IEEE SA
STANDARDS ASSOCIATION

IEEE STANDARDS ASSOCIATION

RAISING THE WORLD'S STANDARDS

March 2023
Yu Yuan, IEEE SA President

IEEE

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HELLO & THANK YOU

Thank you for the opportunity to exchange ideas and information.

IEEE

INTRODUCING OUR TEAM TODAY

- Yu Yuan, IEEE SA President
- Konstantinos Karachalios, IEEE SA Managing Director
- Jim Matthews, IEEE SA Past President
- Gary Hoffman, IEEE SA Board of Governors, Past Chair IEEE SA Standards Board, IEEE Power & Energy Society
- Lloyd Green, IEEE SA Global Market Engagement & Membership Director
- Moira Patterson, IEEE SA Global Market Affairs & Strategic Partnerships Director

IEEE Standards Association

Agile

Innovative

Open

Collaborative

More Than Just Standards…

RAISING THE WORLD'S STANDARDS

ABOUT IEEE SA

Developing market relevant open standards and consensus solutions:

- Advancing global technologies and technology platform
- Promoting innovation
- Protecting public safety, health & wellbeing
- Contributing to a sustainable future

IEEE

ADVANCING TECHNOLOGY FOR HUMANITY

ABOUT IEEE

- 420,000+ Members
- 160+ Countries
- 46 Technical Societies and Councils
- 1900+ Annual Conferences
- 5+ Million Technical Documents
- Global Humanitarian Efforts

IEEE

IEEE SA
STANDARDS ASSOCIATION

WHAT WE DO

Global Membership Open to All

Individual and or Entity/Corporate Membership

Standardization

Fully Adhere To WTO Principles For international Standardization

Equivalent Processes: Individual or Entity Method

Conformity Assessment & Certification Program

Verify & certify adherence of products and services

Industry Connections

Incubating new standards and related products and services

IEEE SA OPEN

Open Source collaboration platform for products & services

Alliance Management Services

Provide turnkey operational & legal support

SA Outreach & Collaboration

- Government engagement program on standards
- Standards fellowship program
- Standards adoption program
- Contributions to the global dialogue
- Cooperative Relationships
  - Standards Bodies (ISO, IEC, ITU)
  - International Organizations (UN, WEF, OECD)
  - NGOs and Institutions

Registry

Give products within a specific category, definitive, unique identifiers & ability to recognize and communicate

IEEE

IEEE Standards Processes

- Rigorous Processes And Governance
  - Open disclosure of who participates and their representation
  - Requirements to prevent dominance of any kind
  - Ethical guidance for member and leadership participation
- Accessible To All
  - SA has about 8000 members; 34,000 volunteers
  - Membership required to vote, lead group; Not required to participate
  - Global participation – More outside US than inside US
- Easy Access For New Technologies And Areas Of Work
  - WTO-TBT Compliant – Public review included
  - Two Processes: **Individual** and **Entity** Based (Voting basis)
  - Linkage to broad academic, conference and publication activities (400K Members Globally)
  - Open to collaboration with all

IEEE SA STANDARDS ASSOCIATION

STANDARDS WORK

Under our renowned global standards development program, we have hundreds of practical standards and projects in development impacting and contributing to the digital economy and that can contribute to a greener and more inclusive future, including:

- IEEE 802® family of standards for **wired and wireless networking** (Ethernet and WiFi)
- IEEE 1888™ for **Ubiquitous Green Community** Control Network Protocol
- IEEE P2030.10™ for DC **Microgrids for Rural and Remote Electricity Access** Applications
- IEEE 1547™ family of standards for interconnecting **Distributed Energy Resources** with electric power systems
- IEEE 1680™ for **Environmental Assessment** of Electronic Products
- IEEE 2089™ for **Age Appropriate Digital Services** Framework
- IEEE 7010™ for **Well-being Metrics** For Autonomous And Intelligent Systems (A/IS)
- IEEE P7010.1™ Advancing **Corporate Social Responsibility**

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GLOBAL COLLABORATION

- Joint Development & Adoption Agreements: With **ISO, IEC, and ISO/IEC JTC1** Committees
- **National Standards Adoption** agreements with NSBs in countries, including Australia, Costa Rica, Ecuador, Hungary, India, Israel, South Africa
- Accredited to develop American National Standards
- IEEE Adherence to the **World Trade Organization** Principles for International Standardization Paper
- Government Engagement Program (Regulators, Ministries…) 54 agencies from 37 countries

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IEEE SA Centers of Competence

Health & Life Sciences
- Pharma
- Clinical health
- Wellness

New Frontiers & Emerging Spaces
- Sustainability
- AIS
- Emerging technology areas

Mobility
- Safe autonomous driving
- Zero emissions
- MaaS

Foundational Technologies
- Industrial IoT
- Consumer technology
- Infrastructure for Emerging Technologies

Energy
- Smart energy
- Energy efficiency
- Energy infrastructure

Telecommunications & Connectivity
- Rural
- Next generation telecom
- Wired and hybrid communications

