IEEE SA
STANDARDS ASSOCIATION

IEEE Standard for Pad-Mounted Dry Vault, Submersible, and Overhead Fault Interrupters for Alternating Current Systems Up to and Including 38 kV

STANDARDS

IEEE Power and Energy Society

Developed by the
Switchgear Committee

IEEE Std C37.62™-2020

IEEE

IEEE Standard for Pad-Mounted, Dry Vault, Submersible, and Overhead Fault Interrupters for Alternating Current Systems Up to and Including 38 kV

Developed by the

Switchgear Committee
of the
IEEE Power and Energy Society

Approved 3 December 2020

IEEE SA Standards Board

Abstract: Required definitions, ratings, procedures for performing design tests and production tests, and construction requirements for pad-mounted, dry vault, submersible, and overhead fault interrupters for alternating current systems up to and including 38 kV are provided in this standard.

Keywords: dry vault, fault interrupter, FI, IEEE C37.62™, medium voltage, overhead, pad-mounted, submersible, switchgear

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-1-5044-7277-7 STD24545
Print: ISBN 978-1-5044-7278-4 STDPD24545

Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE Standards documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page (https://standards.ieee.org/ipr/disclaimers.html), appear in all standards and may be found under the heading "Important Notices and Disclaimers Concerning IEEE Standards Documents."

Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE SA) Standards Board. IEEE develops its standards through an accredited consensus development process, which brings together volunteers representing varied viewpoints and interests to achieve the final product. IEEE Standards are documents developed by volunteers with scientific, academic, and industry-based expertise in technical working groups. Volunteers are not necessarily members of IEEE or IEEE SA, and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

IEEE makes no warranties or representations concerning its standards, and expressly disclaims all warranties, express or implied, concerning this standard, including but not limited to the warranties of merchantability, fitness for a particular purpose and non-infringement. In addition, IEEE does not warrant or represent that the use of the material contained in its standards is free from patent infringement. IEEE standards documents are supplied "AS IS" and "WITH ALL FAULTS."

Use of an IEEE standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity, nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: THE NEED TO PROCURE SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE is the approved IEEE standard.

Official statements

A statement, written or oral, that is not processed in accordance with the IEEE SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that the presenter's views should be considered the personal views of that individual rather than the formal position of IEEE, IEEE SA, the Standards Committee, or the Working Group.

Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE or IEEE SA. However, **IEEE does not provide interpretations, consulting information, or advice pertaining to IEEE Standards documents**.

Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its Societies and Standards Coordinating Committees are not able to provide an instant response to comments, or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in evaluating comments or in revisions to an IEEE standard is welcome to join the relevant IEEE working group. You can indicate interest in a working group using the Interests tab in the Manage Profile & Interests area of the IEEE SA myProject system. An IEEE Account is needed to access the application.

Comments on standards should be submitted using the Contact Us form.

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not constitute compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Data privacy

Users of IEEE Standards documents should evaluate the standards for considerations of data privacy and data ownership in the context of assessing and using the standards in compliance with applicable laws and regulations.

Copyrights

IEEE draft and approved standards are copyrighted by IEEE under US and international copyright laws. They are made available by IEEE and are adopted for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

Photocopies

Subject to payment of the appropriate licensing fees, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400; https://www.copyright.com/. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Updating of IEEE Standards documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect.

Every IEEE standard is subjected to review at least every 10 years. When a document is more than 10 years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit IEEE Xplore or contact IEEE. For more information about the IEEE SA or IEEE's standards development process, visit the IEEE SA Website.

Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE SA Website. Search for standard number and year of approval to access the web page of the published standard. Errata links are located under the Additional Resources Details section. Errata are also available in IEEE Xplore. Users are encouraged to periodically check for errata.

Patents

IEEE Standards are developed in compliance with the IEEE SA Patent Policy.

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE SA Website at https://standards.ieee.org/about/sasb/patcom/patents.html. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

IMPORTANT NOTICE

IEEE Standards do not guarantee or ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. IEEE Standards development activities consider research and information presented to the standards development group in developing any safety recommendations. Other information about safety practices, changes in technology or technology implementation, or impact by peripheral systems also may be pertinent to safety considerations during implementation of the standard. Implementers and users of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

Participants

At the time this IEEE standard was completed, the Fault Interrupter Working Group had the following membership:

Anton Bonner, *Chair*
Frank DeCesaro, *Vice Chair*

John Paul Adigwu
Peter Agliata
Edwin Almeida
Chris Ambrose
Thomas Ballard
Harm Bannink
Jerry Baskin
David Beseda
Christopher Borck
Mohit Chhabra
Kennedy Darko
Anil Dhawan
William Ernst
Paul Found
Brian Gerzeny
Jeffrey Gieger
Peter Glaesman
Harold Hirz
Edward Jankowich
Travis Johnson
Brendan Kirkpatrick
Chris Lettow
Wangpei Li
Donald Martin
Steven Meiners
Jacob Midkiff
Christopher Morton
Stephen Pell
Larry Putman
Scott Reed
Caryn Riley
Ian Rokser
Ben Rosenkrans
Timothy Royster
James Ruebensam
Victor Savulyak
R. Kirkland Smith
Francois Soulard
Jon Spencer
Tom Stefanski
Jim Swank
Karla Trost
Nenad Uzelac
William Walter

