Illuminating
ENGINEERING SOCIETY

IES LM-47-12

Approved Method: **Life Testing of High Intensity Discharge (HID) Lamps**

IES APPROVED METHOD FOR LIFE TESTING OF HIGH INTENSITY DISCHARGE (HID) LAMPS

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

Prepared by:
The Photometry of Light Sources Subcommittee
of the IES Testing Procedures Committee

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FOREWORD

This approved method is a revision of IESNA LM-47-2001, IESNA Approved Method for Life Testing of High Intensity Discharge (HID) Lamps; changes have been made to update information, to give clearer guidelines for test requirements, and to promote uniformity in measurement procedures.

INTRODUCTION

- This guide describes the procedures by which high intensity discharge (HID) lamps can be operated under controlled conditions to obtain optimally comparable data on individual lamp life, changes in light output, and other parameters that vary during the life of the lamp.

- HID lamps are characterized as light producing discharge devices whose discharge containment envelopes have a surface loading in excess of three watts per square centimeter. Additional characteristics of these lamp types are found in references 1 through 5.

- Light is produced in a high intensity discharge lamp by passing current through a vapor at relatively high pressure. Arc tube pressures for HID lamps can range from just less than one to as much as five atmospheres during lamp operation.

- In a high-pressure sodium lamp (HPS) the arc discharge passes through combined vapors of mercury and sodium. The sodium radiation dominates the color appearance of the light produced, which is characteristically gold and contains a minimal ultraviolet energy output.

- Light is produced in the metal halide (MH) lamp by an electrical discharge through combined vapors of mercury and other metals. These metals have the effect of increasing the light output in the blue, green, and yellow-red bands of the visual spectrum. Due to the spectral energy distribution in the lamp output from the metal vapors, the color appearance of MH HID lamps is nearly white. In addition to visible light, ultraviolet energy is also produced in the arc and is used in phosphor coated lamps to improve color characteristics.

- In mercury vapor lamps, light is generated by electric discharge through a vapor of mercury. The light produced is bright white, often with the blue green cast. The color is dramatically improved by adding a phosphor coating to the outer bulb.

- It is often important to know the light output, efficacy, and lamp lumen maintenance along with the life of these lamps. The annex to this document discusses this issue. For information on the photometry of HID lamps, see reference 13.

- HID lamps are affected by many variables such as operating cycle, conditions imposed by auxiliary equipment, ambient temperature, vibration, airflow, and orientation. Test conditions and programs should be designed to give comparable results when adopted by various laboratories. The recommendations of this IES Approved Method have been made with these objectives in mind.

1.0 SCOPE

This approved method describes the procedures to be followed and the precautions to be observed in obtaining uniform and reproducible measurements during life testing of high intensity discharge lamps under standard conditions. This Approved Method includes other technologies within the Metal Halide family including Ceramic Metal Halide and Pulse Start Metal Halide lamps. It addresses life testing of high intensity discharge lamps operated on auxiliary devices, either external or integrated, designed and certified to meet lamp industry standards and tolerance. Xenon arc lamps, low-pressure sodium lamps, and automotive lamps are not addressed in this IES Approved Method.

2.0 NORMATIVE REFERENCES

No normative references

3.0 NOMENCLATURE AND DEFINITIONS

a) The units of electrical measurement used in this approved method are the volt, the ampere, and the watt.

b) Life of a test lamp refers to the actual operating time of the lamp, until failure expressed in hours, and shall not include any off time.