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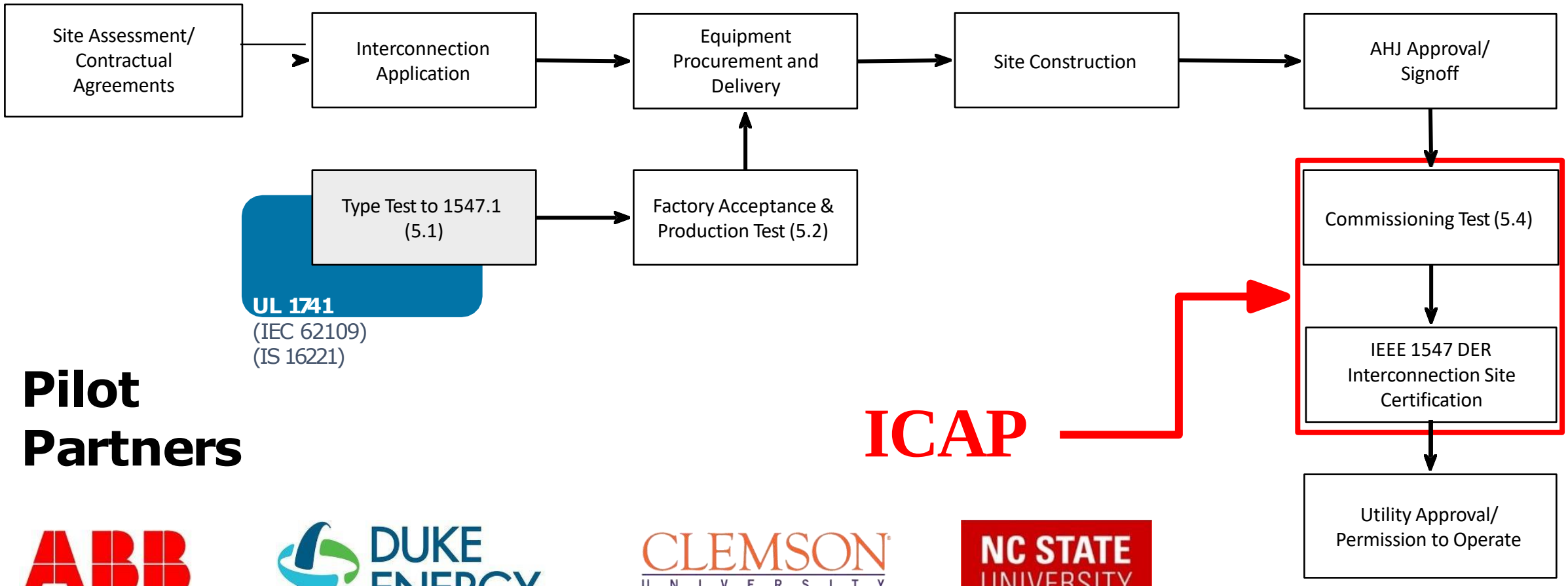
IEEE 1547

IEEE

ADOPTION of IEEE 1547

- IEEE 1547 is adopted in various regions of the world in part or whole including the following:
  - United States
  - Canada
  - Indonesia
  - Vietnam
  - Thailand
  - Malaysia
  - Philippines
  - Israel
  - Ghana
- Revision to IEEE 1547-2018 in progress; participation from India can address and provide more clarity on 50 vs. 60 Hz systems

IEEE 1547 COMPLIANCE PROCESS



Pilot Partners

ABB

DUKE ENERGY®

CLEMSON UNIVERSITY

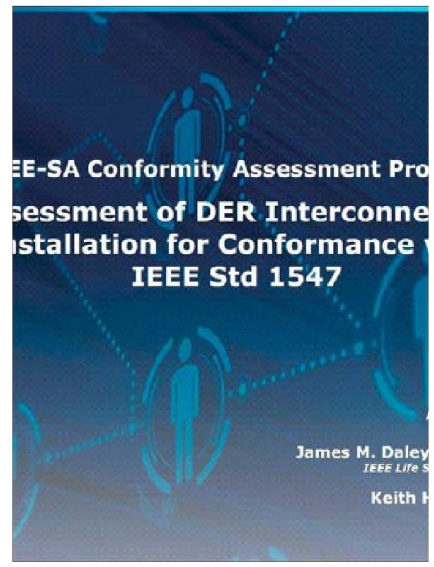
NC STATE UNIVERSITY

ENERGY COMMISSION
Securing Ghana's Energy Future Today

Electricity Company of Ghana Limited

IEEE 1547 CONFORMITY ASSESSMENT PROGRAM

Program Objective: Develop a Site Certification [process] with respect to DER Interconnection that Emphasizes <u>All</u> Essential Aspects of IEEE 1547/1547.1over the <u>life of the Interconnection</u>



GOAL OF THE IEEE 1547 CREDENTIALING PROGRAM

Create a credentialing program that will train and certify individuals who can verify any installed DER Interconnection (e.g., Residential, Utility-Scale, Micro-grid, etc.) for its compliance with the IEEE 1547™-2018 standard and local jurisdictional requirements.

DELIVERABLES

Standardized Commissioning Resources

Documentation templates and resources for the preliminary review, on-site assessment and post inspection reporting of IEEE 1547 commissioning.

IEEE 1547 Education

Classroom style education and content and resources on IEEE 1547-2018, commissioning fundamentals and basic interconnection agreement understanding.

IEEE 1547 Personnel Credentialing

Certification program for qualified individuals who demonstrate a thorough understand of IEEE 1547 and proper field commissioning.

BENEFITS

- **Increase industry pool** of qualified individuals who can verify installed DER Interconnections for their compliance with the IEEE 1547-2018 standard and future revisions.
- **Provide competitive/competent resource** for the assessment of all DER Interconnections INCLUDING Residential.
- **Alleviate burden on the utilities** due to high penetration of DER interconnections and wide range of varying DER technologies.
- **Standardize commissioning process** with applicable documentation for the assessment of installed DER interconnections to IEEE 1547/1547.1.
- **Address Periodic Testing/Inspection Gap** of DER for continued proper operation of DER and its capabilities.
- **Promote DER adoption** through the addition of knowledgeable 1547-2018 personnel and standardized commissioning resources.
- **IEEE 1547 Compliance Resource** for regulators and other AHJs mandating IEEE 1547-2018 compliance.

