



Designation: E 1501 – 99^{e1}

Standard Specification for Nighttime Photometric Performance of Retroreflective Pedestrian Markings for Visibility Enhancement¹

This standard is issued under the fixed designation E 1501; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

^{e1} NOTE—Editorial changes made throughout in September 2000.

INTRODUCTION

The use of appropriate retroreflective markings can significantly enhance the night visibility and safety of the user. As the first in a series addressing overall visibility for individual safety, this standard is intended to establish minimum retroreflective performance requirements and test methods for retroreflective pedestrian markings.

1. Scope

1.1 This specification covers the performance of retroreflective markings to be used on objects worn by pedestrians for the purpose of enhanced conspicuity. It addresses conspicuity from viewpoints around the entire object, and it allows for freedom of design of the markings so long as the minimum requirements are achieved. Objects include but are not limited to jackets, shirts, vests, trousers, socks, backpacks, hats, and footwear. An adjustment for the brightness/luminance ratio as a function of color is also made.

1.2 This specification applies only to nighttime viewing conditions in which the observer is positioned near a source of illumination. The most common example is that of a motor vehicle operator seeing by means of the light from the headlamps of the vehicle.

1.3 This specification describes the minimum retroreflective performance required for a reasonable level of nighttime conspicuity. It does not address potentially diminished performance of retroreflective markings that may be experienced with general storage, use, wear, and care.

1.4 SI (metric) units shall be used in referee decisions under this specification.

1.5 The following safety hazards caveat pertains to specifying materials by this standard specification. Although the markings described in this specification are intended to significantly enhance safety through increased conspicuity under most conditions of illumination and viewing of the type described in 1.2 above, they do not guarantee significantly enhanced conspicuity under all such conditions. Individuals

exposed to adverse weather conditions or associated with high levels of vehicular or hazards exposure may require other types or amounts of retroreflective markings. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 284 Terminology of Appearance²

E 808 Practice for Describing Retroreflection²

E 809 Practice for Measuring Photometric Characteristics of Retroreflectors²

E 811 Practice for Measuring Colorimetric Characteristics of Retroreflectors Under Nighttime Conditions²

F 923 Guide Properties of High Visibility Materials Used to Improve Individual Safety²

2.2 Other Standards:

Publication CIE No. 54, Retroreflection—Definitions and Measurements, Central Bureau of the CIE, Vienna, 1982³

3. Terminology

3.1 *Definitions*—Definitions of terms relating to retroreflection in Terminology E 284, Practice E 808, and Guide F 923 are applicable to this specification.

3.1.1 *coefficient of luminous intensity, R_l , n* —of a retroreflector, ratio of the luminous intensity (I) of the retroreflector in the direction of observation to the illuminance ($E_{\perp}$) at the

¹ This specification is under the jurisdiction of ASTM Committee E-12 on Color and Appearance and is the direct responsibility of Subcommittee E12.08 on High Visibility Materials for Individual Safety.

Current edition approved Nov. 10, 1999. Published January 2000. Originally published as E 1501–92. Last previous edition E 1501–92^{e1}.

² *Annual Book of ASTM Standards*, Vol 06.01.

³ Available from the USNC–CIE Publications Office, c/o Mr. Thomas M. Lemons, TLA-Lighting Consultants, 7 Pond Street, Salem, MA 01970-4819.