Spring 2022, Volume 11, Issue 1

ICC Newsletter

Act now! Special offer to first-time utility attendees to the ICC Spring meeting – ten complimentary registrations! Please contact billtaylor@pesicc.org.

From the ICC Chair

Yingli Wen

Since the start of the COVID-19 pandemic, a greater than normal flux of retirements has taken place in our industry, intensifying the urgency for knowledge transfer. To this end, I am optimistic about our in-person meeting scheduled for May 1-4, 2022, in Anaheim, Calif. and encourage everyone to begin planning your trip to attend. Additional information is available on the ICC website.

ICC meetings provide the opportunity for information exchange on current industrial practices and new trends. In fact, ICC meetings are the best place to learn from experts and to make contributions to industrial standards development utilizing both your knowledge and experience. I hope to see more young engineers become involved by attending ICC meetings; as in the past, the first 10 new utility attendee registrations are complimentary.

2022 marks the 75th year of ICC's operation, so celebratory activities are planned for the Fall '22 and Spring '23 meetings. If you have any ideas or suggestions to mark this occasion, please don't hesitate to let me know. A suggestion box is available at the registration desk during ICC meetings for submitting your input.

It is indeed an honor to serve as your Chair for 2022-2023. I must thank our outgoing Chair, Henk Geene, for his dedication to the ICC community during a very difficult time. Henk encountered many unparalleled challenges during his term as Chair. He handled everything skillfully and prevented ICC from possible financial hardship due to meeting and hotel cancellations. Several working groups continued standards development activities via regular online meetings.

I am fortunate to have Bert Spear from Duke Energy as our Vice Chair. With Bert's technical expertise and leadership skills, the wealth of knowledge and experience of IEEE/ICC operations from the dedicated ExCom and AdCom members, as well as the support from all ICC members and guests, I am confident your new leadership team will keep the ICC torch burning brightly along the path to an even better future. I look forward to seeing you in Anaheim.

Yingli Wen, Ph.D.
Consolidated Edison Company of New York

IEEE 383 Undergoing Changes

By Robert Konnik, Champlain Cable

IEEE 383 is the standard used for qualification of cables and splices for nuclear facilities. Qualification includes sections for normal conditions (referencing standards such as ICEA/NEMA), Arrhenius life projection per IEEE 98, thermal and radiation aging, flame testing (including VW-1 flame test for singles and IEEE 1202 vertical tray flame test for completed cables), long-term water testing at 90°C for one year, and design basis events such as Loss of Coolant accidents.

This is a daughter standard to IEEE 323, the standard for qualifying class 1E equipment (now harmonized with IEC 6078 as IEEE/IEC 60780-323). IEEE 323 was first published more than 50 years ago, while IEEE 383 was first published in 1974 with the first revision coming in 2003 and the latest revision in 2015. A white paper entitled IEEE 383-2003 to 2015 Changes was completed in 2018, and a presentation about the white paper was given at the Spring 2019 Subcommittee D meeting. Many changes were made to update IEEE 383 to reflect life extension from 40 to 60 years, new plant designs with cables and splices starting at a 60-year qualified life, and subsequent life extension from 60 to 80 years and beyond.

A PAR for IEEE 383 was completed and Working Group D10W meetings started in 2020. Work is expected to be complete early in 2023 – a tight schedule. Many items were discussed as part of the 2015 version, including information on condition monitoring, how to handle high beta radiation, jacket sump issues as they pertain to qualification, and splices and cables being qualified together as a system. New items being considered include changes based on IEEE/IEC 60780-323, semiconducting layer to stress control layer, use of discharge resistant material for MV cables, effect of thickness on diffusion limited oxidation, representative samples for IEEE 1202 flame test, and saturated versus superheated steam. Undoubtedly, there will be other topics discussed. Join us as we work towards the next revision of IEEE 383 before its 50th anniversary.

ICC Newsletter Team

Rachel Mosier, ICC Communications Chair
Harry Orton, Associate Editor

ICC Standards Corner

By Kathryn Klement, ICC Assistant Standards Coordinator

We are delighted to announce that two ICC standards have been approved by the IEEE SA Standards Board since the Fall 2021 newsletter.

New standard: IEEE 400.5, *Guide for Field Testing of Shielded DC Power Cable Systems Using High Voltage Direct Current (HVDC)* – WG F06W, chaired by Bill Larzelere.

Revised standard: IEEE 1407, *Guide for Accelerated Aging Tests for Medium-Voltage (5 kV - 35 kV) Extruded Electric Power Cables Using Water-Filled Tanks* – WG A13W Chaired by Detlef Wald (see article in this issue).

Six PARs were extended or revised, and one PAR for the revision of a standard was approved:

- P404, *Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV* - WG B02W, chaired by Jeff Madden.

