



IEEE Standard for Pole-Mounted Equipment—Enclosure Integrity

IEEE Power & Energy Society

Sponsored by the
Transformers Committee

C57.12.31TM

IEEE
3 Park Avenue
New York, NY 10016-5997, USA

20 September 2010

IEEE Std C57.12.31TM-2010
(Revision of
IEEE Std C57.12.31-2002)

IEEE Standard for Pole-Mounted Equipment—Enclosure Integrity

Sponsor

Transformers Committee
of the
IEEE Power & Energy Society

Approved 17 June 2010

IEEE-SA Standards Board

Abstract: Conformance tests and requirements for the coating integrity of carbon steel pole-mounted enclosures containing apparatus energized in excess of 600 V, typically located out of reach of the general public, including, but not limited to, the following types of equipment enclosures: pole-mounted distribution transformers, pole-mounted switches, pole-mounted regulators, pole-mounted metering equipment, pole-mounted reclosers, and pole-mounted switchgear, are covered.

Keywords: coating integrity, enclosure integrity, pole-mounted equipment, switches, transformers

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

Copyright © 2010 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 20 September 2010. Printed in the United States of America.

IEEE is a registered trademark in the U.S. Patent & Trademark Office, owned by the Institute of Electrical and Electronics Engineers, Incorporated.

PDF: ISBN 978-0-7381-6379-6 STD96096
Print: ISBN 978-0-7381-6380-2 STDPD96096

IEEE prohibits discrimination, harassment and bullying. For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>. No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the 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.

Use of an IEEE Standard is wholly voluntary. The IEEE disclaims liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon this, or any other IEEE Standard document.

The IEEE does not warrant or represent the accuracy or content of the material contained herein, and expressly disclaims any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the material contained herein is free from patent infringement. IEEE Standards documents are supplied “**AS IS.**”

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. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation, or every ten years for stabilization. When a document is more than five years old and has not been reaffirmed, or more than ten years old and has not been stabilized, 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 publishing and making this document available, the IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is the IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing this, and any other IEEE Standards document, should rely upon his or her 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.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received 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 interpretation requests except in those cases where the matter has previously received formal consideration. A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal interpretation of the IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Recommendations to change the status of a stabilized standard should include a rationale as to why a revision or withdrawal is required. Comments and recommendations on standards, and requests for interpretations should be addressed to:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854
USA

Authorization to photocopy portions of any individual standard for internal or personal use is granted by The Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Introduction

This introduction is not part of IEEE Std C57.12.31-2010, IEEE Standard for Pole-Mounted Equipment—Enclosure Integrity.

The Accredited Standards Committee on Transformers, Regulators, and Reactors, C57, has for a number of years been developing and correlating standards on these products. The data used in this work have been gathered from many sources, including the standards of the Institute of Electrical and Electronics Engineers (IEEE) and the National Electrical Manufacturers Association (NEMA), reports of committees of the Edison Electric Institute (EEI), and others.

This IEEE standard is a voluntary consensus standard. Its use becomes mandatory only when required by a duly constituted legal authority or when specified in a contractual relationship. To meet specialized needs and to allow innovation, specific changes are permissible when mutually determined by the user and the producer, provided such changes do not violate existing laws and are considered technically adequate for the function intended.

This standard was originally prepared by the Joint C57/C37 Working Group on Enclosures with Joseph Martin and then Robert C. Olen as chairmen. This group is now the Enclosure Integrity Working Group of the IEEE Transformers Committee.

Notice to users

Laws and regulations

Users of these documents should consult all applicable laws and regulations. Compliance with the provisions of this standard does not imply 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.

Copyrights

This document is copyrighted by the IEEE. It is made available 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 this document available for use and adoption by public authorities and private users, the IEEE does not waive any rights in copyright to this document.

Updating of IEEE documents

Users of IEEE standards 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. 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 the IEEE Standards Association web site at <http://ieeexplore.ieee.org/xpl/standards.jsp>, or contact the IEEE at the address listed previously.

For more information about the IEEE Standards Association or the IEEE standards development process, visit the IEEE-SA web site at <http://standards.ieee.org>.

Errata

Errata, if any, for this and all other standards can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/updates/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Interpretations

Current interpretations can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/interp/index.html>.

Patents

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 with respect to the existence or validity of any patent rights in connection therewith. 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 Patent 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.

