IEEE STANDARDS ASSOCIATION

IEEE Standard for Electrical Safety Practices in Electrolytic Cell Line Working Zones

IEEE Industry Applications Society

Sponsored by the
Petroleum and Chemical Industry Committee

REDLINE
Shows changes from the previous version!

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

IEEE Std 463™-2013
(Revision of
IEEE Std 463-2006)

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Documents
Document Sharing Hub
Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.
Full document details: IEEE 463-2013

This is a Redline Document produced by Techstreet, a business of Thomson Reuters.

This document is intended to provide users with an indication of changes from one edition to the next. It includes a full-text version of the new document, plus an indication of changes from the previous version.

Redlines are designed to save time and improve efficiencies by using the latest software technology to find and highlight document changes. More professionals are using valuable new technologies like redlines, to help improve outcomes in a fastpaced global business world.

Because it may not be technically possible to capture all changes accurately, it is recommended that users consult previous editions as appropriate. In all cases, only the current base version of this publication is to be considered the official document.

445 Hoes Lane, Piscataway, NJ 08854 USA | http://standards.ieee.org | Tel. +1 732-981-0060 Fax +1 732-562-1571

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Redline Processing Notes:

1. ~~**Red Text**~~ - Red strikethrough text denotes deletions.

2. **Blue Text** - Blue underlined text denotes modifications and additions.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

IEEE Std 463™-2013
(Revision of
IEEE Std 463-2006)

IEEE Standard for Electrical Safety Practices in Electrolytic Cell Line Working Zones

Sponsor

Petroleum and Chemical Industry Committee
of the
IEEE Industry Applications Society

Approved 23 August 2013

IEEE-SA Standards Board

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Abstract: Means for improved safeguarding of personnel while operating or maintaining equipment located in electrolytic cell line working zones are provided. Included are related requirements for equipment and electrical conductor installations. The general types of electrolytic cells covered include, but are not limited to, the direct current cells used in the production of aluminum, cadmium, sodium chlorate, chlorine, copper, fluorine, hydrogen peroxide, magnesium, sodium, and zinc.
Keywords: cell line working zone, electrical conductor installations, electrical safety, electrolytic cell line, IEEE 463™

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

Copyright © 2013 by The Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 4 October 2013. 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.

National Electrical Code and NEC are both registered trademarks of the National Fire Protection Association, Inc.

PDF: ISBN 978-0-7381-8595-8 STD98358
Print: ISBN 978-0-7381-8596-5 STDPD98358

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.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page, appear in all standards and may be found under the heading "Important Notice" or "Important Notices and Disclaimers Concerning IEEE Standards Documents."

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

IEEE Standards documents (standards, recommended practices, and guides), both full-use and trial-use, are developed within IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association ("IEEE-SA") Standards Board. IEEE ("the Institute") develops its standards through a consensus development process, approved by the American National Standards Institute ("ANSI"), which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute 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 does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims all warranties (express, implied and statutory) not included in this or any other document relating to the standard, including, but not limited to, the warranties of: merchantability; fitness for a particular purpose; non-infringement; and quality, accuracy, effectiveness, currency, or completeness of material. In addition, IEEE disclaims any and all conditions relating to: results; and workmanlike effort. 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: PROCUREMENT OF 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 should be considered the approved IEEE standard.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

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, or 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 his or her views should be considered the personal views of that individual rather than the formal position of IEEE.

Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide 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 revisions to an IEEE standard is welcome to join the relevant IEEE working group.

Comments on standards should be submitted to the following address:

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

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 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

IEEE draft and approved standards are copyrighted by IEEE under U.S. 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 fee, 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. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Copyright © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

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 ten years. When a document is more than ten 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 the IEEE-SA Website at http://ieeexplore.ieee.org/xpl/standards.jsp or contact IEEE at the address listed previously. For more information about the IEEE-SA or IEEE's standards development process, visit the IEEE-SA Website at http://standards.ieee.org.

Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE-SA Website at the following URL: http://standards.ieee.org/findstds/errata/index.html. Users are encouraged to check this URL for errata periodically.

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 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 http://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.