In addition, ICC has accepted two Entity PARs submitted through IEEE's Entity Process. This is a new process for ICC and we look forward to sharing more information at the Spring meeting.

- P3148, *Guide for Field Detection of Metallic Sheath Current of Single-conductor Shielded and Cross-linked Polyethylene (XLPE) Insulated Alternating Current (AC) Cable*
- P3150, *Guide for Testing the Semi-Conductive Water Blocking Tape in Cross-Linked Polyethylene Insulated Alternating-Current Power Cables*.

Thank you to all the active working group members for your continued time and dedication to standards development. To get involved, you can attend any of the working group meetings at the next ICC or reach out to the Subcommittee chair for more information.

New Policies and Procedures for Working Groups – Part II

By Lauri Hiivala (retired)

Our new *Policies and Procedures for Working Groups of the IEEE Power and Energy Society (PES) Insulated Conductors Committee (ICC) Using the Individual Method* is posted on our website at *pesicc.org/ICCWP/2021/04/07/policies-and-procedures-for-working-groups*.

Following are some of the more important changes regarding the operation of Working Groups (WG):

Officers - The officers (and any person designated to manage the Sponsor ballot) must be IEEE members of any grade, or IEEE Society affiliates, and also be members of IEEE-SA.

Once appointed, the WG Chair must appoint a Secretary. The responsibilities of the Secretary now include those of what was previously known as the Vice-Chair. The Secretary maintains the attendance record and responses to letter ballots for all members on the roster and displays or announces the status of voting and non-voting members at the start of each meeting.

Subgroups - Any participant of the WG is granted voting membership. The WG determines the scope and duties delegated to the subgroup, and may decide to allow participation of persons who are not WG members and specify the terms and conditions under which they participate in the subgroup.

Meetings - A meeting notice must be distributed to all members at least 30 days in advance of a face-to-face meeting and at least 15 days in advance of an electronic (including teleconference) meeting. A meeting agenda must also be distributed to all members at least 10 days in advance of a face-to-face meeting, and at least five days in advance of an electronic meeting.

Quorum - When the voting membership is less than 50 voting members, a quorum is defined as a majority of the current total voting membership. When the voting membership is 50 or more voting members, a quorum is 10 percent of the current total voting membership or 26, whichever is greater.

Executive Session (ES) - The matters discussed in executive session are confidential; therefore, attendance at the ES must be limited to those with governance authority, outside advisors (e.g., lawyers or consultants) where necessary to provide professional guidance, and select IEEE-SA staff who may have information or a perspective relevant to the subject matter discussed in ES. An individual may be invited to join for a portion of the discussion and then excused at the appropriate time. In each case, except as authorized by the WG, participants in an ES are prohibited from discussing or disclosing any information presented and discussed during such ES to a third party or other person not present during the session, and shall not continue to discuss such matters after it has adjourned.

ESs should be conducted face-to-face (in person) to provide the greatest assurance that the content of such sessions will be kept confidential. However, when necessary, ESs may include participants who participate by teleconference provided such persons agree not to disclose any information so discussed, and agree that they will participate in such conference in a manner that does not result in third parties gaining access to such discussions or information.

Appeals - Any person dissatisfied with a technical decision must follow the approved procedures for providing technical input to the WG, including but not limited to presenting the concern to the group, and making a technical comment during the applicable comment submission and/or balloting period.

Procedural concerns within the group must first be presented to the WG Chair for resolution. If the procedural concern is not resolved after presentation to the Chair, the concern can be brought to the Sponsor for resolution.

(Part I of this article appeared in the Fall 2021 issue of the newsletter)

IEEE 1407 Updated

By Detlef Wald, Eifelkabel

IEEE 1407, *Guide for Accelerated Aging Tests for 5 kV to 46 kV Extruded Electric Power Cables Using Water-Filled Tanks*, provides information and recommendations on test equipment, cable specimens, test conditions, test control methodologies, measurements, data analysis and interpretation in performing accelerated aging tests for 5 kV to 46 kV rated cables using water-filled tanks. These Accelerated Cable Life Tests (ACLT) may be time-to-failure tests or tests in which the samples are aged for fixed times followed by diagnostic testing. Unlike the familiar Accelerated Water Treeing Test (AWTT) referenced in ICEA, the IEEE 1407 test installs the cables in a water-filled tank rather than water-filled pipes.

The updated guide extends the upper voltage limit from 35 kV to 46 kV to better cover the range of medium-voltage cables when water treeing might be an issue for cable performance. The next version of the guide will likely increase the upper voltage to 66 kV, since 66 kV wet cables have become popular as array cables in offshore wind parks where fewer lead-shielded types are being used.

