

IEEE Individual vs Entity Standards Development

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Georgia Tech / NEETRAC

Your Presenters

Joe Goldenburg, P.E.



- Mechanical Section Manager
- Serves on 5 standards committees in 3 organizations (ASTM , ANSI, IEEE)
- Bachelors Mechanical Engineering
- MS Operations Research
- 28 years' experience

Tristen Cline, E.I.T.



- Mechanical Research Engineer I
- BS in Mechanical Engineering
- Working on MS degree
- Focusing on corrosion and UV testing
- Huge help on this project!
- 2 years' experience

About NEETRAC

What: *Research, Testing and Applications Center in the School of Electrical & Computer Engineering at Georgia Tech*

Scope: *Electric Energy Delivery (Generator to the Meter)*

Approach: *Applied R&D, Membership-Based, Consortium Focus, Self-Supporting*

Membership: *Electric Utility Industry in North America*

Size: *38 Members, 28 Staff, \$5,000,000+*



History: *Began in 1996 with transfer of the Georgia Power Research Center to Georgia Tech*

Mission: *Advancing the Electric Grid through Collaboration*

Facilities: *High Voltage, Medium Voltage, Mechanical, and Environmental*

Membership

**NEETRAC started with 10 Members in 1996.
We now have 38.**

- 20 Utilities
- 15 Manufacturers
- 3 Associates
- (24 have been members for > 10 yrs.)

Utility Membership

- 76 million US Electric Customers
- ~ 60% of US Customer Base

Manufacturer Membership

- Represent a large portion of the providers of products and services to the electric utility industry