Copyright © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Participants

At the time this IEEE standard was completed, the Electrolytic Cell Line Working Group had the following membership:

Kenneth White, *Chair*
Daryld Ray Crow, *Vice Chair*
Paul Buddingh, *Secretary*

William Glover
Richard Holub
John Hus
Patrick Loupe
David Pace
Jack St. Mars

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

Dennis Bogh
Gustavo Brunello
Paul Cardinal
Keith Chow
Daryld Ray Crow
Ray Davis
Dan Evans
Robert Fletcher
Carl Fredericks
Randall Groves
Lee Herron
Werner Hoelzl
Richard Holub
Yuri Khersonsky
Jim Kulchisky
Saumen Kundu
Kenneth Mcclenahan
Peter Megna
Michael S. Newman
David Pace
Lorraine Padden
Christopher Petrola
Ulrich Pohl
Jesse Rorabaugh
Bartien Sayogo
Peter Sutherland
Kenneth White

When the IEEE-SA Standards Board approved this standard on 23 August 2013, it had the following membership:

John Kulick, *Chair*
David J. Law, *Vice Chair*
Richard H. Hulett, *Past Chair*
Konstantinos Karachalios, *Secretary*

Masayuki Ariyoshi
Peter Balma
Farooq Bari
Ted Burse
Wael William Diab
Stephen Dukes
Jean-Philippe Faure
Alexander Gelman
Mark Halpin
Gary Hoffman
Paul Houzé
Jim Hughes
Michael Janezic
Joseph L. Koepfinger*
David J. Law
Oleg Logvinov
Ron Petersen
Gary Robinson
Jon Walter Rosdahl
Adrian Stephens
Peter Sutherland
Yatin Trivedi
Phil Winston
Yu Yuan

*Member Emeritus

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

Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Michelle D. Turner
IEEE Standards Program Manager, Document Development

Lisa Perry
IEEE Standards Program Manager, Technical Program Development

Copyright © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Introduction

This introduction is not part of IEEE Std 463™-2013, IEEE Standard for Electrical Safety Practices in Electrolytic Cell Line Working Zones.

In 1974, the Electrical Cell Line Working Group of the Petroleum and Chemical Industry Committee prepared a trial-use standard for Electrical Safety Practices in Electrolytic Cell Line Working Zones. Comments on the trial-use standard were incorporated into a full-use IEEE standard, which was published as IEEE Std 463-1977. The standard was developed to provide electrical safety practices for the unique conditions of the working areas of electrolytic cell installations. It defines the extent of the area covered and sets forth means of improved safeguarding of personnel in the area. The means are based on many years of successful experience in the industry.

This standard covers conditions that are different from the general safety requirements in electrical installations stated in IEEE Std 141™-1993, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (The Red Book) [B2][a]; and IEEE Std 142™-1991, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems (The Green Book) [B3]. The standard was used as a source document for Article 668, Electrolytic Cells, of the National Electrical Code® (NEC®) (NFPA 70-2011); and Chapter 3, Safety Requirements for Special Equipment, of the Standard for Electrical Safety in the Workplace (NFPA 70E-2012).

This standard shall be applied with judgment. The requirements are of necessity general to cover the widely varied conditions of electrolytic cell areas. The selection of safeguards shall include consideration of the nature and exposure of an electrical hazard as well as unnecessary restriction of operation of the plant.

In 2005, a working group was formed for the purpose of reviewing and updating the standard.

[a] The numbers in brackets correspond to those of the bibliography in Annex B.

Copyright © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013

Contents

1. Overview 1
1.1 Scope 1
1.2 Purpose 2

2. Definitions 2

3. Description of electrolytic cell lines 3

4. Cell line working zone 3

5. Improved safeguarding of personnel from electrical hazards within the cell line working zone 4
5.1 Insulation 4
5.2 Guards 4
5.3 Voltage equalization 4
5.4 Isolation 4
5.5 Physical clearance 4
5.6 Personal protective equipment 5
5.7 Work practices for improved safety 5
5.8 Additional requirements 6
5.9 Pacemakers and metallic implants 6
5.10 Tools 6

6. Cell line working zone installations 6
6.1 Power supply circuits 6
6.2 Electric equipment 7
6.3 Portable generators used to supply temporary power in the cell line working zone 9
6.4 Arc-welding machines (electrically powered) 9
6.5 Cranes and hoists 9
6.6 Nonelectrical components 10

7. Cell and cell line circuit grounding 10

8. Enclosures 10

Annex A (informative) Typical cell line working zone applications of safeguards where electrical hazards exist 11

Annex B (informative) Bibliography 13

Copyright © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Authorized licensed use limited to: Tsinghua University. Downloaded on March 07,2026 at 05:22:37 UTC from IEEE Xplore. Restrictions apply.

Full document details: IEEE 463-2013