality* of illumination for the manufacturing processes involved. (See **Section 3.0 Quality of Lighting in Industrial Facilities**.)
- Determine the *quantity* of illumination for the manufacturing processes involved. (See **Section 12.0 Lighting Criteria** and **Annex A**.)
- Determine the lighting required for *safety*, and ensure that quality, quantity, and safety are properly weighted and addressed in the final design.
- Select listed or approved lighting equipment that will provide the requirements of quality and quantity, including photometric characteristics, as