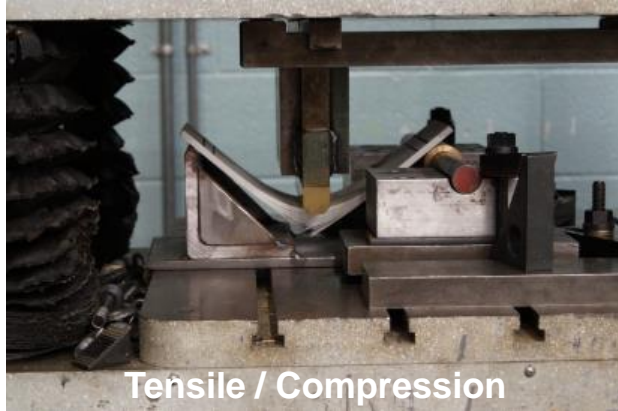
Facilities



Facilities



Facilities



Facilities

Connector Testing



Tensile Testing



Agenda

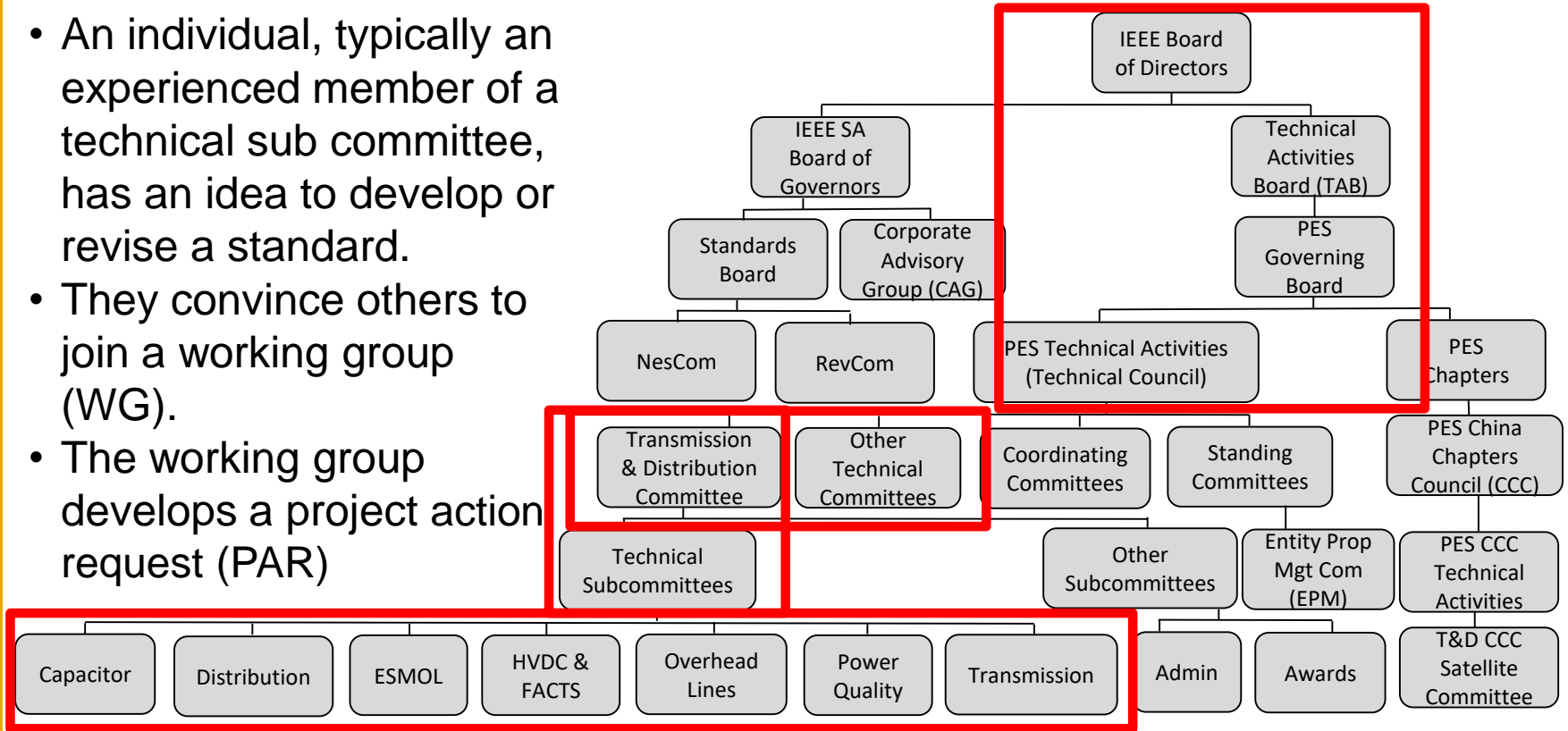
- How does an IEEE Standard or Guide become a Standard or Guide
 - Individual Method
 - Entity Method
- Types of Standards / Guides
 - Component Test
 - Design, construction and operations
- We're focusing on Design Construction, and Operations standards/guides, while remaining engaged in engaged with Component standards.
- Examples of issues from IEEE 1863-2019, IEEE 2870, IEEE 2871
- How to tell the difference between Individual and Entity standards
- Ensure you're using standards and guides developed by/for your region!

What's an Entity

- Corporation
- Non-profit
- University
- Government body
- The “entity” pays for a corporate membership in the IEEE Standards Association.
 - Cost is \$4.5k to \$16k per year

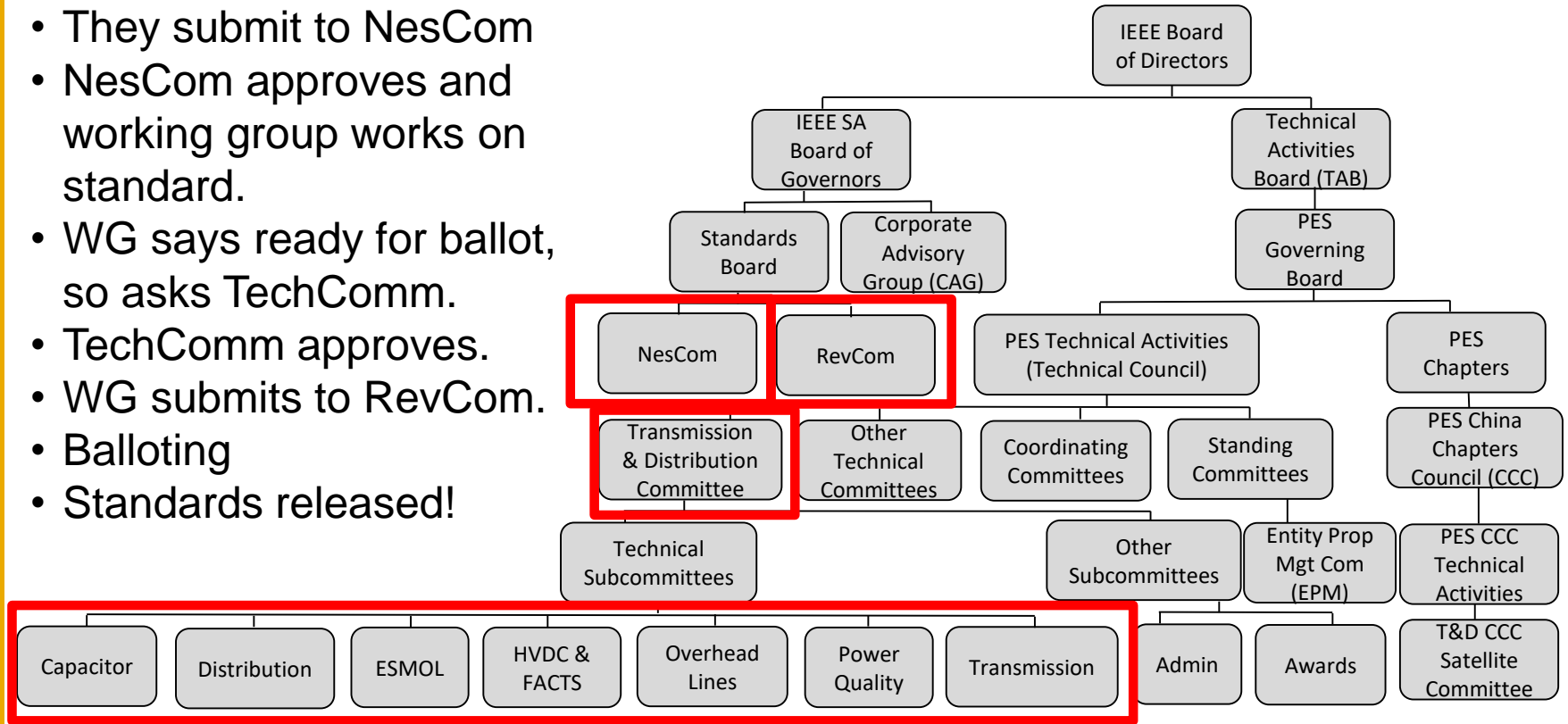
Individual Standards Development Process