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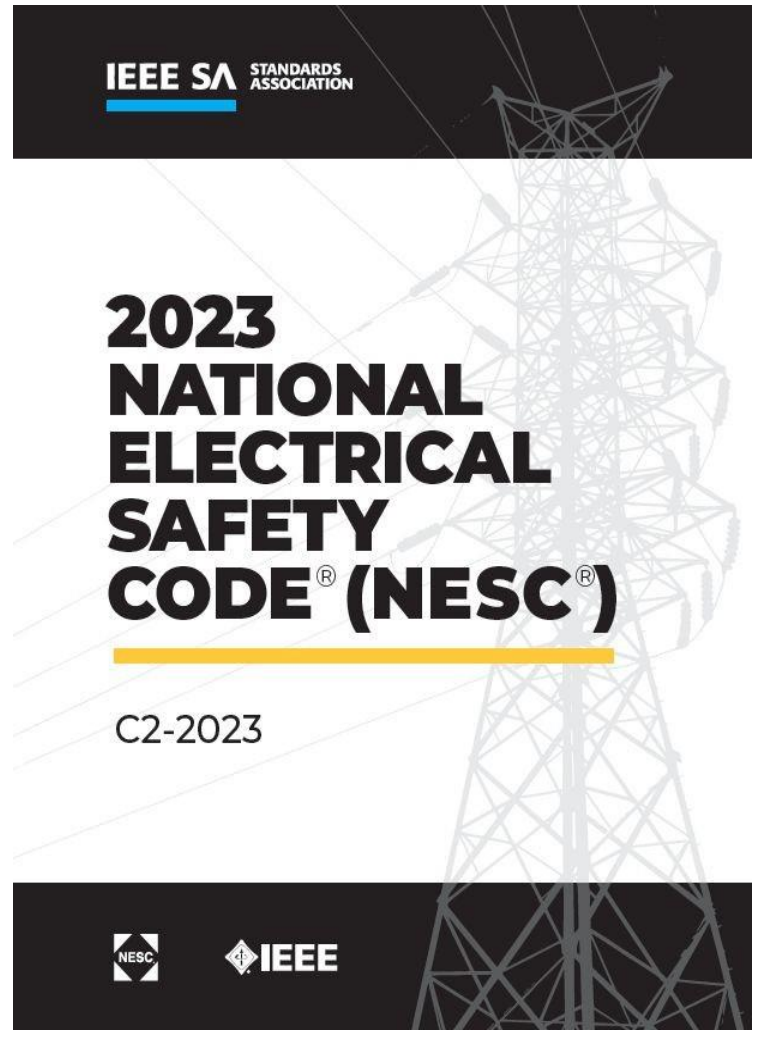
NESC

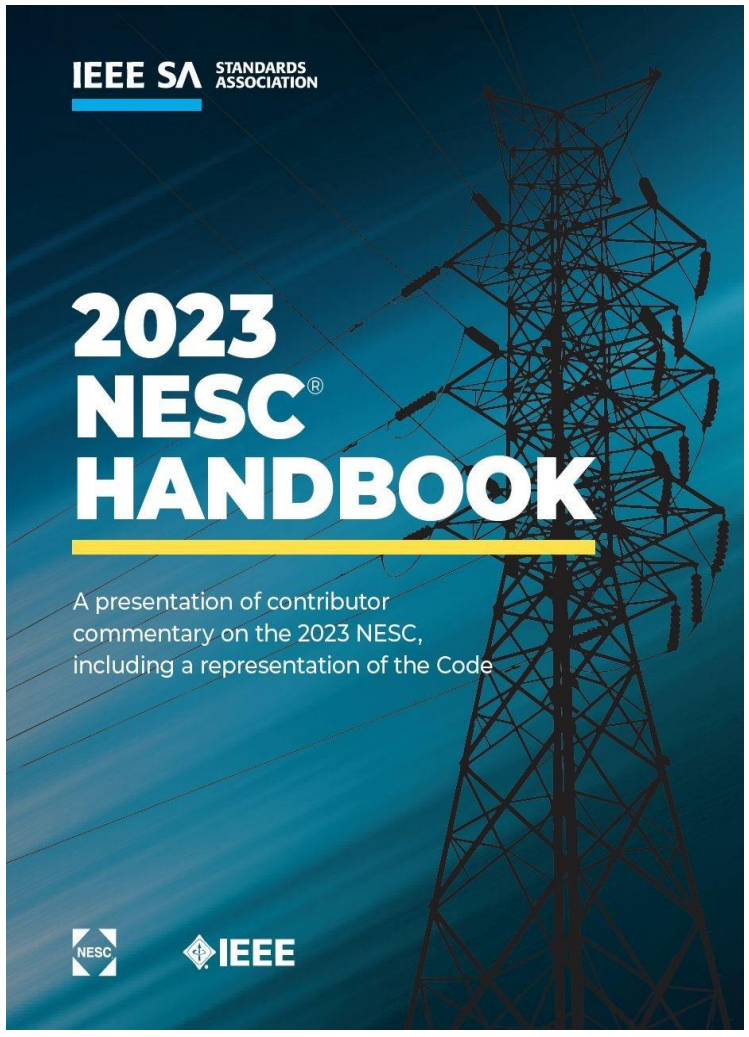
IEEE

NESC 2023 EDITION - OVERVIEW

- The NESC is revised every 5 years.
- The NESC is an authoritative source on best practices and has been for over 100 years.
- The 2023 edition contains extensive updates and critical revisions that directly impact the power utility industry. (In effect as of February 2023.)
- It contains the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions.



