

IESNA Approved Method for Photometric Testing of Fiber Optics Lighting Systems



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Prepared by: The Subcommittee on Fiber Optics Photometry
of the IESNA Testing Procedures Committee

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by the IESNA. Suggestions for
revisions should be directed
to the IESNA.

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1.0 INTRODUCTION

This Approved Method provides a uniform technique for determining and reporting the photometric characteristics of fiber optic lighting systems. It does not address the colorimetry of such systems. It is not intended to explain the photometric testing of individual fiber optic system components such as illuminators, couplers, the fibers themselves, or partial systems. Component testing may require additional test procedures.

Variations in the illuminator, harness, fibers, and emitting optics will affect photometric performance. Therefore, each variation in a fiber optic system must be evaluated. If appropriate, photometric reports may condense data by using weighting factors to account for performance differences caused by system variations.

The purpose of this Approved Method is to allow production of standard photometric reports which the designer can use in laying out fiber optics lighting and comparing different systems. This Approved Method treats fiber optic lighting devices essentially as luminaires, with special considerations. The designer can use design techniques similar to those used for conventional luminaire systems, including computerized approaches. The form of reporting, and the production of standard photometric files, are consistent with the methods used for other luminaires.¹⁻⁴

The rapid introduction of fiber optic systems and components, as well as the many component variations, requires that documents concerned with the technical utilization of these products be reviewed and updated periodically. However, because experience with new products is necessarily limited, this Approved Method may not cover all the unique characteristics exhibited by a particular device. Also, despite frequent revisions to this Approved Method, recently introduced systems with new characteristics may not be included.

2.0 FIBER OPTIC SYSTEM CHARACTERISTICS

There are two general classes of fiber optics lighting system types; those using end-emitting fibers and those using side-emitting fibers. This Approved Method includes both end-emitting fibers used to provide illumination and side-emitting fibers used for decorative purposes. A standard test and reporting format is provided which contains data applicable to either purpose.

2.1 End-emitting Fiber Optic Systems

End-emitting fiber optic systems typically use an illuminator to inject light into a fiber that has an opaque cladding. Light is transmitted along the fiber, then emitted at the far end either directly or through a supplementary optical device. This device may include lensing, some form of reflector, or shielding. End-emitting systems usually produce a conical light beam, although not necessarily. For such systems, the intensity distribution, flux distribution, and system efficiency are usually of interest. These performance data may be developed into tabulated factors and/or tables that allow the predetermination of illuminance (or surface luminance) at a given distance from the fiber end. Luminance of the fiber end or emitting device also may be of interest.

2.2 Side-emitting Fiber Optic Systems

Systems built with side-emitting fibers also employ an illuminator to inject light into the fiber, but the fiber is translucent or textured. This disrupts the internal reflections within the fiber, emitting light from the fiber surface. Side-emitting systems may be designed such that both ends of the fiber connect into the illuminator and collect light. Side-emitting fibers are frequently used for decorative purposes, where fiber luminance is the chief interest. Side-emitting fibers may also serve as extended length luminaires to illuminate other surfaces. Used this way, interest normally centers on intensity distribution, flux distribution, and efficiency. Fiber luminance may also be of interest in such applications.

2.3 Selection and Preparation of Equipment for Test

Equipment selected for test shall be clean and representative of the manufacturer's normal product. Ballasts and power supplies regularly furnished as part of the system shall be used to operate the lamp during the test and shall be mounted in their normal location within the illuminator. Any filters normally used with the system shall be in place during the test.

2.4 Fiber Optic Cable Length and Type

The length of the cable imposes an extra variable when testing fiber optic lighting systems, as the light intensity will be reduced when cable length is increased. This Approved Method recommends that standard cable lengths be used for data presentation. Where the nature of the product under test makes standard length cable inapplicable, the test report should clearly state cable length.