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Peter Agliata
Chris Ambrose
Charles Ball
Thomas Ballard
Harm Bannink
Thomas Barnes
David Beseda
Antone Bonner
Demetrio Bucaneg, Jr.
Ted Burse
Eldridge Byron
Thomas Callsen
Paul Cardinal
Nancy Chilton
Frank DeCesaro
Robert Dempsey
Edgar Dullni
Leslie Falkingham
Paul Found
Mietek Glinkowski
Randall Groves
John Harley
Werner Hoelzl
Robert Hoerauf
Richard Jackson
Rahul Jain
Peter Kelly
Boris Kogan
Jim Kulchisky
Chung-Yiu Lam
Benjamin Lanz
John Leach
Bradley Lewis
Wangpei Li
Donald Martin
Steven Meiners
Peter Meyer
Charles Morse
Christopher Morton
Daniel Mulkey
Timothy Myers
Dennis Neitzel
Joe Nims
T. W. Olsen
Lorraine Padden
Stephen Pell
Christopher Petrola
Larry Putman
Moises Ramos
Caryn Riley
Timothy Robirds
Charles Rogers
Ian Rokser
Timothy Royster
Bartien Sayogo
Jerry Smith
R. Kirkland Smith
Gary Smullin
Francois Soulard
Jon Spencer
Gary Stoedter
David Tepen
Karla Trost
Nenad Uzelac
James Van De Ligt
John Vergis
William Walter
John Webb
Steven Whalen
Jonathan Woodworth
Terry Woodyard
Matthew Zeedyk

When the IEEE-SA Standards Board approved this standard on 3 December 2020, it had the following membership:

Gary Hoffman, *Chair*
Jon Walter Rosdahl, *Vice Chair*
John D. Kulick, *Past Chair*
Konstantinos Karachalios, *Secretary*

Ted Burse
Doug Edwards
J. Travis Griffith
Grace Gu
Guido R. Hiertz
Joseph L. Koepfinger*
David J. Law
Howard Li
Dong Liu
Kevin Lu
Paul Nikolich
Damir Novosel
Dorothy Stanley
Mehmet Ulema
Lei Wang
Sha Wei
Philip B. Winston
Daidi Zhong
Jingyi Zhou

*Member Emeritus

Introduction

This introduction is not part of IEEE Std C37.62-2020, IEEE Standard for Pad-Mounted, Dry Vault, Submersible, and Overhead Fault Interrupters for Alternating Current Systems Up to and Including 38 kV.

Fault interrupter (FI) and automatic recloser switchgear have shared the same standard, IEEE Std C37.60™, for many decades.[1] Because reclosers are used extensively throughout the world, IEEE coordinated with the International Electrotechnical Commission (IEC) to publish a dual logo standard, IEEE Std C37.60/IEC 62271-111, in 2005 and revised in 2012. A second revision started shortly after the 2012 publication. As part of that revision, it was decided that the fault interrupter, which is not used extensively throughout the world, should have its own IEEE non-dual logo standard, to be designated IEEE Std C37.62. As FIs are primarily used in regions where equipment is specified to IEEE standards, it was considered to be appropriate for this to be an IEEE standard and not have a dual logo, the intent being that the new standard will maintain its focus on FIs without being influenced by the requirements of other switchgear.

This standard is an extraction from IEEE Std C37.60-2012/IEC 62271-111:2012 of the rating structure, preferred ratings, construction requirements, and design and routine test requirements that are relevant to FIs. Changes made to the 2018 revision of IEEE Std C37.60/IEC 62271-111 have been included in this standard as they are relevant to FIs.

The principle technical changes, with respect to IEEE Std C37.60-2012/IEC 62271-111:2012, are as follows:

- The clause numbering was changed from the IEC style as used in IEEE Std C37.60-2012/IEC 62271-111:2012 to the preferred IEEE style.
- The temperature rise limits were lowered for tin-coated contacts (see 5.4.2).
- An oil sampling provision for sampling from the bottom of the tank is required of all pad-mounted units, not just submersible units (see 6.1.3).
- The power frequency voltage withstand wet test method was changed from the traditional ten second wet test to the one minute wet test per the IEEE Std 4™ “standard test procedure” (see 7.3.7.2).
- A limitation on preliminary impulse test shots was added to impulse voltage withstand testing of vacuum interrupters (see 7.3.7.3).
- A procedure for testing line- and cable-charging current interruption in three-phase FI with three independently controlled poles was added (see 7.13.4.1).
- The handling of restrikes in line- and cable-charging current interruption tests was changed to a limitation of no more than three operations with restrikes rather than three restrikes (see 7.13.6.2).
- The T100 test duty current range was changed from 90% to 100% of rated symmetrical interrupting current to 100% to 105% (see Table 9).
- The critical current interrupting test was replaced by a low current interrupting test at 5% and 10% of rated symmetrical interrupting current (see 7.16).
- A thermal runaway test was specified for verifying current carrying capability following current interrupting tests if resistance measurements are not conclusive (see 7.25).
- A sealed tank pressure test to verify proper mechanical operation was specified (see 7.26).
- An operations endurance test, performed with the switchgear under rated pressure, was added for submersible units (see 7.27).

[1] Information on references can be found in Clause 2.

Contents

IEEE Standard for Pad-Mounted, Dry Vault, Submersible, and Overhead Fault Interrupters for Alternating Current Systems Up to and Including 38 kV

1. Overview

1.1 Scope

This standard applies to all pad-mounted, dry vault, submersible, and overhead single- or multi-pole alternating current fault interrupters (FIs) for rated maximum voltages above 1000 V and up to and including 38 kV.

Devices that require a dependent manual operation are not covered by this standard.

In order to simplify this standard where possible, the term FI (FIs) has been substituted for fault interrupter (fault interrupters).

1.2 Purpose

The purpose of this standard is to define the rating structure, preferred ratings, test, and construction requirements for pad-mounted, dry vault, submersible, and overhead single- or multi-pole alternating current FIs for maximum voltages above 1000 V and up to 38 kV.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (shall equals is required to).[2, 3]

[2] The word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.
[3] The word *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.