THE NESC HANDBOOK



- The 2023 NESC Handbook represents a next-generation tool for the professional who needs to understand the NESC.
- The handbook was developed for use at many levels in the electric and communication industries, including those involved in system design, construction, maintenance, inspection, standards development and worker training.
- This Handbook gives users insight into what lies behind the NESC's rules and how to apply them.
- Note that the 2017 version is available in Spanish.

THE NESC ELEARNING COURSE PROGRAM

- 7 online courses.
- Courses are self-paced and delivered in a convenient, easy-to-use online learning environment.

VALUE ADDED CONTENT (I.E. ELEARNINGS)

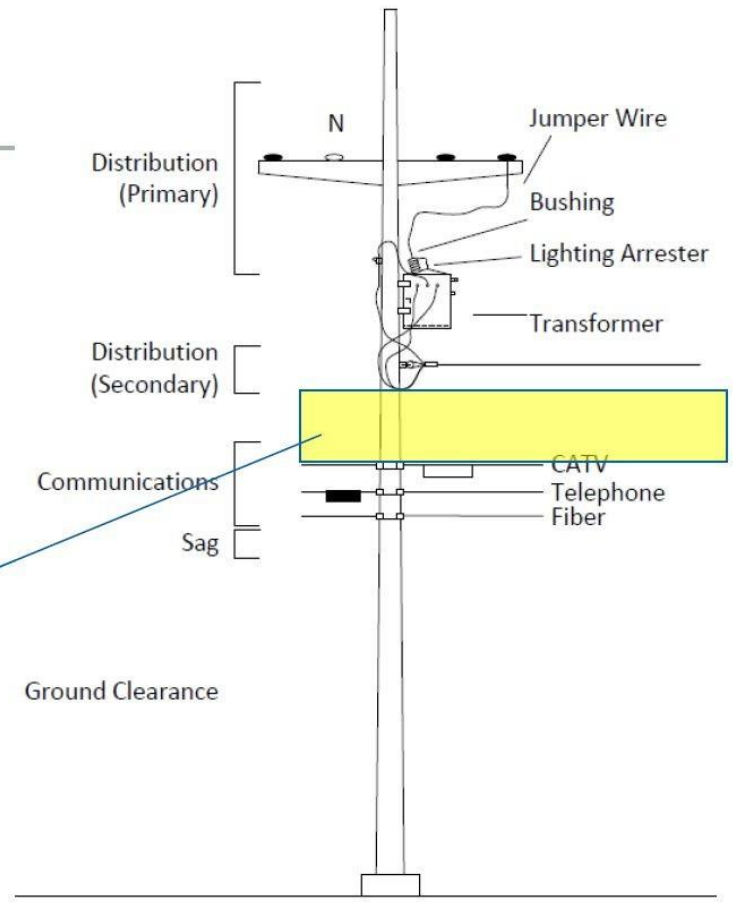
NESC™ National Electrical Safety Code®

- **Digitized Drawings**
- **SMEs direct contact**
- **Learning Lessons**

SECTION 2: DEFINITIONS
COMMUNICATION WORKER SAFETY SPACE

- The space on joint-use structures where communication facilities are separated from the supply space by the **communication worker safety zone**.