Participants

At the time this standard was submitted to the IEEE-SA Standards Board for approval, the Enclosure Integrity Working Group had the following membership:

Robert C. Olen, *Co-Chair*
Daniel H. Mulkey, *Co-Chair*

Ignacio Ares
Israel Barrientos-Torres
Bikash Basu
David Blew
Paul Buchanan
Thomas Callsen
Joseph Carulli
Tommy Cooper
John Crotty
Kevin dela Houssaye
Charles Drexler
Michael Faulkenberry

Carlos Gaytan
Ali Ghafourian
Myron Gruber
Said Hachichi
Kenneth Hanus
Michael Hardin
Richard Hollingsworth
Gael Kennedy
Gary King
Stan Linsenbardt
Jerry Murphy
Carl Niemann
Tim Olson

Dwight Parkinson
Mahesh Sampat
Stephen Shull
Ed Smith
Ron Stahara
Giuseppe Termini
Alan Traut
Donnie Trivitt
Shelby Walters
Alan Wilks
William Wimmer
Zuoqing Xu

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

Satish K. Aggarwal
Peter Agliata
Samuel H. Aguirre
Steven Alexanderson
Chris Ambrose
Robert Behl
Steven Bezner
Wallace Binder
Thomas Blackburn
Harvey Bowles
Paul Buchanan
Suresh Channarasappa
Yunxiang Chen
Kevin dela Houssaye
Randall Dotson
Charles Drexler
Dana Dufield
Edgar Dullni
Gary Engmann
Michael Faulkenberry
Bruce Forsyth
Marcel Fortin
James Gardner
Jalal Gohari

Edwin Goodwin
Randall Groves
Said Hachichi
Gary Heuston
Werner Hoelzl
George House
Andrew Jones
Gael Kennedy
Gary King
Joseph L. Koepfinger
Jim Kulchisky
Chung-Yiu Lam
John Leach
Deni Lee
John W. Matthews
Lee Matthews
Steven Meiners
Peter Meyer
Georges Montillet
Daniel H. Mulkey
Michael S. Newman
Carl Niemann
Robert C. Olen
Tim Olson
Donald Parker

Bansi Patel
Alvaro Portillo
Michael Roberts
Robert Robinson
Charles Rogers
Ken Romano
John Rossetti
Bartien Sayogo
Stephen Shull
Gil Shultz
Hyeong Sim
James Smith
Jerry Smith
Steve Snyder
Ronald Stahara
Gary Stoedter
John Sullivan
James Swank
Alan Traut
John Vergis
Waldemar Von Miller
William H. Walter
Alan Wilks
William Wimmer

When the IEEE-SA Standards Board approved this standard on 17 June 2010, it had the following membership:

Robert M. Grow, *Chair*
Richard H. Hulett, *Vice Chair*
Steve M. Mills, *Past Chair*
Judith Gorman, *Secretary*

Karen Bartleson
Victor Berman
Ted Burse
Clint Chaplin
Andy Drozd
Alexander Gelman
Jim Hughes

Young Kyun Kim
Joseph L. Koepfinger*
John Kulick
David J. Law
Hung Ling
Oleg Logvinov
Ted Olsen

Ronald C. Petersen
Thomas Prevost
Jon Walter Rosdahl
Sam Sciacca
Mike Seavey
Curtis Siller
Don Wright

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Satish K. Aggarwal, *NRC Representative*
Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Michelle Turner
IEEE Standards Program Manager, Document Development

Mathew J. Ceglia
IEEE Standards Program Manager, Technical Program Development

Contents

1. Overview	1
1.1 Scope	1
1.2 Purpose	1
2. Normative references.....	2
3. Definitions	2
4. Enclosure design and coating system requirements	3
4.1 Enclosure design requirements—Objective.....	3
4.2 Substrate requirements.....	4
4.3 Coating system requirements.....	4
4.4 Coating system test specimens	4
4.5 Coating system performance requirements.....	5
5. General	9
5.1 Shipment.....	9
5.2 Coating repair procedure	9
Annex A (normative) Scab procedure	10
Annex B (informative) Bibliography.....	11

IEEE Standard for Pole-Mounted Equipment—Enclosure Integrity

IMPORTANT NOTICE: This standard is not intended to ensure safety, security, health, or environmental protection. Implementers of the standard are responsible for determining appropriate safety, security, environmental, and health practices or regulatory requirements.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

1. Overview

1.1 Scope

This standard covers conformance tests and requirements for the enclosure integrity of pole-mounted equipment containing apparatus energized in excess of 600 V, typically not accessible to the general public, such as but not limited to the following types of equipment:

- a) Pole-mounted distribution transformers
- b) Pole-mounted switches
- c) Pole-mounted regulators
- d) Pole-mounted metering equipment
- e) Pole-mounted reclosers/sectionalizers
- f) Pole-mounted capacitors

1.2 Purpose

The purpose of this standard is to describe the requirements for a comprehensive system for pole-mounted enclosures providing long service life with minimum maintenance.