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Nuclear instrumentation - Geophysical borehole instrumentation to determine rock density ('density logging')

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Nuclear instrumentation - Geophysical borehole instrumentation to determine rock density ("density logging")

FOREWORD

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IEC 61874 has been prepared by IEC technical committee 45: Nuclear instrumentation. It is an International Standard.

This second edition cancels and replaces the first edition published in 1998. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Clause 2: updating of reference documents;
b) Clause 3: revision of the terms and definitions;
c) Clause 4: revision of the composition of the equipment;
d) Subclause 5.1.2: addition of the outside diameters of borehole probes;
e) Subclause 5.2.1: revision of the time constant;

f) Subclauses 6.1, 6.2, 6.3, and 6.6: revision of the mechanical and environmental performance requirements;

g) Subclause 8.2: revision of the operating time requirements;

h) Clause 10: addition of the mechanical and environmental performance test methods;

i) Subclause 11.2: addition of the pre- and post-logging operation checks;

j) Clause 12: revision of the safety requirements;

k) Clause 13: addition of the characteristics to be specified in the operation and maintenance documentation or certificate of the equipment.

The text of this International Standard is based on the following documents:

Draft	Report on voting
45/1004/CDV	45/1014/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,

– withdrawn, or

– revised.

1 Scope

This document applies to equipment consisting of:

– a borehole logging probe equipped with a collimated radioisotope (gamma) source (during the actual measurements only) and a detector unit to measure scattered gamma radiation;

– a hoisting system and depth measuring system;

– other instruments and devices (power supply, pulse converter/amplifier, ratemeter, recorder, signal processing and readout units).

This document defines the terminology, specifies the types of apparatus, design and general technical requirements, specific radiation performance, electrical, mechanical, safe and environmental performance requirements. It also defines test and calibration procedures and covers electrical safety and radiation protection issues. Further, it gives recommendations about items included in the manufacturer's operation and maintenance documentation (or certificate).

The purpose of this document is to specify design requirements and performance characteristics of nuclear instrumentation used in boreholes to determine bulk rock density *in situ*. With suitable response charts the measurements can be equated to rock lithology and porosity.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-395, *International Electrotechnical Vocabulary (IEV) - Part 395: Nuclear instrumentation - Physical phenomena, basic concepts, instruments, systems, equipment and detectors*

IEC 60359, *Electrical and electronic measurement equipment - Expression of performance*

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements*

ISO 2919, *Radiological protection - Sealed radioactive sources - General requirements and classification*

IAEA Safety Standards Series No.SSG-57, *Radiation Safety in Well Logging*