- An individual, typically an experienced member of a technical sub committee, has an idea to develop or revise a standard.
- They convince others to join a working group (WG).
- The working group develops a project action request (PAR)



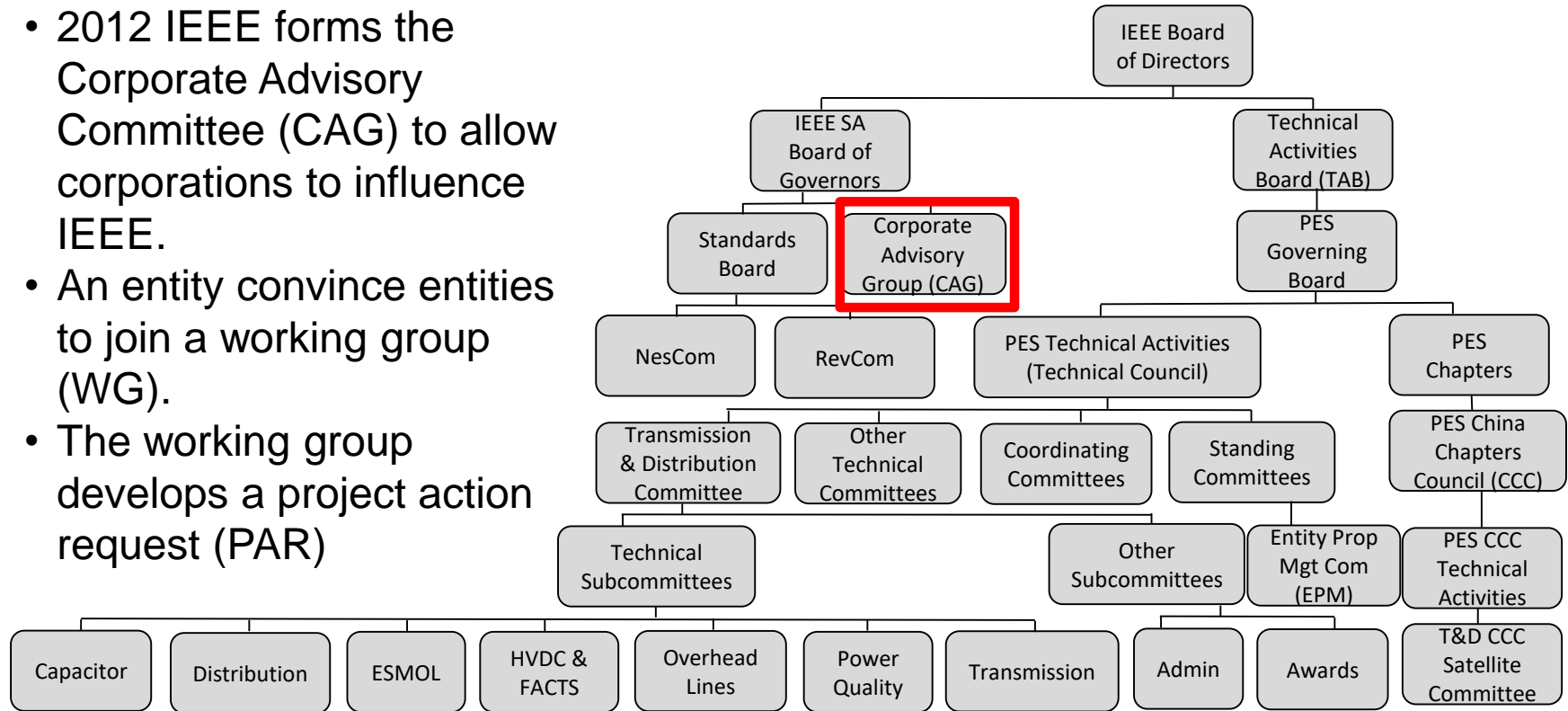
Individual Standards Development Process