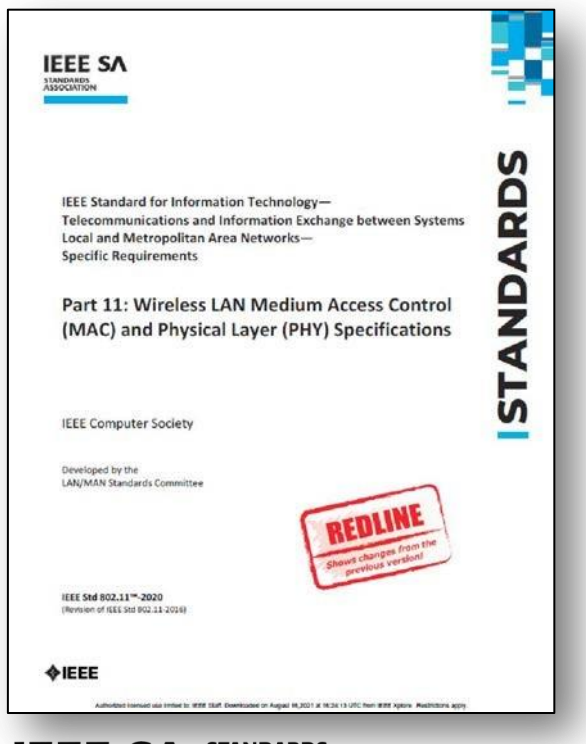
Communication Worker Safety Zone

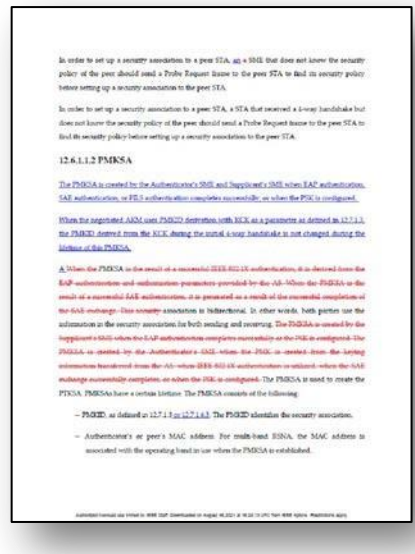


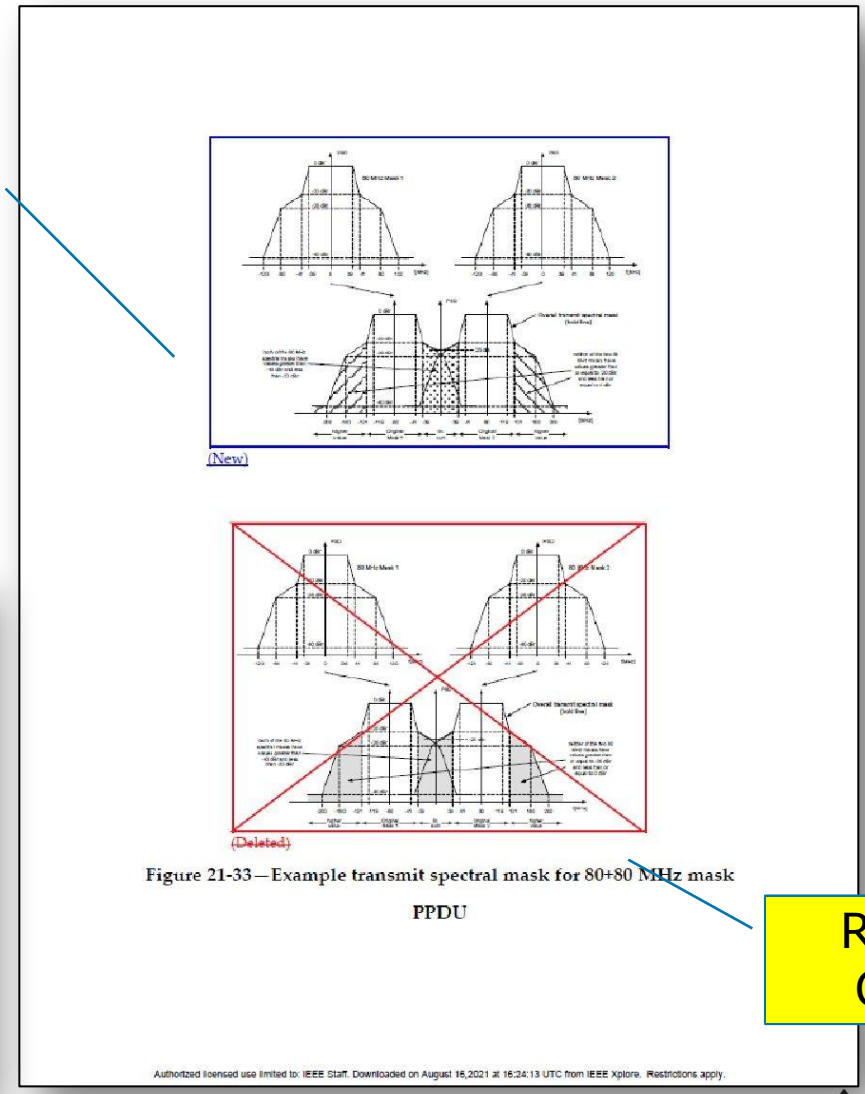
VALUE ADDED CONTENT (I.E. REDLINE VERSIONS)