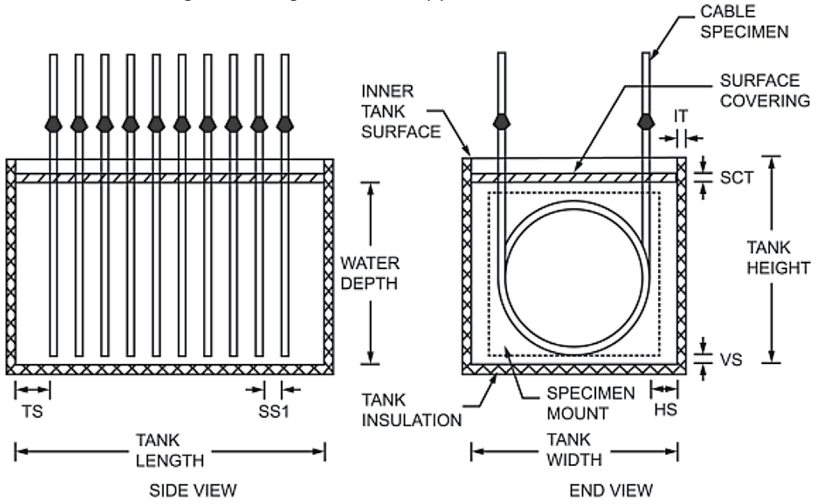
The guide has been also updated to include a test to evaluate the influence of jacketing materials on water treeing within the insulation. In addition, cable sample preconditioning has been specified with more clarity to reflect current methods in use.

One of the most important updates is a better definition of the cable test methods and an explanation of why this should be done. Furthermore, the use and dependency of the dummy loop for testing purposes was better explained.

Since the water tank design is well established, there was no need to modify the existing recommended size, shape and materials used for the testing tanks.

When the guide was originally written, analyses of the results were intense as it was done manually. But with recent software tools now available, data analyses are significantly easier for the user, so this section of the guide was updated to reflect these new tools.

As part of the document, the working group (WG) made several recommendations. It was noted that, since the last update of the guide, little research work has been done on factors influencing wet aging behavior of polymers. Therefore, research was recommended to evaluate the influence of the cross-linking by-products from silane cross-linked polyethylene (XLPE) and ethylene propylene rubber (EPR). Furthermore, the WG recommended analyzing different water types, like sea water, since wet array cables are being used more and more. These cables are also used currently for higher voltages, up to 66 kV. In the future, there might also be a demand for even higher voltages for this application.



Typical setup for ACLT from IEEE 1407

In Memorium

Arturo Jose ("Art") Maldonado Guzmán

August 5, 1952 – July 2, 2021

By Charles A. Darnell, President, Talon Products

At an electrical standards meeting in 2009, I met a handsome and dapper Puerto Rican chemical engineer named Arturo Jose Maldonado Guzmán. Immediately, I sensed that he was passionate about electrical cables. After the meeting, I invited him to join me for a glass of wine so I could get to know this well-spoken gentleman and borrow a few minutes of his time to become more informed about cable insulation and jacket materials.

It turned out that, like me, Art was passionate about food and wine. And as luck would have it, his favorite fermented beverage was Chardonnay, particularly from the French region of Puligny Montrachet. As we shared that first bottle, Art told me about his previous life working at Uniroyal Chemical, where he developed Uniroyal's first medium voltage EPR. He also shared his experiences as vice president of technology and market development at Cable USA in Naples, Fla. He was proud, but humble, when he mentioned his U.S. patent for thermoplastic elastomer blends with improved oil-resistance. His last job was to share his vast polymer chemistry expertise through AM Technology Group, his entrepreneurial venture. He seemed to be one of the happiest men on earth.

Over the years, Art regularly attended ICC meetings, as well as virtually every electrical standards working group that pertained to cable construction, testing or installation. He was always dapper, smiling and eager to volunteer his time. After each day's business concluded, he was ready to enjoy a glass of Chardonnay and a fine meal. The last time I spoke with Art was in September 2020, when he was traveling to Puerto Rico to help family and friends after an earthquake had pummeled the island. Despite his long journey and the serious circumstances in his homeland, Art invited me to meet him in Naples later that year to share a special bottle of wine that he had been saving. Regrettably, Covid interrupted our plans and that visit to Florida did not take place.

It is with profound sadness that I share the news of Art's passing on July 2, 2021 at his home in Naples. I will always remember Art's warm friendship and generosity. As I type this eulogy, I am planning to cook his famous Puerto Rican Jambalaya. When I lift my glass of Chardonnay, I will be reminded of our former colleague and good friend, Art Maldonado.