- They submit to NesCom
- NesCom approves and working group works on standard.
- WG says ready for ballot, so asks TechComm.
- TechComm approves.
- WG submits to RevCom.
- Balloting
- Standards released!



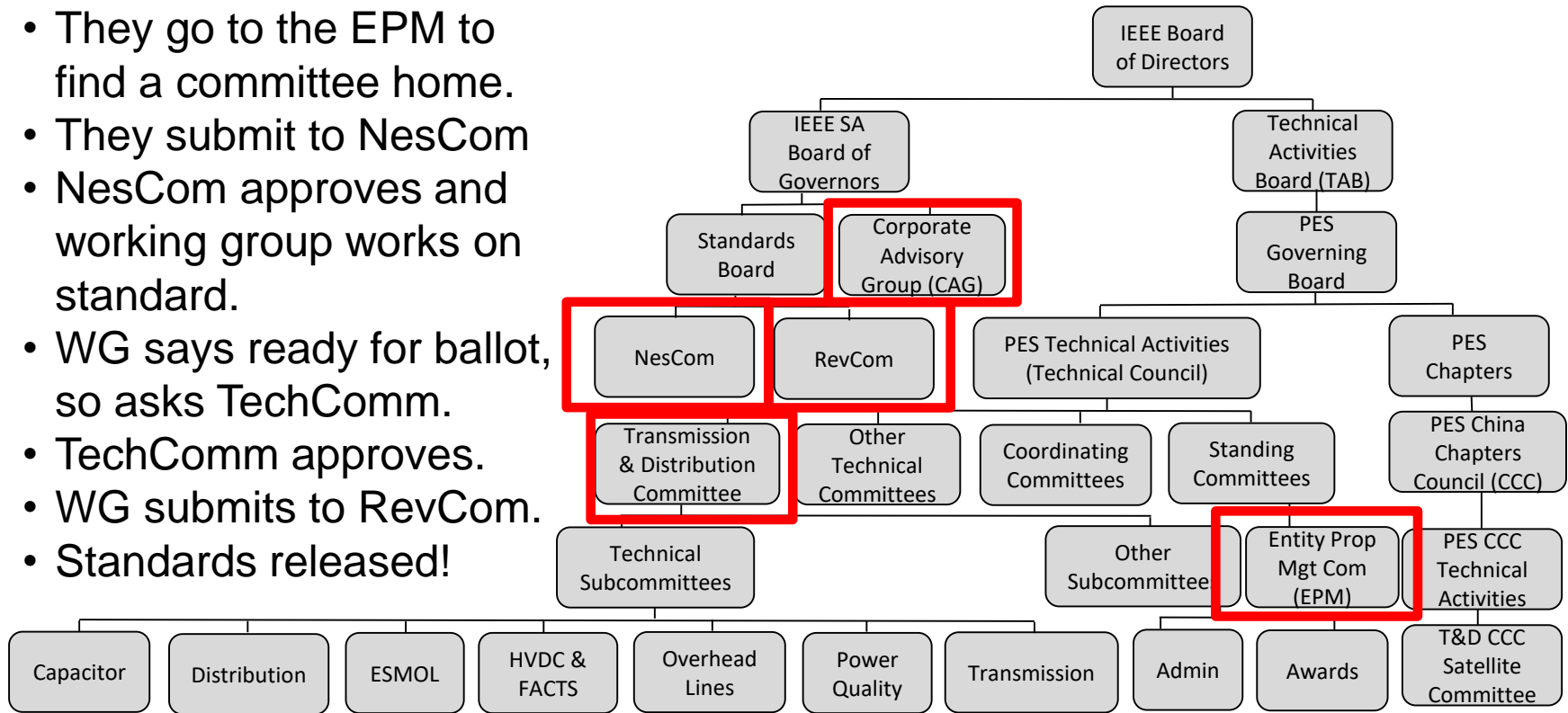
Entity Standards Development Process

- 2012 IEEE forms the Corporate Advisory Committee (CAG) to allow corporations to influence IEEE.
- An entity convince entities to join a working group (WG).
- The working group develops a project action request (PAR)



Entity Standards Development Process

- They go to the EPM to find a committee home.
- They submit to NesCom
- NesCom approves and working group works on standard.
- WG says ready for ballot, so asks TechComm.
- TechComm approves.
- WG submits to RevCom.
- Standards released!



