



Standard Guide for Conducting Borehole Geophysical Logging— Electromagnetic Induction¹

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1. Scope*

1.1 This guide is focused on the general procedures necessary to conduct electromagnetic-induction, induction, electromagnetic-conductivity, or electromagnetic-resistivity logging (hereafter referred as induction logging) of boreholes, wells, access tubes, caissons, or shafts (hereafter referred as boreholes) as commonly applied to geologic, engineering, groundwater and environmental (hereafter referred as geotechnical) explorations. Induction logging for minerals or petroleum applications is excluded.

1.2 This guide defines an induction log as a record of formation electrical conductivity or resistivity with depth as measured by the induction method in a borehole.

1.2.1 Induction logs are treated quantitatively and should be interpreted with other logs and data whenever possible.

1.2.2 Induction logs are commonly used to: (1) delineate lithology; (2) evaluate formation water quality and effective porosity, and (3) correlate stratigraphy between boreholes.

1.3 This guide is restricted to induction measurements that are at a frequency of less than 50 KHz; are non-directional; and average formation properties around the circumference of the borehole; which are the most common induction measurement devices used in geotechnical applications.

1.4 This guide provides an overview of induction logging including (1) general procedures; (2) specific documentation; (3) calibration and standardization; and (4) log quality and interpretation.

1.5 To obtain additional information on induction logs see References section in this guide.

1.6 This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This guide should not be used as a sole criterion for induction logging and does not replace education, experience, and professional judgment. Induction logging procedures

should be adapted to meet the needs of a range of applications and stated in general terms so that flexibility or innovation are not suppressed. 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 without consideration of a project's many unique aspects. The word standard in the title of this document means that the document has been approved through the ASTM consensus process.

1.7 *Units*—The values stated in either inch-pound units or SI units [given in brackets] 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. Combining values from the two systems may result in non-conformance with the standard. Add, if appropriate, “Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.”

1.8 *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 requirements prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D5088 Practice for Decontamination of Field Equipment Used at Waste Sites

D5608 Practices for Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

D5753 Guide for Planning and Conducting Borehole Geophysical Logging

3. Terminology

3.1 Definitions:

¹ This guide is under the jurisdiction of ASTM Committee **D18** on Soil and Rock and is the direct responsibility of Subcommittee **D18.01** on Surface and Subsurface Characterization.

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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.