Art's recipe can be found at:
hugtherung.com/wp-content/uploads/Art_Maldonado_Puertorican_Jambalaya.pdf

International Events Calendar

Compiled by Harry Orton

Once again please note: The continuing world situation has made it very difficult to provide accurate conference listings and dates as some conferences have gone virtual while others have changed dates, relocated or been cancelled. Please refer to the respective website for up-to-date conference information. Be very careful when searching the Internet for conferences and symposia as there are fraudulent websites advertising predatory conferences with very similar names. Their sole purpose is to collect papers and registration fees.

2022

CIGRE Kyoto Symposium 2022
3-8 April 2022, Kyoto, Japan
cigre.org

IEEE PES T&D Conference
25-28 April 2022, New Orleans, La., USA
ieee-pes.org

Clean Power 2022
16-20 May 2022, San Antonio, Texas, USA
cleanpowerexpo.org

INSUCON (International Electrical Insulation Conference)
17-19 May 2022, Birmingham, UK
insucon.org

Wire Expo 2022
7-8 June 2022, Dallas, Texas, USA
wirenet.org

EIC (Electrical Insulation Conference)
19-23 June 2022, Knoxville, Tenn., USA
ieee-eic.org

Global Offshore Wind 2022
21-22 June 2022, Manchester Central, UK
events.renewableuk.com

CIGRE General Meeting
28 August-2 September 2022, Paris, France
cigre.org

Floating Offshore Wind 2022
12-13 October 2022, P&J Live, Aberdeen, UK
events.renewableuk.com

CEIDP (Conference on Electrical Insulation and Dielectric Phenomena)
30 October-2 November 2022, Denver, Colo., USA
ceidp.org

CMD (International Conference on Condition Monitoring and Diagnostics)
13-18 November 2022, Kitakyushu, Japan
www2.iee.or.jp/~cmd2022/

Calendar

Robotic Plasma Tunneling Technology: A New Dimension in Underground Infrastructure

By Ben Lanz, IMCORP/PDI2.org and Troy Helming, EarthGrid PBC

On a cold December day about 60 miles outside of Minneapolis, a group of utility industry representatives and investors huddled around the control center screen to witness a demonstration showing a 20,000°C remotely operated plasma tunneling technology bore through rock at speeds never seen before. A question immediately came to mind for the engineers witnessing this demonstration: Which previously impossible opportunities will this promising technology enable?

Some in the industry predict that continued 'electrification' will dramatically increase consumption and thus necessitate much more resilient electric power systems. Increasingly, utilities are looking to underground cable systems to address risks from repeated high-impact, low-frequency (HILF) events such as wildfires, hurricanes and tornadoes. After announcing the plan to underground 10,000 miles of overhead line in the next ten years, Pacific Gas & Electric Executive Vice President and Chief Financial Officer Chris Foster recently stated that underground answers the "ultimate sustainability question." Other utilities agree and are planning their own multi-billion-dollar strategic undergrounding initiatives. These recent developments, however, have not stopped some in the industry to pose the age-old concerns about underground's initial costs and fears of unplanned and long-duration outages.

This is where the IEEE/PE/ICC team of cable system experts can guide the industry and push the boundaries with knowledge sharing and the effective application of emerging technologies. What if we could install cable systems at a much lower cost, and eliminate the fears of unplanned and long-duration outages through technician-accessible tunnels or the application of diagnostic and inspection technologies? What if we incorporate the total cost of ownership (life-cycle costs) in our comparison of overhead vs. underground?

According to the tunnelling technology developer, plasma created from electricity and airflow can produce plumes of up to 27,000 °C. These plumes can bore 2.5-meter diameter tunnels at speeds of 1 kilometer per day by vaporizing and spallation (breaking the rock into little bits) with little or no environmental impact. To put this in perspective, the developer claims the process has the potential to lower tunneling costs by up to 98 percent while working 100 times faster than current methods. The goal is to use this technology to lower the cost of underground infrastructure through the use of tunnels and the cost of operation and maintenance through accessibility.

The future of resilient electrification is bright, and it is an exciting time to play a role and make a difference. Do you agree?

Techdemo video link: youtube.com/watch?v=RiZysvCDC3k

Tell Us What You Think!

ICC welcomes your feedback. If you'd like to suggest topics for upcoming issues of the ICC Newsletter or add a colleague to our email database, please contact Rachel Mosier at r.mosier@pdc-cables.com.

Upcoming ICC Events

Spring 2022:	**1-4 May 2022, Anaheim, Calif.**
Fall 2022:	**30 October-2 November 2022, Orlando, Fla.**
Spring 2023:	**30 April-3 May 2023, Denver, Colo.**
Fall 2023:	**30 October-2 November 2023, New Orleans, La.**