Two Methods to Develop Standards

IEEE has two standards development processes:

- Individual: Individuals form working groups to develop and update standards.
 - Very popular among companies in North America (NA)
 - Focus tends to be on public safety and reliability
- Entity: Corporations form working groups (and assign representatives) to develop and update standards
 - Very popular in China.
 - Focus is on corporate interests and influence.

The Entity Method

“The Entity Program allows companies to engage and influence technology development to ensure their business interests are heard and represented.” IEEE-SA Website

Difference Between Development Processes

Individual

- Open to individuals (any IEEE member)
- Open voting participation
- 10 individuals required to form a working group
- 10 individuals minimum to ballot*
- Individual standards protect the public welfare

*Balloting requires individuals/entities hold a Standards Association (SA) membership in addition to their PES Membership

Entity

- Open to entities
- Open to listen and speak
- 3 entities required to form a working group
- 5 entities minimum to ballot*
- Entity standards promote the self interests of corporations

Status – PES Standards Development Processes

Individual

- Regional preference:
Predominantly used in North America

Entity

- Regional preference:
Predominantly used in China

-
- Both work under a technical committee.
 - The technical committee only provides procedural oversight.
 - The working group is responsible for technical accuracy and content.
 - Both working groups own the standards until it is released.

Standards Applications

Background: There are two applications of standards we can consider:

- Typically the design, construction and operation of systems of manufactured and field fabricated components.
 - Regionally Applicable: Standards and guides apply to a given region under some regulatory authority. (They may also be useful outside said region.)
- Typically qualification test standards for components designed and manufactured for use in an Utility System.
 - Universally Applicable: Standards apply globally.

Standards Applications

Design, Construction, and Operations

- Focus on the Design, Construction or Operation of an electric utility system.
- Subject to a system's topology that reflects local history, technology, regulation, and values.
- Requires harmonization with regional regulation (NESC)
- Overlapping standards required.

Component Qualification

- Focus on test standards for self-contained manufactured components.
- Component qualification not subject to regional regulation (OSHA, UL, etc.)
- Could be harmonized with other SDO's standards (IEC).
- Manufacturers do not prefer overlapping standards.

NEETRAC's IEEE Corporate Membership

- NEETRAC joined IEEE SA as a corporate member in 2020, and represents NEETRAC Members
- Corporate membership includes:
 - Unlimited working group attendance as participants
 - Unlimited balloting on entity standards (NEETRAC has 1 vote)
 - Eligibility to serve as an entity working group officer
 - Subscriptions and access to corporate programs newsletters, news, alerts, events, and private web areas

IEEE 1863

- IEEE 1863 Guide for Overhead AC Transmission Line Design
- Developed through the CAG
- The Overhead Lines Subcommittee of the T&D Committee formed a task force address this during the development.
- The task force found 194 issues with the guide.
- The task force requested withdrawal or correction.

IEEE 1863

- Released in 2019
- Developed by entities such as China Jiliang University, State Grid Corp of China, Zuoyi Power Equipment Co, Jaingsu Jiameng Electric Equipment
- PAR submitted by State Grid Corporation of China (SGCC) in November 2014. It is an English Translation of their design guide for northern China
- Scope includes foundations, structures, conductors, connectors, hardware, and insulators (far exceeding the scope of the IEEE Overhead Lines Subcommittee)

IEEE 1863

- The writing contains confusing passages such as, “The first fitting connected with the cross-arm may be able to rotate flexibly, and is reasonably imposed with force, and its strength may be a level higher than that of other fittings within the same string.”
- Only components used by State Grid of China corporations are discussed:
 - Non-ceramic insulators and certain designs of ceramic insulators are not addressed. Only designs used by SGCC are addressed in Standard 1863.
 - Commonly-used connectors and fittings are not address.
 - Tubular steel, concrete, and fiberglass structures are not discussed.

