

ICC Newsletter

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

From the ICC Chair

2017 marks the 70th year of ICC meetings, following record-setting attendance at our 2016 events. Attendees seek solutions to the many challenges



faced by our industry: maintaining infrastructure, siting new transmission lines, developing more compact designs and finding more efficient materials. Utilities and manufacturers rely on committees like the ICC for answers to their most demanding problems. If you have ever found yourself facing a challenging question regarding power cable systems, chances are someone at an ICC meeting had the answer. If not, it's likely a solution doesn't exist!

Each meeting's educational session focuses on bridging the knowledge

gap that occurs when we lose expertise to attrition. This session introduces new technologies and discusses older tried-and-true approaches.

To keep our organization strong, we must continue to develop new standards, guides and training to stay in the forefront of technology. Remember, we are a volunteer organization. We need everyone's help to continue the ICC's tradition of success. We urge you to put your talents to use for the benefit of our industry.

See you at the Spring 2017 meeting in San Diego!



Frank Frentzas
Commonwealth Edison
IEEE PES ICC 2016 – 2017 Chair

Industry Report: Smart Utilities

By Ram Ramachandran, SRValueconsulting LLC

The Black & Veatch 2017 *Strategic Directions: Smart City/Smart Utility Report* measures the progress made by communities and utilities on the path toward smarter cities. Around the globe, cities and infrastructure providers are working to make critical systems run more efficiently and sustainably. Should they adopt gradual, single-point upgrades? Or should they employ root-level master planning to holistically rethink infrastructure, transportation and city services? Find the answers by downloading the complete report at <https://pages.bv.com/SDR-Smart-City-Smart-Utility-DL.html>.

Spring 2017 Education Session – The Case for Superconductors

By Rachel Mosier, Education Session Chair, PDC and Jared Jajack, Education Session Vice Chair, AEP

Not just for demonstrations anymore, superconducting cables are making their way into the mainstream, and for good reason! The ampacity of superconducting cables is not appreciably affected by nearby heat sources, large overburdens or losses due to installation in a steel pipe. And while you may have heard about issues with fault current, the new conductors can be made inherently fault limiting. Best of all, these cables may allow you to install a high-capacity line without the need for transformation, a potential savings in cost and space.

The Spring 2017 education session will feature medium- and high-voltage superconducting cable systems, focusing primarily on design, installation and operation. Please join us on Wednesday, May 10, from 1:00 – 5:00 p.m.

ICC Newsletter Team

Harry Orton, ICC Communications Chair
Wim Boone, ICC Advisory Committee Chair
Ram Ramachandran, AC Task Force Chair

ICC Awards

By Lauri Hiivala, ICC Awards Chair

Certificates of Appreciation (COAs) were awarded for the best presentation at a subcommittee, working group, discussion group or educational program for the Spring 2016 meeting:

- R. Nigel Hampton, Subcommittee A Meeting, *Experiences of Combined HV & EHV Cable Qualifications to IEC, AEIC and the Challenges of Adding IEEE 48 or 404*
- Andrew R. Morris, Discussion Group A20 Meeting, *Failure and Fire on 208V Secondary Network*
- Donald N. Kleyweg, Jr., Subcommittee C Meeting, *High Voltage Underground Cable System Infrastructure in Dense Urban Environments*
- Greg McElyea, Subcommittee D Meeting, *Fiber Optic Sensing and Condition Monitoring in Nuclear Plants*
- Douglas S. DePriest, Subcommittee D Meeting, *Fiber Optic Sensing and Condition Monitoring in Nuclear Plants*

- Sverre Hvidsten, Subcommittee F Meeting, *Preliminary On-site Classification of MV Cables by Using a Simple DC Insulation*.

COAs were also presented to all outgoing subcommittee, working group and discussion group chairs and vice chairs, or upon publication of their IEEE standard or guide:

- Henk Geene, Chair, Subcommittee C, Cable Systems, Spring 2011 – Fall 2016
- Ed Gulski, Chair, Working Group F05, IEEE 400.4-2015 *Guide for Field Testing of Shielded Power Cable Systems Rated 5 kV and Above with Damped Alternating Current (DAC) Voltage*
- Ralph Patterson, Vice-Chair, Working Group F05, IEEE 400.4-2015 *Guide for Field Testing of Shielded Power Cable Systems Rated 5 kV and Above with Damped Alternating Current (DAC) Voltage*.
- Rachel Mosier, for contributions in advancing accessibility, efficiency and productive interaction among members and guests involved with working groups, discussion groups, technical activities and social events through the development and promotion of the Guidebook Application.

Tim Wall was awarded the IEEE-SA Standards Medallion “for extraordinary leadership as chair of Working Group B16W in completing the 2016 revision for IEEE Standard 386” *Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV*.



IEEE-SA Standards Medallion recipient Tim Wall and his wife Linda

Willem Boone received the 2016 CIGRE Fellow Award for his contribution to CIGRE in the field of Insulated Cables, as Convener, Special Reporter and Tutorial lecturer for Study Committee B1.