Standard requirements Plus highlighted changed compared to previous edition

Added Value



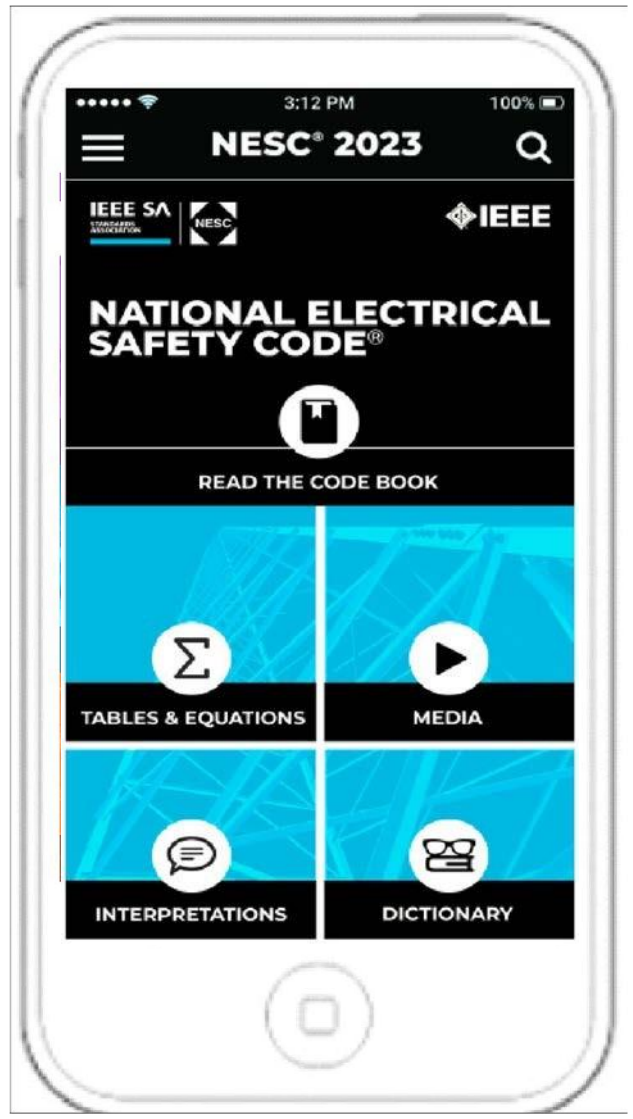


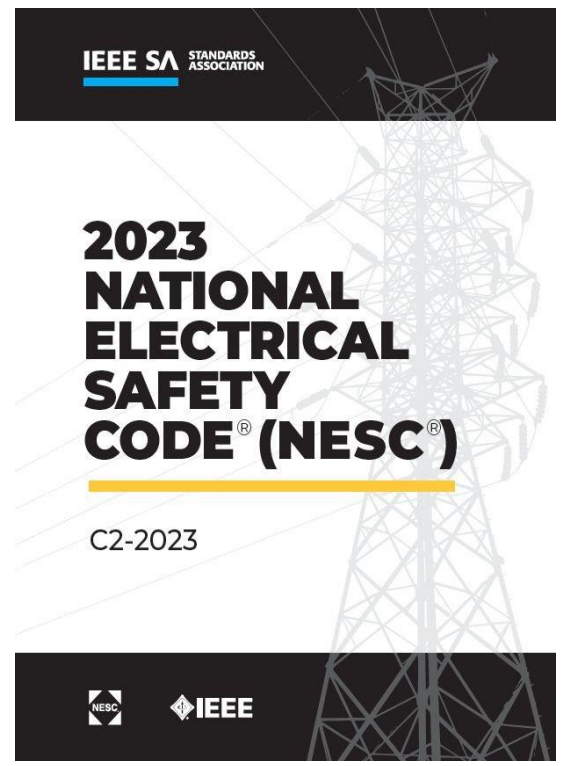


Removed Content

VALUE ADDED CONTENT (I.E. MOBILE APPS)

- NESC's Mobile App (2017ed & 2023ed)
- Tables & Equations
- Link to Interpretations webpage
- Free Access to Online Dictionary
- Video recordings of SMEs and Workshops





THE NESC STRUCTURE

SC1- Coordination - Sections 1, 2 and 3; Coordination between technical subcommittees

SC2- Grounding Methods - Section 9

SC3- Electric Supply Stations - Sections 10-19

SC4- Overhead Lines - Clearances - Section 20-23

SC5- Overhead Lines - Strength and Loading - Sections 24-27

SC7- Underground Lines - Sections 30-39

SC8- Work Rules - Sections 40-43

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Sustainability & Planet Positive

IEEE

IEEE & Sustainable Development

With over 400,000 members in more than 160 countries, IEEE is a leading authority in ICTs, Power, and virtually every other technology area that enables sustainable development — with applications such as smart cities, transportation, buildings, and all aspects of power and energy generation, from generation to efficient consumption.

IEEE and its members inspire a global community through technology standards, highly cited publications, conferences, and professional and educational activities across these technology areas and markets around the globe.

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SUSTAINABLE MARITIME
PRE-STANDARDS
ACTIVITY

Sustainable Maritime

The global maritime industry is facing significant challenges in moving towards more sustainable operational practices to align with international sustainable development goals.

Maritime is comprised of both **shipping and port aspects**.

IEEE has a number of committees and programs associated with maritime technical issues, each working on specific topical areas in their respective domains.

The goal of this Industry Connections activity is to bring together these areas of domain expertise and build a collaborative IEEE community of interest around maritime issues, and investigate **opportunities for new standards, reports, events and thought leadership to support these ambitious goals of the maritime industry.**

- Electric Ships and Marine Platforms Subcommittee
- Marine Wind, Wave, and Tidal Systems Subcommittee
- Marine Transmission and Distribution Subcommittee
- Marine Grounding and Safety Subcommittee
- Environmental Impact Subcommittee
- Education and Symposia Subcommittee
- IEEE Power & Energy Society Marine Systems Coordinating Committee
- IEEE Oceanic Engineering Society
- Industry Applications Society
- IEEE Transportation Electrification Community (TEC)

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Trustworthy AI & CertifAIEd

IEEE

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INFLUENCED THE HUMAN FOCUSED AI / TECHNICAL S LANDSCAPE

EAD, Version 1
December, 2016

EAD, Version 2
December 2017

EAD, Edition 1
March 2019

BKCenter Chart
January, 2020

CEN/CENELEC Workshops (Digital Sovereignty, IEEE 2089)

Confiance + IEEE AI Ethics Standards

2015 - 2018

AI ETHICS INITIATIVE
IEEE
Work Begins
October 2015

ASILOMAR AI PRINCIPLES
FLI Institute
January 2017

P7000 SERIES LAUNCHES
IEEE Standards Working Groups Inspired by EAD
June 2016

OCEANIS
IEEE
July 2018

2019 – 2020

ETHICS GUIDELINES
EU High Level Experts Group
April 2019

AI PRINCIPLES
OECD
May 2019

EVERYDAY ETHICS FOR AI
IBM
October 2019

IEEE 2863
Recommended Practice for Organizational Governance of Artificial Intelligence Inspired by EAD
February 2020

IEEE 7010-2020
Recommended Practice for Assessing the Impact of Autonomous and Intelligent Systems on Human Well-Being
LAUNCHED 2020

2021-2022+

IEEE 7000-2021
IEEE Standard Model Process for Addressing Ethical Concerns During System Design
LAUNCHED 2021

IEEE 2089-2021
Age Appropriate Digital Services Framework Based on the 5Rights Principles for Children

IEEE 7002-2022
IEEE Standard for Data Privacy Process
LAUNCHED 2022

IEEE CertifAIEd
City of Vienna Use Case Certification

IEEE 7001-2021
IEEE Standard for Transparency of Autonomous Systems
LAUNCHED 2021

IEEE 7005-2021
IEEE Standard for Transparent Employer Data Governance
LAUNCHED 2021

IEEE 7007-2021
IEEE Ontological Standard for Ethically Driven Robotics and Automation Systems
LAUNCHED 2021

IEEE 7007-2021
IEEE Ontological Standard for Ethically Driven Robotics and Automation Systems
LAUNCHED 2021

IEEE

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PROGRAM

IEEE's Path: Make the implicit explicit & verifiable for the entire AI ecosystem

STANDARDS

Developing a growing series of standards that promote innovation, foster interoperability and honor human values.