IEEE 1863

- IEEE 1863 is not harmonized with IEEE C2, “National Electric Safety Code (NESC)”. The NESC has force of Law in many North America jurisdictions. NESC discrepancies include:
 - Wind direction for computing the structure load can be simplified into 45 degree steps. The NESC references ASCE 74 computing wind loads, and requires using a wind direction that maximizes loading from line tensions and line angles.
 - The method for computing broken wire loads are less severe than stipulated in ASCE 74.

IEEE 1863

- NESC discrepancies include:
 - Assumes less conservative return intervals for weather loads than the NESC.
 - Specifies a 50 year wind speed Mean Recurrence Interval (MRI), but the NESC requires a 100 year MRI.
 - Describes a linear conductor model for computing line tensions, ground clearances, and worker safety clearances. While the NESC is silent on conductor models, North America practice since the 1920s has been to use a non-linear conductor model developed by Alcoa, which is what PLS CAD and SAG 10 use.

IEEE 2870

IEEE 2870 Grip Test Method Guide for Fittings of High-Temperature, Low-Sag Overhead Conductor Under Tension and Electric Current Co-effect – released in 2022

- Initial ballot on August 14th
 - Vote: Disapproved with 80 comments
 - 54 accepted, 12 revised, & 14 rejected
- First recirculation ballot on September 24th
 - Vote: Disapproved with 3 comments
 - 2 accepted & 1 rejected
- Second recirculation ballot on October 29th
 - Vote: Disapproved with 0 comments
- Through balloting process, only one comment (editorial) was submitted by another entity.

IEEE 2870

- 2870 requires measuring relative humidity to +/- 5% to ensure it is below 80%. None of the ANSI C119 standards have humidity requirement.
- 2870 requires temperature be measured to +/- 0.5 °C; however, even Special T thermocouples are +/- 0.5 °C OR +/- 0.4%, but at 250 °C, that results in +/- 1°C. ANSI C119.0 says 1 °C recommended and 2.2 °C required.
- Requires measuring and recording “wind speed.” ANSI C119 does not require airflow measurements.
- In 2870 the number of thermal cycles is determined by the utility. No guidance is provided.

IEEE 2870

- Requires a 1 minute load-hold at operating temperature and 80% RBS.
- Calculations from industry experts on steel core conductor indicate expected strengths at temperature in the range of 64% to 78%.
 - Strength is highly dependent on steel fraction (for steel core conductors)
- No one expects composite core conductors to pass.
- Standard does say, “Test consigner may specify the tension,” but provides no guidance on how to do that.

IEEE P2871

- Draft Standard for Wedge-shaped Groove Clamps
- Initial ballot on August 14th
 - Vote: Disapproved with 92 comments
 - 40 accepted, 32 revised, & 20 rejected
 - Contributions from Gary Schrader, Seydou Diop, Mike Smalley, and Nathan Bruins
- First recirculation ballot
 - Vote: Disapproved with 14 technical comments
 - 9 accepted, 1 revised, & 4 rejected
 - Contributions from Gary Schrader
- Second recirculation ballot
 - Vote: Disapproved with 0 comments
- Through balloting process, only one comment (editorial) was submitted by another entity.

IEEE P2871

- Still under development, so difficult to comment on contents.
- The language is difficult to interpret / understand.
- Seven references to IEC 61284 (appears to be very similar).
 - They use significant graphics from IEC 61284
- Includes Production Testing: Manufacturers are required to make/compress 8 samples and measure resistance on every batch of connectors.

IEEE 2871

- IEEE P2871 applies to wedge type connectors, and is similar to NEMA/ANSI C119 series of connector standards and IEC 61284.
- ANCI C119 predominantly accepted in the USA, and a mix of ANSI C119 and IEC 62584 in Canada and Mexico.
 - Different requirements for sample number and test assembly requirements including requirements for conductor size combinations.
- IEEE 2870 requires end-users test the resistance of each connector following installation. Laboratory research has shown that initial resistance is not a valid predictor of connector reliability or service life. Most connectors require several thermal cycles before the resistance is stable.

The Real Difference

- Practically speaking entity standards are being developed rapidly (2-4 years), behind closed doors.
- While individuals can listen and speak at Entity Working Group meetings, finding out when the meeting is held and getting a link is difficult at best
 - The Entity Working Group has no obligation to consider individual comments.
- Representatives are hand picked by corporations.
- This is very much a closed process.

The Real Difference

- Individual working groups publicly announce their meetings. Any IEEE member can show up and participate.
 - Their feedback must be considered by the working group.
- Individual working groups include many retirees and participants with a diversity of experiences.
- This is very much an open process.