Pierre Argaut was named 2016 CIGRE Honorary Member for his contribution to CIGRE as Chairman of Study Committee B1 “Insulated Cables” (2010 – 2016).

CSA Low Voltage Testing Protocol

by Evangeline Cometa, CSA, Toronto, Canada

The Canadian Electrical Code, Part I, also known as CE Code, Part I, or CSA C22.1, establishes safety standards for the installation and maintenance of electrical equipment. Part II (CSA C22.2) is a series of safety standards that establishes the construction, design specifications, material requirements and performance criteria for a particular product.

Part I, Rule 2-130 refers to the National Building Code of Canada for flame spread requirements for wires and

cables. The marking for wires and cables (without additional fire protection) are:

- FT1 – in buildings of combustible construction. This test is similar to VW-1 with a few differences.
- FT4 – in buildings of non-combustible construction or in plenums in buildings of combustible construction. This is a vertical tray flame test similar to the UL Vertical Tray Flame test, but FT4 criteria are more stringent. FT4 is identical to IEEE 1202.

- FT 6 – in plenums of buildings required to be of non-combustible construction. FT6 has the same test protocol as NFPA 262.

CSA also maintains a surveillance process for certified products through regular sample pick up and conformity testing to verify continued compliance to critical properties and cable performance as required in the applicable standard. For the full presentation from the IEEE-ICC Spring 2015 Discussion Group A20 meeting, please contact Evangeline Cometa at evangeline.cometa@csagroup.org.

Distributed Temperature Monitoring Systems for High Voltage Cable Corridors

By Dr. Sudhakar Cherukupalli, Principal Engineer, BC Hydro

In 1992, BC Hydro launched a pilot project to evaluate the benefits of a Distributed Temperature Sensing System (DTS) for transmission and distribution cables. While this technology typically was used for well-hole logging applications in the oil and natural gas industry, it was still an emerging technology for power system applications. Following a successful pilot, we applied the technology to monitor a 69kV cable and a 230kV high-pressure fluid-filled cable system corridor in downtown Vancouver.

Early DTS systems lacked good control and visualization software. Another serious concern about these systems was lack of proper data integration and communication capabilities with standard SCADA networks. There were also a large number of protocols used at that time, which made it challenging to agree on and specify a suitable protocol. When placed in a substation environment, DTS systems (and their control computers) suffered from damage due to high frequency transients created by SF6 disconnect switches, which resulted in damage requiring expensive repair.

Since these challenges are not faced by the oil and gas industries, BC Hydro had to impose strict electromagnetic compliance requirements for all new acquisitions if these systems were to be placed within substations. Our experience also pushed refinements to on-site calibration as well as real-time calibration which proved to be quite fortuitous, especially when we experienced strange anomalies with aging fiber performance. With increased confidence using DTS systems on our network, we applied the technology to monitor real-time conductor temperatures on an operating 525kV submarine self-contained fluid-filled cable system. It has now been in-service for almost 14 years without incident.

To consolidate our collective experience, we have developed a BC Hydro DTS Standard, which includes an overview of DTS Systems, optical fiber cable specifications for DTS applications, technical specification for a DTS System, recommended factory tests and site acceptance tests, including methods to calibrate these systems off-line and in real-time. For more information, please contact Dr. Sudhakar Cherukupalli at BC Hydro at Sudhakar.Cherukupalli@bchydro.bc.ca.

ICC Standards Corner

By John Merando, ICC Standards Coordinator

Congratulations to WG B17W Chairman Fran Angerer and Vice Chair Brieana Reed-Harmel for successfully completing a revision to IEEE 1610, "Guide for the Application of Faulted Circuit Indicators on Distribution Circuits." Congratulations also to WG D18W Chairman Gil Shoshani and Vice-Chair Mick Bayer for successfully completing new standard IEEE 1810, "Guide for the Installation of Fire-Rated Cables Suitable for Hydrocarbon Pool Fires for Critical and Emergency Shutdown Systems in Petroleum and Chemical Industries."

The following ICC Working Groups have had their PARs approved since the fall meeting:

- WG A08W, chaired by Joe McAuliffe, for a revision to IEEE 1210 "Standard Tests for Determining Compatibility of Cable-Pulling Lubricants for Wire and Cable" to add CSA as a joint logo.
- WG B03W, chaired by Todd Richardson, for a revision to IEEE 592 "Standard for Exposed Semi-Conducting Shields on HV Cable Joints and Separable Insulated Connections."
- WG B24W, chaired by Eugene Weaver, for a revision of IEEE 495 "Guide for Testing Faulted Circuit Indicators."
- WG C11W, chaired by Harry Orton, for a revision to IEEE 1120 "Guide for the Design and Installation of Submarine Power & Communication Cables."
- WG C25W, chaired by Nimesh Patel, for an extension and modification of IEEE 442 "Guide for Soil Thermal Resistivity Measurements."
- WG D07W, chaired by Stephanie Watson, for an inactive document P1186 "Recommended Practices for the Evaluation of Installed Cable Systems for Class IE Circuits in Nuclear Power Generating Stations."
- WG D08W, chaired by Gabriel Taylor, for a revision to IEEE 634 "Cable Penetration Fire Stop Qualification Test."
- WG D20W, chaired by Robert Fleming, for a new document IEEE P2776 "Guide for Specifying and Selecting Cables for Nuclear Power Plants."
- WG F02W, chaired by Bill Larzelere, for a revision to IEEE 400.1 "Guide for Field Testing of Laminated Dielectric, Shielded Power Cable Systems Rated 5kV and Above with High Direct Current Voltage."
- WG F06W, chaired by Bill Larzelere, for a new document P400.5 "Guide for Field Testing of Shielded DC Power Cable Systems Using High Voltage Direct Current (HVDC)."

