IEEE Industry Applications Society Meeting

NEMA

TRANSFORMING THE FUTURE

Opportunities and Challenges for Industrial Control Panels

December 14, 2020

Presenter Biography

- Senior Field Representative – Southern Region
- NFPA 78, NFPA 1078, and NFPA 780
- ICC Commercial Energy Code Development Committee
- 41 ICC Certifications
- 24 FEMA Certifications
- Certified Standards Professional (CStd)

NEMA
National Electrical Manufacturers Association

Strength in numbers fused with sector expertise is the hallmark of the National Electrical Manufacturers Association (NEMA). We are nearly **325** Member companies representing a wide range of electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems serving seven major markets:

- Building Infrastructure • Building Systems • Lighting Systems • Industrial Products & Systems
- Transportation Systems • Utility Products & Systems • Medical Imaging

Our combined industries account for **370,000** American jobs in more than **6,100** facilities covering every state. These industries produce **$124** billion in shipments and **$42** billion in exports of electrical equipment and medical imaging technologies per year.

NEMA publishes more than **700** electrical and medical imaging Standards and technical papers that cover millions of Member products. We believe that Standards play a vital part in the design, production, and distribution of products destined for both national and international commerce.

Presentation Topics

Industrial Control Panel – Industry Issues

- Marketplace Barriers – Opportunities and Challenges
- Standards Development and Harmonization

Introduction to the Field Representative Program

- Codes and Standards Development
- State and Local Codes and Standards Adoption Activity
- Education and Training Activity
- Core Industry Services

NFPA Requirements for Industrial Control Panels

- NFPA 79 Chapters 9, 10, and 11
- NFPA 70 (NEC) Article 409

Opportunities and Challenges in the Field

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Industrial Control Panel Industry Issues

Industrial Control Panel - Industry Issues

- UL 508A MTR Qualification Test
- Supplier-Manufacturer Collaboration
- Industry Awareness and Visibility
- UL 508A Industrial Control Panels
- Standards Harmonization

Topic 1: UL 508A "MTR qualification test"

- 80 question, 4 hr exam
- No industry input on questions
- One person (minimum) per site
- Website makes no mention of any benefit for Manufacturer

Topic 2:
Supplier-Manufacturer Collaboration

- Industrial Control Panels are growing in complexity
- Connected products, trouble-shooting, and component selection is complicated
- Strong relationships between suppliers and manufacturers can reduce downtime and increase sales

Topic 3: Added visibility for your organization

- Building awareness opens opportunities
- Website drives traffic and opportunities to your company
- Differentiate your company from the thousands of others in the market

Topic 4: New Edition of UL 508A

- New 3rd edition with effective date of July 2020
- New structure
- Additional revisions introduced with future effective dates
- Are there benefits of having a broad industry interpretation of the new requirements?

Topic 5: Update UL 508A

- Standards are designed to be easy-to-understand and help make safe products
- Are there gaps in the standard, ambiguous paragraphs, conflicting requirements?
- How does the standard differ from the requirements of Art. 409 of the NEC?

Topic 6: Harmonization

- UL, CSA and the NEC all have (different) defined requirements for Industrial Control Panels
- Would there be a benefit in working so that these differences are eliminated?
- Would harmonization between one or more of these groups create other issues?