- **Technical**
- **Socio-technical**

CERTIFICATION

Developing metrics and processes towards the implementation of a certification methodology.

- **Transparency**
- **Accountability**
- **Algorithmic bias**
- **Respect of Privacy**

GOVERNANCE

Support responsible Artificial Intelligence Systems innovation through proper governance mechanisms for:

- **Business**
- **Municipalities/Cities**
- **Public Sector/ Governments**

https://standards.ieee.org/initiatives/artificial-intelligence-systems

IEEE

Ethical Assurance Requires a Global Ecosystem

Ecosystem Regulation through Competence Framework

- A Generic Systemic Competence Framework
- Contextualised for AI Ethics Roles
- Developed a Formal Deployment Process
- Formal Deliverables (Case for AIE Competence) by Applicants
- Independent Evaluation and Assessment
- Grading and Accreditation by IEEE-SA
- Continual Professional and Ethical Development

- Role Profiling for:
  - Assessor
  - Auditor
  - Partner
  - Advisor
  - Trainer
  - AIE Officer

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IN ACTION - CITY OF VIENNA

Use Case

Problem set/rationale

- The City of Vienna sought to advance its Digital Humanism Strategy in a practical and demonstrative manner to reflect the impact of its outcomes.

What they did about it

- Identified a specific use case to evaluate
- Engaged with the IEEE CertifAIEd team to understand the scope and assessment requirements

Result

- City took a milestone step toward advancing its Digital Humanism strategy through the process.
- City of Vienna's dedicated resource has a clearer perspective on how to practically consider AI Ethics and certification and can cross-pollinate learned expertise with other divisions.
- The city was awarded their IEEE Certificate for Ethical AI application in November 2021
  - **And where do they go from here?**
- Additional use cases continue to emerge to explore earning of a similar designation.

IEEE ADVANCES THE CITY OF VIENNA'S DIGITAL HUMANISM STRATEGY THROUGH ITS AI ETHICS CERTIFICATION PROGRAM

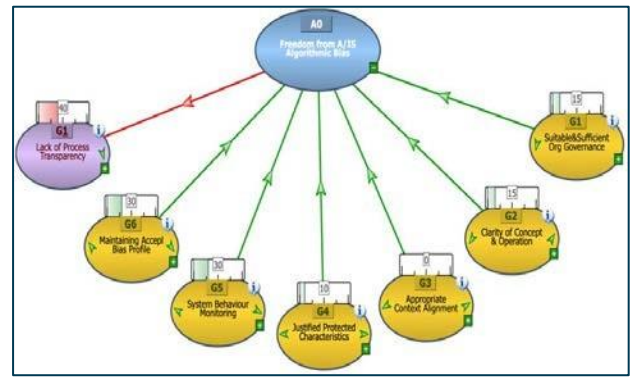
For the City of Vienna, the IEEE Standards Association completed its first AI Ethics Certification, a milestone in our European Standards Strategy.

- Executive City Councilor of Finance, Business, Labour, International Affairs, and Vienna Public Utilities Peter Hanke and the Deputy General Director DI Peter Weinelt hosted IEEE SA at Vienna's Town Hall, where a prominent public announcement was made on Nov 15.
- This marks the first city in the world to earn the IEEE AI Ethics designation. The milestone was commemorated with the IEEE SA formally providing the certificate to City representatives.
- Expressed interest from City to continue formal engagement with IEEE on AIE subject areas. In addition, several entities in the audience have expressed interest in further engaging in the AIE certification ecosystem.

Learn More at:
https://www.businesswire.com/news/home/20211115005200/en/City-of-Vienna-Earns-IEEE-AI-Ethics-Certification-Mark-Reinforcing-Commitment-to-Digital-Humanism-Strategy
https://www.ots.at/presseaussendung/OTS_20211115_OTS0071/foto-hankeweineltkarachalios-wien-machts-vor-kuenstliche-intelligenz-in-der-verwaltung-ethisch-zertifiziert

IEEE CertifAIEd

- **Certification is a basis for trust in products and services**
- **Independent Scrutiny**
  - ✔ Identifies Strengths and Shortfalls
  - ✔ Demonstrates Duty of Care
- **Adaptive and agile**
  - ✔ Assessment effort proportionate to the risk/reward profile
  - ✔ Rapid tailoring to the needs of a sector
- **Demonstrate implementation towards the proposed EU AI regulation**



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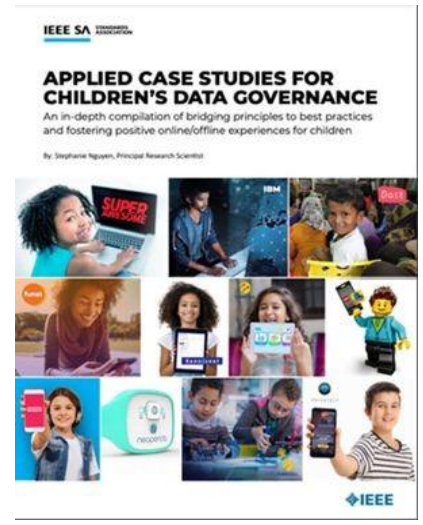
Trustworthy & Inclusive Design for Children & Youth in a Connected World



Children need space to grow up, to learn, evolve in a manner that allows them to develop through their stages of evolving capacities in a trustworthy environment. Yet in a world of increasing merging of online and offline spheres, the potential benefits come with serious r**isks relating to privacy, safety, security, and ultimately the mental and physical wellbeing** of children.

