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# Best Practices for Operating Fluorescent Lighting Systems

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The opinions expressed in this statement represent the consensus views of the member companies of the Lighting Systems Division of the National Electrical Manufacturers Association. The members of the Lighting Systems Division manufacture indoor and outdoor lamps, which include incandescent, fluorescent, light-emitting diode, and solid-state lamps, lighting fixtures, and lamp ballasts.

## Contents

1. Introduction ..... 3
2. Initial Installation or Retrofit ..... 3
3. Best Practices for Initial Installation or Retrofit ..... 3
4. Normal Operation and Maintenance ..... 4
5. Best Practices for Normal Operation and Maintenance ..... 5
6. End-of-Life/Disposal ..... 6
7. Best Practices for End-of-Life/Disposal ..... 6
8. References and Additional Information ..... 6

# Best Practices for Operating Fluorescent Lighting Systems

## 1. Introduction

Fluorescent lighting systems provide outstanding performance at low cost. They are relatively simple to install, maintain, and operate. Fluorescent remains a system of choice for many applications in offices, schools, healthcare facilities, hotels, and stores.

This document summarizes information and recommendations found in more detailed NEMA and industry papers on individual topics, as well as additional information and recommendations. The information provided in this white paper will benefit those seeking to ensure the proper operation of fluorescent systems and will help owners and those responsible for maintaining them to minimize possible operating or maintenance issues while maximizing system reliability and operational economy.

The suggested best practices, recommendations, and tips given are generally organized under the three common modes encountered over the system's lifecycle: installation, operation and maintenance, and end-of-life/disposal.

## 2. Initial Installation or Retrofit

Initial installation falls into two broad categories: new construction (including major renovation) and retrofit. In new construction or major renovation, entirely new ceiling systems are installed, including the lighting. In either situation, there are many options that can be considered for fluorescent lighting, with the two most fundamental choices being direct or indirect illumination of the space. It is beyond the scope of this paper to provide the detailed tradeoffs that should be considered when specifying a new installation. For retrofit installations, it is common practice to utilize the existing ceiling system and even the existing luminaires. Although tradeoffs and choices also exist for retrofit installations, typically the options are somewhat more limited than one might have in new construction or major renovation.

It is recommended that a professional lighting designer be used to help assess the range of possible options versus desired cost, performance, and aesthetics in either case since there are many tradeoffs that need to be considered. In addition, lamp, ballast, lighting control, and luminaire manufacturers provide a range of products that are suitable for each application and offer literature, recommendations, and various levels of application assistance. Multiple lighting control options should be considered, even where they are not required by local codes, since considerable economic savings can result.

## 3. Best Practices for Initial Installation or Retrofit

a. Use IESNA guidelines and recommendations to establish initial and maintained light levels for the application. Ensure that all applicable local codes are considered in this process since such codes may set requirements of power density (watts per square foot) or require the use of certain lighting control strategies. Even if you are not in an area subject to such codes, the use of ANSI/ASHRAE/IES Standard 90.1 along with IES recommended lighting levels will provide proper lighting while achieving greater efficiency and power savings (1)(2).

b. Use T8 or T5 linear fluorescent lamps, 2G11 long twin tube lamps, or U-bend type lamps for offices, schools, and stores. Pin-based compact fluorescent lamps should be used where general illumination down lighting is employed. For maximum system efficiency, replace old 60 Hz magnetic ballasts with high frequency electronic ballasts. Use a lighting controls strategy that fits the application, occupancy sensors and centralized on/off control being two typical options. If dimming or proportional light level control is required, use a dimming electronic ballast that complies with NEMA LL 9 to ensure adequate lamp life (3). If lamps will typically be operated for