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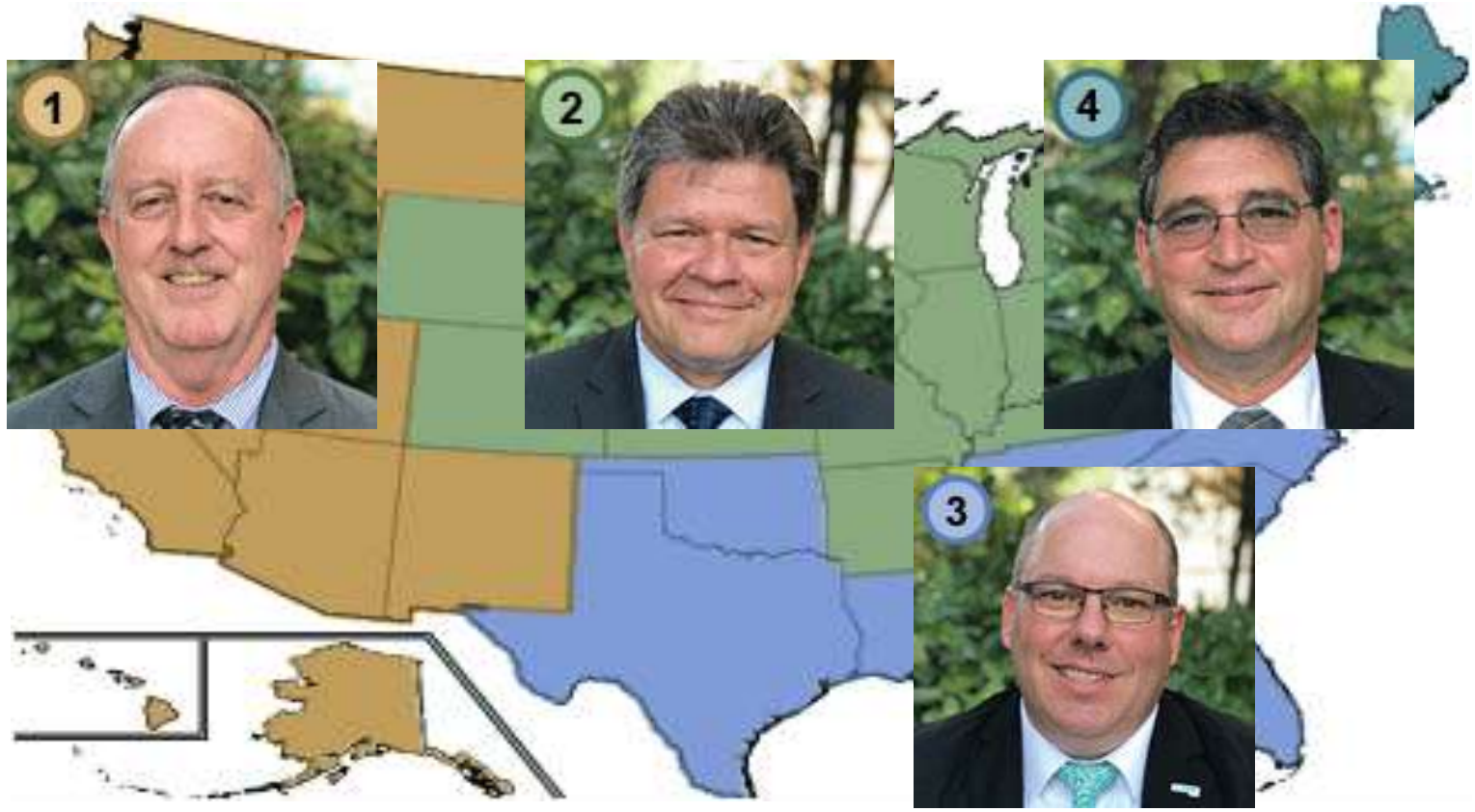
Introduction to the NEMA Field Representative Program



- 1. Mike Stone: AK, AZ, CA, HI, ID, MT, NV, NM, OR, UT, WA
- 2. Tim McClintock: AR, CO, IA, IL, IN, KS, KY, MI, MN, MO, ND, NE, OH, SD, WI, WV, WY
- 3. Bryan Holland: AL, FL, GA, LA, MS, NC, OK, PR, SC, TN, TX, USVI, VA
- 4. Jack Lyons: CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT

Field Representative Program

- Develop and maintain relationships with Authorities Having Jurisdiction and other Electrical Professionals throughout the nation
- Provide training on the latest Codes, Standards, and the proper installation and use of NEMA Member products
  - 50+ PowerPoint Presentations / 25+ Whitepapers / Engineering Bulletins
- Advocate NEMA positions pertaining to electrical safety, efficiency, resilience, and sustainability
- Assist in solving problems in the field involving the installation of NEMA Member products

Codes and Standards Development

NFPA Codes and Standards

ICC Codes (I-Codes)

