



**Illuminating**  
ENGINEERING SOCIETY

**APPROVED METHOD:**  
**IDENTIFYING OPERATING FACTORS**  
**FOR INSTALLED HIGH INTENSITY**  
**DISCHARGE LUMINAIRES**  
**AN AMERICAN NATIONAL STANDARD**



**ANSI/IES LM-61-20**

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Publication of this Committee Report  
has been approved by the IES.  
Suggestions for revisions  
should be directed to the IES.

**Prepared by  
The IES Testing Procedures Committee**



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## 1.0 Introduction and Scope

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### 1.1 Introduction

While lighting manufacturers and independent testing laboratories generally follow IES published procedures for testing HID luminaires under controlled laboratory conditions, measurements made in the field to confirm predicted performance can be influenced by a variety of factors. Under laboratory conditions, care is exercised in the control of the precision and accuracy of the photometric measurement conditions, including luminaire orientation, test distances, ambient temperature, electrical supply and regulation, and selection of lamps for optimal stability and arc tube geometry.

In the field, this level of control and accuracy in operating and measurement conditions is seldom possible, and measurements made of installed photometric performance can deviate from predicted performance levels. This Lighting Measurement (LM) document identifies many of the potential factors that apply to outdoor HID luminaires, including mercury vapor (Hg), metal halide (MH), and high pressure sodium (HPS), as well as low pressure sodium (LPS) lighting equipment utilizing core and coil ballasts for contemporary lamp wattage designations. The issues and factors associated with electronic ballasts for HID lamps have not been addressed in this revision of LM-61.

### 1.2 Scope

This LM outlines factors that can cause differences between calculated and measured illuminance and luminance values of outdoor high intensity discharge (HID) and low pressure sodium (LPS) lamps and luminaires. It does not offer solutions, nor does it quantify all of the possible variables that might be encountered. The relevant ANSI/IES Recommended Practice document should be consulted for specific design recommendations.

## 2.0 Variables

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This document lists variables that can affect the results of an HID lighting design and outlines issues encountered

when comparing field measurements with predicted calculations using photometric data. It is possible that the tolerances for all the components could combine to produce a substantial difference in illuminance or luminance performance between laboratory and field conditions. The variables can be divided into five general categories:

- Power supply and ballast variations
- Lamp variations
- Luminaire optical variations
- Field conditions
- Field measurement

Each category is reviewed and its significance with respect to HID luminaire operation is explained.

### 2.1 Power Supply and Ballast Variations

*SAFETY PRECAUTION: Only persons experienced in using measurement equipment under high voltage conditions should make measurements of electrical characteristics at the lamp. High primary and secondary voltages, high-voltage starting pulses for both HPS and MH lamps (up to 5,000 V), and high-voltage instant re-strike circuits (over 40 kV) present a serious shock hazard. It is critical that proper precautions also be taken to protect instruments from the high voltages and high-voltage starting pulses.*

**2.1.1 Power Supply Voltage.** In the photometric laboratory, it is standard practice to maintain lamp watts at a constant value when HID lamps, or luminaires using them, are being photometered. This is typically accomplished by monitoring lamp power via a wattmeter and adjusting the supply voltage to the ballast until the lamp is stable at rated lamp watts. This establishes the luminaire performance and efficiency for the photometric report with a standardized procedure.

The predicted light output in the field assumes that a “nominal” electrical supply is used. In field installations, lamps may or may not operate at their rated wattage even though the ballasts are operated within the design limits of the electrical distribution system. The supply voltage at a luminaire is dependent on several electrical power system characteristics. Factors such as local time-variable power loads, transformer tap choices, and the length and gauge of the wiring runs can all