



Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications¹

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1. Scope*

1.1 This practice covers the procedure for certifying continuous opacity monitors. In the main part of this practice, it includes design and performance specifications, test procedures, and quality assurance requirements to ensure that continuous opacity monitors meet minimum design and calibration requirements, necessary in part, for accurate opacity monitoring measurements in regulatory environmental opacity monitoring applications subject to 10 % or higher opacity standards. In **Annex A1**, additional or alternative specifications are provided for certifying opacity monitors intended for use in applications where the opacity standard is less than 10 %, or where the user expects the opacity to be less than 10 % and elects to use the more restrictive criteria in **Annex A1**. In both cases, the error budgets for the opacity measurements are given in **X1**.

1.2 This practice applies specifically to the original manufacturer, or to those involved in the repair, remanufacture, or resale of opacity monitors.

1.3 Test procedures that specifically apply to the various equipment configurations of component equipment that comprise either a transmissometer, an opacity monitor, or complete opacity monitoring system are detailed in this practice.

1.4 The specifications and test procedures contained in the main part of this practice have been adopted by reference by the United States Environmental Protection Agency (U.S. EPA). For each opacity monitor or monitoring system that the manufacturer demonstrates conformance to this practice, the manufacturer may issue a certificate that states that opacity monitor or monitoring system conforms with all of the applicable design and performance requirements of 40 CFR 60, Appendix B, Performance Specification 1 except those for which tests are required after installation.

¹ This practice is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.03 on Ambient Atmospheres and Source Emissions.

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2. Referenced Documents

2.1 ASTM Standards:²

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

2.2 U.S. Environmental Protection Agency Document:³

40 CFR 60 Appendix B, Performance Specification 1

2.3 Other Documents:

ISO/DIS 9004 Quality Management and Quality System Elements-Guidelines⁴

ANSI/NCSL Z 540-1-1994 Calibration Laboratories and Measuring Equipment - General Requirements⁴

NIST 260-116 - Filter calibration procedures⁵

3. Terminology

3.1 For terminology relevant to this practice, see Terminology **D1356**.

3.2 Definitions of Terms Specific to This Standard:

Analyzer Equipment

3.2.1 *opacity, n*—measurement of the degree to which particulate emissions reduce (due to absorption, reflection, and scattering) the intensity of transmitted photopic light and obscure the view of an object through ambient air, an effluent gas stream, or an optical medium, of a given pathlength.

3.2.1.1 *Discussion*—Opacity (Op), expressed as a percent, is related to transmitted light, (T) through the equation:

$$\text{Op} = (1 - T) (100). \quad (1)$$

3.2.2 *opacity monitor, n*—an instrument that continuously determines the opacity of emissions released to the atmosphere.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

*A Summary of Changes section appears at the end of this standard