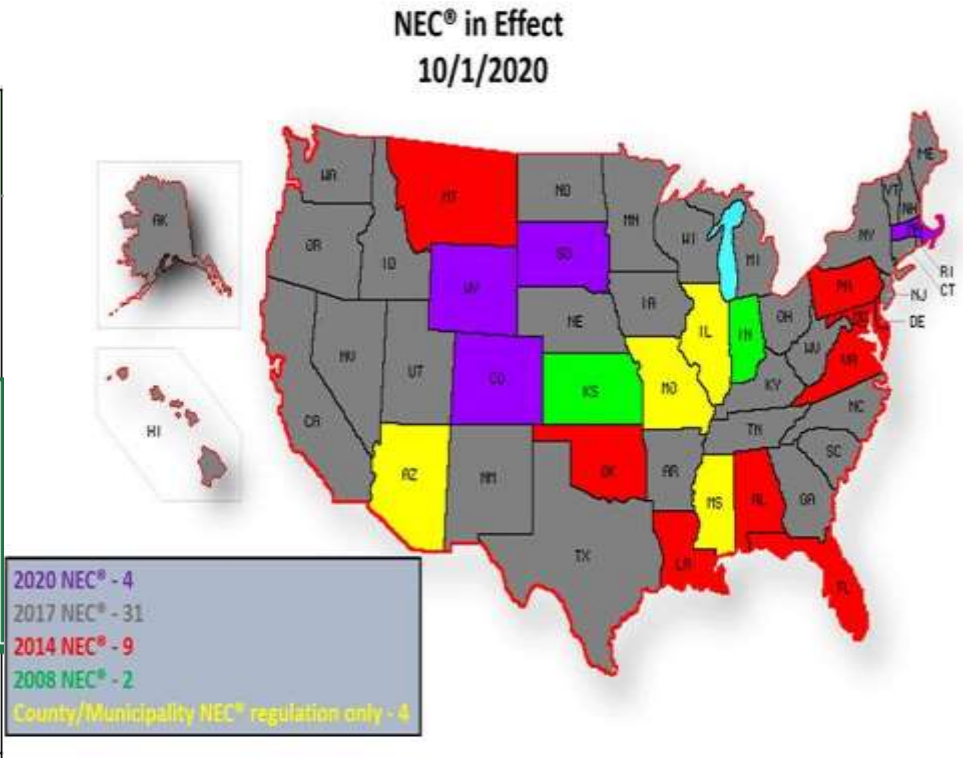
Codes & Standards Development

- **National Committee Participation**
  - NFPA 70, 70B, 78, 780, 915, and 1078 Technical Committees
  - ICC Commercial Energy Code Development Committee
- **Public Input / Proposal Development**
- **Hearing Testimony**
- **Industry Partner Collaboration / Stakeholder Engagement**

Codes & Standards Adoption Activity

- National Electrical Code
- Building, Fire, & Life Safety Codes (ICC / NFPA)
- Energy Codes (ICC / ASHRAE)

State	Adoption By	NEC Edition: Adoption and Effective Date	IRC Edition	IRC Part VIII	Promulgating Agency	Date Last Change Made to Report	Notes
Alabama	State	2014: Adopted on 5/31/2016, Effective on 7/1/2016	2015	Yes	State of Alabama Building Commission / Alabama Energy & Residential Codes Board	11/1/2019	Alabama does not have statewide adoption of the NEC except for State Buildings, Schools, Hotels, & Motion Picture Studios. The 2015 IRC went into effect on October 1, 2016 and applies statewide to residential construction only.
Alaska	State	2017: Adopted and Effective on 5/9/2018	No	No	The Office of the State Fire Marshal adopts the International Building Code, International Fire Code, International Mechanical Code,. The State legislature adopts the Uniform Plumbing Code and the National Electrical Code.	7/1/2018	There is little enforcement as there are only 3 inspectors covering the entire state outside of Anchorage, Fairbanks, and Juneau. The state Division of Labor Standards and Safety enforces the electrical codes; The Mechanical Inspection Section has jurisdiction over the electrical inspection and adoption process. The electrical code may be found HERE: http://touchngo.com/lglcntr/akstats/AAC/Title08/Chapter070.htm
Arizona	Local Jurisdiction	No State Adoption: See select jurisdictions below	2018		N/A	1/10/2019	There is no statewide adoption in Arizona. Most major jurisdictions including Phoenix and Tucson communities have recently adopted the 2017 NEC, moving directly from the 2011 NEC and skipping over the 2014 NEC. The



Codes & Standards Adoption Activity

Monitoring & Reporting:

- Code Adoption Task Force and Toolkit:
  - Maps, Reports, Guidance Documents, State Playbooks
- Council, Section, Technical Committee, Task Group Listserv
- Code Alerts
- Intelligence Report Submittal

Regulatory & Legislative Action:

- Committee Work (State and Local)
- Hearing Testimony / Public Comment (State and Local)
- Advocacy, Networking, Education

Affecting Change Through Education

The NEMA field representatives' contributions to state code adoption involves more than advocacy and support. Education plays a significant role before, during, and after the code adoption cycle.

This education can take on many forms and includes virtually all stakeholders.

Many NEMA Members have and continue to contribute and partner with a field rep during educational sessions and training events. This activity has led to many successful state code adoption campaigns and has raised the overall electrical safety of communities and society at large.

Learn more at www.nema.org/fieldreps.