IEEE C62.22.1 was administratively withdrawn by the IEEE SA Standards Board on December 6, 2016. PARs are required for WG B22 and B23 to officially begin work on merging and re-scoping IEEE 48 and IEEE 404.

Fifteen standards are due for revision before the end of 2018 to avoid being withdrawn. Each has a technical and financial impact on our economy, environment and society. We encourage ICC attendees to contribute to these working groups.

Calendar

of International Events

Compiled by Harry Orton & Wim Boone

International Conference on Electrical Materials and Power Equipment (ICEMPE)

May 14 – 17, Xi'an, China
icempe2017.org/

13th International Electrical Insulation Conference (2017 INSUCON)

May 16 - May 18,
Birmingham, United Kingdom
aconf.org/en-us/conf_70703.html

6th Annual Subsea Power Cables Conference

May 23-25, London, Birmingham, United Kingdom
<https://energy.knect365.com/subsea-power-cables/>

Offshore Wind Energy 2017

June 6-8, London, United Kingdom
offshorewind2017.com/

35th Electrical Insulation Conference (EIC)

June 11 – 14, Baltimore, Maryland USA
electricalinsulationconference.com/

Aluminum Wire and Cable Conference

June 12-13, Detroit, Michigan
usa.aluminum-wire-cable.com/

CIRED

June 12 – 15, Glasgow, UK
cired-2017.org/

CRU Wire and Cable Conference

July 17-19, Munich, Germany
crugroup.com/events/wireandcable/venue

20th International Symposium on High Voltage Engineering

August 28 – September 1,
Buenos Aires, Argentina
ish2017.org/

JICABLE HVDC

November 20-22,
Dunkerque, France
jicable.org

Going Overhead with Underground

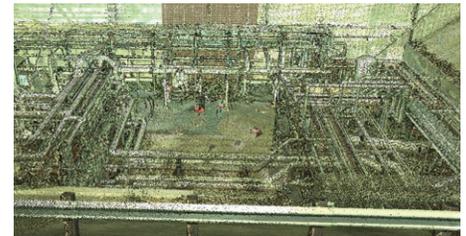
By: Gary Clark, P.E., NV5, Inc.

An innovative solution for the Carlsbad Desalination Project in Southern California merged the benefits of overhead construction and underground cabling practices.

The largest seawater desalination project in the Western Hemisphere, the project produces up to 50 million gallons of desalinated seawater each day using a peak 38MW load provided by four twin 12kV circuits consisting of a 1000 kmcl XLPE copper cable. The challenge: to find a way to get the power from the nearby substation, traveling underground through an abandoned oil storage facility, through a congested oil detention basin of steel and abandoned oil pipelines, then under a railroad right of way via a nine-foot-diameter tunnel, with consideration for extensive environmental concerns.

The project team learned that an adjacent and soon-to-be-decommissioned power plant would no longer need their oil tanks and oil piping storage pits on the east side of the road. We saw an opportunity to place our conduit into this tunnel if we could figure out a way to travel down into the 40-foot-deep oil pit and reconfigure the tunnel to fit 12 new five-inch steel conduits along with the protection and control conduits required by our client.

A ground-based LiDAR scan using High-Definition Scanning (HDS) equipment showed that this unique mixture of sharp angles and abundant steel piping would not allow either an underground trench or overhead pole design to make it to the available tunnel crossing. We also created a 3D rendering of all existing oil conduits and performed a BIM-type analysis to see if new conduits could be installed above the ground in order to avoid aerial conflicts with the existing steel pipes.



3D rendering of all existing oil conduits in Autodesk Inventor.

Once an above-ground conduit path was deemed feasible, our civil and structural engineers began working together on a mixture of pile foundations and custom steel beam support designs to hold up the bulletproof fiberglass conduits and also to facilitate the extensive lateral loads experienced during cable pulling.

The unique overhead-underground solution utilizes existing infrastructure, avoids additional environmental impact, saves the general public money, and helps accelerate the construction schedule to bring an additional local water resource to the drought-stricken San Diego County. Please contact Gary.Clark@NV5.com for more information on this unique project.

Upcoming ICC Events

May 7 – 10, 2017Spring ICC – San Diego, California

Visit www.pesicc.org to view all Spring ICC presentations and activities or to register for the meeting and Transnational Lunch.

October 29 - November 1, 2017 Fall ICC – Hollywood, Florida

Please return frequently to www.pesicc.org for updates on presentations, event registration and other meeting information.

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 Harry Orton at h.orton.1966@ieee.org.