



Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration¹

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1. Scope*

1.1 This guide describes the process and objective of calibrating the density system of a nuclear surface moisture and density gauge, or formulating the mathematical relationship between the density system response (the “density count”) of a nuclear surface moisture and density gauge and the corresponding density value of the density standard upon which the density system response was observed.

1.2 This guide describes the process and objective of calibrating the water content system of a nuclear surface moisture and density gauge, or formulating the mathematical relationship between the water content system response (the “water content count”) of a nuclear surface moisture and density gauge and the corresponding water mass per unit volume value of the water content standard upon which the water content system response was observed.

1.3 This guide describes the process and objective of verifying the density system of a nuclear surface moisture and density gauge.

1.4 This guide describes the process and objective of verifying the water content system of a nuclear surface moisture and density gauge.

1.5 This guide describes two mathematical processes by which the gauge measurement precision may be computed or measured.

1.6 This guide offers guidance for developing and reporting estimates of uncertainties in measurements made with gauges that have undergone calibration or verification.

1.7 All observed and calculated values shall confirm to the guide for significant digits and rounding established in Practice [D6026](#).

1.8 *Units*—The values stated in either SI units or inch pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combin-

ing values from the two systems may result in non-conformance with the standard.

1.9 *This guide 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 guide to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.10 This guide offers an organized collection of information or a series of options and does not recommend specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project’s many unique aspects. The word “Standard” in the title of this document means only that the document has been approved through the ASTM consensus process.

2. Referenced Documents

2.1 ASTM Standards:²

- [D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)
- [D2216 Test Methods for Laboratory Determination of Water \(Moisture\) Content of Soil and Rock by Mass](#)
- [D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#)
- [D6026 Practice for Using Significant Digits in Geotechnical Data](#)
- [D6938 Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods \(Shallow Depth\)](#)
- [D7013 Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Setup](#)

3. Terminology

3.1 *Definitions*—See Terminology [D653](#) for general definitions.

¹ This practice is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.08](#) on Special and Construction Control Tests.

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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.