IEEE SA supports the development of **standards & resources that can be implemented to support a trustworthy ecosystem for children**, including:

- IEEE 2089-2021 - Standard for Age Appropriate Digital Services Framework - Based on the 5Rights Principles for Children
- IEEE P2089.1 - Standard for Online Age Verification
- IEEE P7004 - Standard for Child and Student Data Governance
- IEEE 3527.1-2020 - IEEE Standard for Digital Intelligence (DQ) -- Framework for Digital Literacy, Skills and Readiness
- 2 Editions of the IEEE SA Children's Data Governance Applied Case Study Report (see image on the right)
- The IEEE Trustworthy Implementations of Technology for Children's Online/Offline Experiences program
- The IEEE Dignity, Inclusion, Identity, Trust and Agency (DIITA) program
- The IEEE Digital Resilience program, including Human Digital Resilience Sub-Committee

LEGO case studies in the two Case Study Reports:

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Metaverse

IEEE

IEEE METAVERSE STANDARDS COMMITTEE (CTS/MSC)

The first standards committee on metaverse in major global/international SDOs

- Formerly **IEEE Virtual Reality and Augmented Reality Standards Committee** (CTS/VRARSC)
- Name change and scope change
  - Committee approval: 16 May 2022
  - IEEE SASB approval: 21 September 2022
- New scope:
  - The scope of the Standards Committee is to develop and maintain standards, recommended practices, and guides for **metaverse**, virtual reality and augmented reality, using an open and accredited process, and to advocate them on a global basis. Its technical scope is intended to be flexible and is ultimately determined by the sum of its approved PARs.

IEEE Standards & Projects: Metaverse

Many metaverse-related standards and projects are NOT listed here if their titles do not explicitly include "metaverse"

- P2048 **Standard for Metaverse: Terminology, Definitions, and Taxonomy**
  - Status: Approved by IEEE SASB on 10 November 2022
- P7016 **Standard for Ethically Aligned Design and Life Cycle of Metaverse Systems**
  - Status: Approved by IEEE SASB on 10 November 2022
- P7016.1 **Standard for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse**
  - Status: PAR submitted to IEEE SA
- P3812.1 **Standard for General Requirements for Identity Framework for Metaverse**
  - Status: Approved by IEEE SASB on 3 December 2022
- IC22-012 **Persistent Computing for Metaverse Initiative**
  - Status: Approved by IEEE SA CAG on 12 October 2022
- IC22-015 **Decentralized Metaverse Initiative**
  - Status: Approved by IEEE SA CAG on 12 October 2022
- *See also* **"Why Are Standards Important for the Metaverse?"**
  - https://standards.ieee.org/beyond-standards/industry/technology-industry/why-are-standards-important-for-the-metaverse/

IEEE-ISTO Metaverse Acceleration & Sustainability Association

In preparation

- Roadmaps
- Standards
- Pilot/Reference Implementations
- Conformity Assessment & Certification

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Rural Connectivity

IEEE

IEEE Standards & Projects: Rural Connectivity

IEEE P2030.10™ - IEEE Draft Standard for DC Microgrids for Rural and Remote Electricity Access Applications

This standard covers the design and operation of a dc microgrid for rural or remote applications based on extra low voltage dc to reduce cost, simplify stability, and to be safer than grids using typical ac voltages. Such microgrids are typically operated without connecting to a nation's electric power system and are referred to as stand-alone microgrids. Sponsored by the IEEE Power & Energy Society.

IEEE P1941.1™ - Recommended Practice for Internet Grades of Service in Rural Areas

This project will provide recommendations for Grades of Service offerings by internet service providers in rural areas. Service scenarios include generations of cellular networks. Recommendations include access service and core network parameters, service concentration, service availability and reliability. Sponsored by the IEEE Communications Society and developed by the Internet Grade of Service in Rural Areas working group.

Rural Communications Industry Connections Activity

Rural areas continue to be sparsely covered and are not considered as a viable business case by telecommunication operators. Recent growth of teledensity in urban areas, fueled by mobile technology, has meant that the digital gap between rural and urban areas has widened. Join this activity to help contribute toward the goal of global digital inclusion by developing solutions for rural and remote areas using suitable technologies.

User-Centered Approach to Designing a User Interface for Rural Communities

Bringing together experts and designers from across industries, an Industry Connections (IC) Program was formed to research technology needs of global rural communities. These insights will be used to develop a model for the design and implementation of user interfaces for rural communities.

A Transdisciplinary Framework for 5G, Future Networks Applications, and Services

Today's communication architectures are typically designed in a bottom-up approach, requiring the applications to fit the underlying physical layer (PHY). This fragmented landscape is difficult to introduce newer components and applications.

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WHAT CAN WE DO TOGETHER?

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THANK YOU!

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