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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for Preparation of Pressed Powder White Reflectance Factor Transfer Standards for Hemispherical and Bi-Directional Geometries¹

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INTRODUCTION

The internationally accepted standard of reflectance is the perfect reflecting diffuser. This ideal reflecting surface reflects 100 % of the incident radiant power such that the radiance is the same for all directions within the hemisphere above the surface. No physical realization of this standard exists. Optical properties of standards prepared from pressed plaques of magnesium carbonate (MgCO_3), barium sulfate (BaSO_4), or polytetrafluoroethylene (PTFE) can approximate an ideal standard. For further information see CIE Publication No. 46 (1).² The principal use of a white reflectance factor standard is to transfer an absolute scale of reflectance to a more durable material or from one instrument to another. In theory, it should be easy to do this transfer from first principles. In practice, one is likely to need values for parameters that are unknown, proprietary, or require a high level of skill. Some, but not all, of those parameters are discussed in this practice.

1. Scope

1.1 This practice covers procedures for preparing pressed powder transfer standards. These standards can be used in the near-ultraviolet, visible and near-infrared region of the electromagnetic spectrum. Procedures for calibrating the reflectance factor of materials on an absolute basis are contained in CIE Publication No. 44 (2). Pressed powder standards are used as transfer standards for such calibrations because they have a high reflectance factor that is nearly constant with wavelength, and because the geometric distribution of reflected flux resembles that from the perfect reflecting diffuser.

1.2 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.3 *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 Appearance³

3. Terminology

3.1 Terms and definitions in Terminology E 284 are applicable to this practice.

3.2 *Definitions*—The following definitions are particularly important to this practice:

3.2.1 *perfect reflecting diffuser*—ideal reflecting surface that neither absorbs nor transmits light, but reflects diffusely, with the radiance of the reflecting surface being the same for all reflecting angles, regardless of the angular distribution of the incident light. (1990)

3.2.2 *reflectance*, ρ , n —ratio of the reflected radiant or luminous flux to the incident flux in the given conditions. [CIE]^A

3.2.3 The term *reflectance* is often used in a general sense or as an abbreviation for *reflectance factor*. Such usage may be assumed unless the above definition is specifically required by the context. (1989b)

3.2.4 *reflectance factor*, R , n —ratio of the flux reflected from the specimen to the flux reflected from the perfect reflecting diffuser under the same geometric and spectral conditions of measurement. [CIE]^B(1988)

4. Summary of Practice

4.1 Procedures are given for the preparation of white

¹ This practice is under the jurisdiction of ASTM Committee E-12 on Color and Appearance and is the direct responsibility of Subcommittee E12.02 on Spectrophotometry and Colorimetry.

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² The boldface numbers in parentheses refer to the list of references at the end of this practice.

³ *Annual Book of ASTM Standards*, Vol 06.01.