IEC TR 63436

Edition 1.0 2026-01

TECHNICAL REPORT

Insulation monitoring device - Marine AC application example

ICS 47.020.60

ISBN 978-2-8327-0994-8

IEC TR 63436:2026-01(en)

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FOREWORD

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IEC TR 63436 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
18/2010/DTR	18/2019/RVDTR

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 Technical Report 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– withdrawn, or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.

INTRODUCTION

The purpose of this document is to determine the values of the alarm thresholds of the insulation controller resulting from a loss of insulation of a device or a group of devices installed in an IT electrical system.

IEC 60364-4-41:2005 and IEC 60364-4-41:2005/AMD1:2017 is dedicated to the safety of people, i.e. protection against electric shock. Subclause 411.6 is dedicated to the IT system.

In cases where an IT system is used for reasons of continuity of supply, also in the event of an earth fault, an insulation monitoring device is used to indicate the occurrence of that first fault from a live part to exposed-conductive-parts or to earth.

For onshore applications, the exposed-conductive-parts are connected to earth, either individually, in groups, or collectively to R_A (see Figure 1). R_A is the sum of the resistance in ohms of the earth electrode and protective earthing conductor PE (see IEC 60364-4-41:2005 and IEC 60364-4-41:2005/AMD1:2017, 411.6, and IEC 60364-1:2025, Figure 19).

For marine applications, the exposed-conductive-parts are connected, either individually, in groups, or collectively to the hull. The protective conductors are either connected to the earthing bar of the switchboard or directly to the hull.

For the purpose of this study of the alarm thresholds and touch voltage, the following is presumed:

a) R_A is the parameter to calculate at the fault point to find the touch voltage between exposed-conductive-parts of a faulty equipment and to the hull (not including R_B). The basic schematics are not changed. See Figure 1.

b) R_B is not used in the calculations, because this is a very low value which does not influence the current within the impedance if fitted on the neutral point and this value is not easily identified.

c) R_A and R_B are estimated in Clause 6.

Low voltage rotating machines, transformers, switchgear and controlgear assemblies, cables, loads, etc., are subject to insulation resistance measurements during production, installation, commissioning and periodic maintenance of equipment and systems. These values give the operators information regarding the operational quality of a product or a sub-assembly, but do not make it possible to conclude on the operational quality of an entire electrical network.

Insulation monitoring devices (IMDs) measure the insulation resistance, including the resistance of all the connected loads to one voltage system to earth.

These two types of measurements have generally different values and cannot be compared.

1 Scope

This document explains the setting parameters of insulation monitoring devices (IMDs) and how to interpret these measurements through plotted curves. Some examples of injection methods are also proposed.

NOTE 1 Requirements for IMDs are specified by IEC 61557-8.

The examples given in this document consider the situation of an insulation fault in an installation or equipment (motors, enclosure, cables, etc.) creating a resistive path to earth and calculate the touch voltage. It does not consider a person making direct contact with a live conductor in an IT grid.

NOTE 2 This document is informative and cannot contain requirements, in accordance with the ISO/IEC Directives, Part 2, for technical reports.

2 Normative references

There are no normative references in this document.

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SOLAS International Convention for the Safety of Life at Sea, 1974 as amended by the 1981, 1992, 1995, 1996 and 2004 SOLAS Amendments, CHAPTER II-1 CONSTRUCTION - STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS, PART D ELECTRICAL INSTALLATIONS, Regulation 45 Precautions against shock, fire and other hazards of electrical origin

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