The Real Difference

- We recommend using standards developed by engineers with
 - experience with your systems topologies
 - knowledge of regional regulations
 - similar values (eg safety, individual vs collective processes)
- Entity
 - Developed for systems topologies on another continent
- Individual
 - Developed for system topologies in North America.

How to Tell the Difference

- How do you tell the difference between the two?

IEEE SA
STANDARDS
ASSOCIATION

IEEE Standard for
IEEE Power and Energy Society

Developed by the
Transmission and Distribution Committee

Developed by the
Transmission and Distribution Committee

IEEE SA
STANDARDS
ASSOCIATION

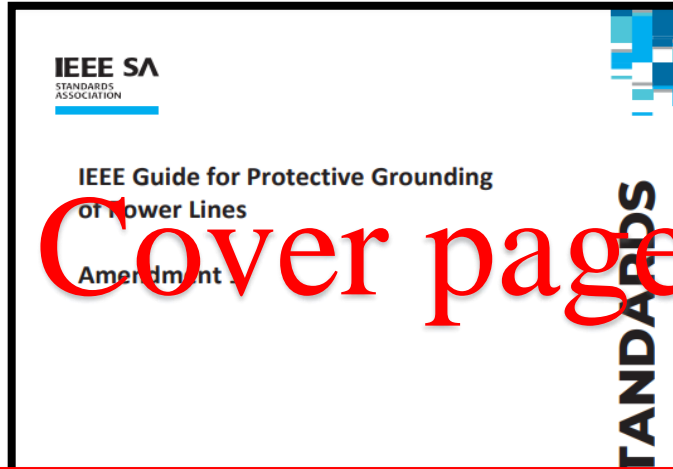
IEEE Guide for Overhead AC
Transmission Line Design

IEEE Standards Association

Developed by the
Corporate Advisory Group

STANDARDS

Individual vs Entity



Developed by the
Transmission and Distribution Committee

Developed by the
Transmission and Distribution Committee



Individual Participant Page

Subcommittee working group

Participants

At the time this amendment was completed, the **ESMOL/1048 Working Group** had the following membership:

Gary Zevenbergen, *Chair*
Rick Kennerly, *Vice Chair*

Brian Erga
George Gela
Mark Green
Tom Joines
Edward Hunt

Bill McGough
Teja Rao
Jason Smith
George Sparks

Sam Stonerock
Tom Verdecchio
David Wallis
Xuan Wu
Steve Zubiri

Individual Participant Page

The following members of the individual Standards Association balloting group voted on this amendment. Balloters may have voted for approval, disapproval, or abstention.

Saleman Alibhay
Gustavo Brunello
Kristine Buchholz
Thomas Buonincontri
William Byrd
Robert Christman
Gary Donner
Donald Dunn
Fredric Friend
David Garrett
George Gela
Edwin Goodwin
Charles Grose
Werner Hoelzl
Robert Hoerauf
Edward Hunt
Tom Joines
Boris Kogan

Jacob Kulangara
Jim Kulchisky
Chung-Yiu Lam
Jeffrey Laninga
Lawrenc Long
Daniel Mulkey
Dennis Neitzel
Jeffrey Nelson
Arthur Neubauer
Joe Nims
Lorraine Padden
Bansi Patel
Christopher Petrola
Percy Pool
Charles Rogers
Steven Sano
Bartien Sayogo

Robert Schaerer
Dennis Schlender
Kenneth Sedziol
Stephen Shull
P. Sivaraman
Michael Smalley
Jerry Smith
Gary Smullin
Paul Sullivan
Peter Sutherland
Wayne Timm
Raul Velazquez
John Vergis
John Wang
Kenneth White
Darren Woodhouse
Jian Yu
Gary Zevenbergen

Entity Participant Page

Participants

At the time this guide was completed, the Fittings of Thermal-Resistance Conductor Working Group had the following entity membership:

Zhoulong Zhou, Chair

Hong Ying, Vice Chair

Ge Zheng, Secretary

<i>Organization Represented</i>	<i>Name of Representative</i>
China Datang Corporation	Feng Liu
China Jiliang University	Pengyue Zhang
Far East Smarter Energy, Co., Ltd.	Jing Xu
Gulifa Group Co., Ltd.	Zhe Zheng
Hogn Electric Group Co., Ltd.	Boyang Lin
Jiangsu Jiameng Electrical Equipment Co., Ltd.	Xiaofeng Shi

