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General requirements for residual current operated protective devices for DC systems

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee PEL/23/1, Circuit breakers and similar equipment for household use.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 63053, which is a technical specification, has been prepared by subcommittee 23E: Circuit-breakers and similar equipment for household use, of IEC technical committee 23: Electrical accessories.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
23E/1006/DTS	23E/1021/RVDTS

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types are used:

– *conformity statements: in italic type*

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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

In AC systems, residual current devices are used to provide protection against the risk of electric shocks. In IEC 60364 (all parts), residual current devices are used for automatic disconnection of supply in case of fault (see Clause 411 of IEC 60364-4-41:2005) and residual current devices with rated residual operating current not exceeding 30 mA are used as additional protection (see 415 of IEC 60364-4-41:2005). IEC SC 23E has developed a set of standards for residual current operated protective devices intended to be used in AC systems.

DC systems are used for applications such as photovoltaic installations, data centres and telecom centres, and electric vehicle charging systems. In addition, standards for plugs and socket-outlets for ICT equipment installed in date centres and telecom centre have been published. Therefore, a reference document for residual current devices intended to be used in DC supply systems is necessary.

Residual current devices for DC systems may be used to provide fault protection (automatic disconnection of supply according to Clause 411 of IEC 60364-4-41:2005); they may also be used to provide protection against direct contact. They provide protection against electric shock downstream of the device in DC networks.

This document defines the operating characteristics for residual current operated protective devices for DC systems. Details of how they should be installed to provide the desired level of protection are specified in the various parts of the IEC 60364 series.

The operating characteristics given in this document are based on the information contained in IEC 60479 (all parts) and the requirements in IEC 60364-4-41.

This document is intended for use by technical committees in the preparation of standards for residual current devices. It is not intended to be used as a stand-alone document, for example, for certification.

GENERAL REQUIREMENTS FOR RESIDUAL CURRENT OPERATED PROTECTIVE DEVICES FOR DC SYSTEMS

1 Scope

This document provides general minimum requirements, recommendations and information for the drafting and testing procedures of standards for residual current operated protective devices, intended to be used in DC systems having a rated voltage not exceeding 400 V DC and a rated current not exceeding 125 A, hereafter referred to as DC-RCDs.

NOTE 1 This document can also be used as a guide for DC-RCDs with voltages up to 1 500 V DC.

This document is primarily intended to be used as a reference for drafting product safety standard for DC-RCDs.

This document cannot be used alone but is intended for use by technical committees in the preparation of standards for products similar to those mentioned in the scope of this standard.

This document applies to a device

– which detects a residual current,
– compares it to a reference value, and
– opens the contacts or poles when the residual current exceeds this reference value.

Any association of devices, each one of them performing separately one or two of the above-mentioned functions, but acting together in order to accomplish all three functions, is also covered by this document.

NOTE 2 RCMs (residual current monitor according to IEC 62020) whose purpose is to monitor an electrical installation and not to provide protection are not covered by this document and cannot be considered similar or equivalent to DC-RCDs.

DC-RCDs are intended to provide fault protection, the exposed conductive parts of the installation being connected to an appropriate earth electrode, in accordance with IEC 60364-4-41.

DC-RCDs having a rated residual operating direct current not exceeding 80 mA are also used as a provision for additional protection in case of failure of the protective means against electric shock.

In accordance with IEC 60364-4-42, residual current devices with a rated residual operating current not exceeding 300 mA can also be used to provide protection against fire hazards due to a persistent earth fault current.

DC-RCDs are suitable for isolation. They are suitable for all supply systems, with the exception of single-pole DC-RCDs with two current paths which are not suitable for use in IT systems.

DC-RCDs of the general type are resistant to unwanted tripping including the case where surge voltages (as a result of switching transients or induced by lightning) cause loading currents in the installation without occurrence of flashover.

NOTE 3 Installation and application rules of RCDs are given in IEC 60364 (all parts).

NOTE 4 Surge protective devices installed downstream of DC-RCDs and connected in common mode can cause unwanted tripping.