Entity Participant Page

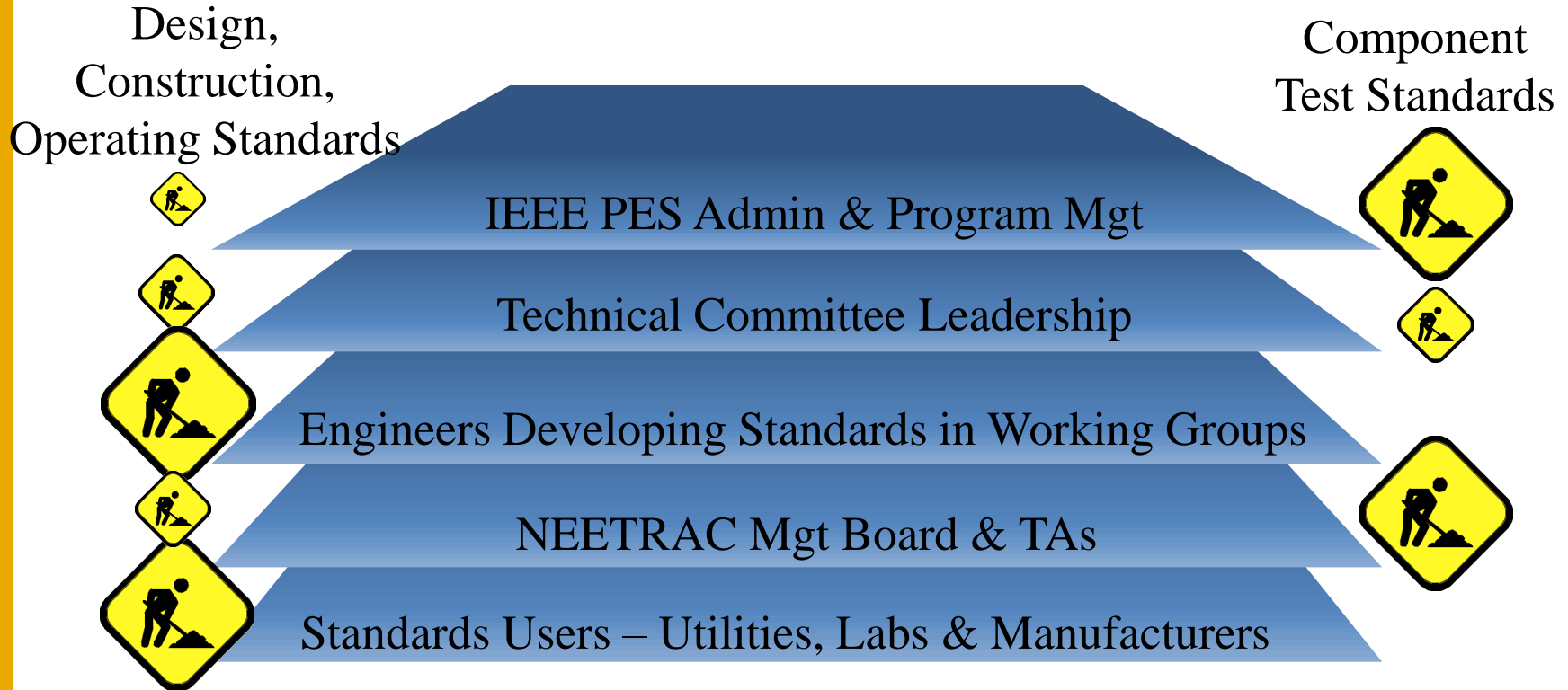
The following members of the entity Standards Association balloting group voted on this guide. Balloters may have voted for approval, disapproval, or abstention.

0xSenses Corporation
China Jiliang University
Far East Smarter Energy Co.,
Ltd.
Georgia Institute of Technology
Gulifa Group Co., Ltd.
Hongguang Electric Group Co.,
Ltd.

Jiangsu Jiameng Electrical
Equipment Co., Ltd.
North China Electric Power
University
Phoenix Electric Power Co., Ltd.
Shanghai Jiaotong University
Southwest Jiaotong University

State Grid Corporation of China
(SGCC)
Tianjin University
Yonggu Group Corporation Co.,
Ltd.
Zuoyi Power Equipment Co.,
Ltd.

Recommendations Going Forward



How Can You Help

- If your company is a NEETRAC member, let us add you to our project Technical Advisor List.
- If you serve on an IEEE Technical Subcommittee Working Group
 - When revising or creating standards and guides, lobby for language be placed in the abstract that indicates:

This standard/guide was developed by engineers whose primary experience includes the design, construction and operation of electric transmission and distribution systems based in North America. The contents of this standard/guide take national regulatory requirements into consideration, and references other applicable national standards.

Questions?

Get the word out!

Questions?

Questions