- **Technical Analysis**
  Before the code update process begins, education includes a technical analysis of significant code changes since the last edition and a review of updates to electrical safety product Standards associated with those changes. The audiences at these seminars and workshops include design professionals, installers, and code enforcers. The ultimate goal is to familiarize them with the changes and to develop support for them.
- **Dispelling Misconceptions**
  Education during the code update process involves the regulatory or legislative body charged with voting for the code adoption. While these entities are interested in cost and benefit analyses, education may also dispel misconceptions, misunderstandings, and outright falsehoods that may have been provided by opponents to the updates being considered.
- **Installation and Enforcement**
  Once the updated code has been adopted and scheduled to go into effect, we want to see that the installation and use of electrical products is consistently interpreted and enforced. This becomes an opportunity to support and promote specific product Sections and application-specific technology, rather than the code as a whole.

Education & Training Activity

Education & Training Events:

- Conferences, Trade Shows, Forums, Workshops
- In-Person, Webinars, YouTube
- Industry Partners, State/Local Jurisdictions, Individual Companies

Education & Training IP:

- NEMA Developed Presentations and Resources
- Industry Partner Presentations and Resources
- Collaborative Presentations and Resources

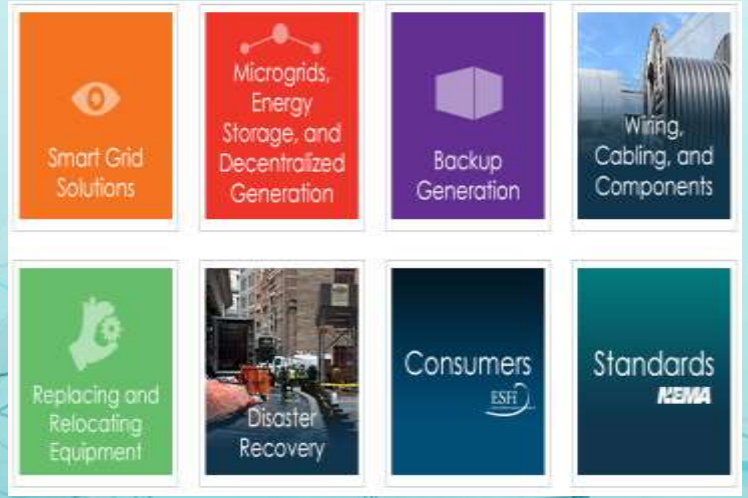
Core Industry Services

Product Development

Key Individuals and Resources

State and Local Agency and Industry Insights

Market Trends



Natural Disaster Response

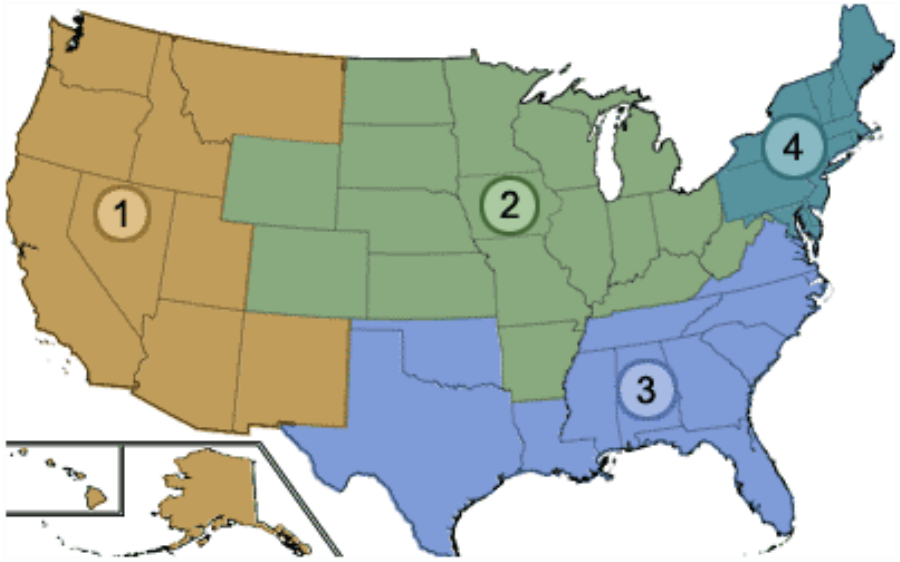
Conflict Resolution

Field Representative Program

NEMA's field representative program serves NEMA members by promoting the use and adoption of the National Electrical Code® (*NEC*®) and by monitoring regional developments of importance to the electroindustry. As advocates of safe electrical systems and installations, NEMA field representatives also make a valuable contribution to the public safety.

- The Field Program One-Pager
- The Field Program: Serving NEMA Members and Promoting Public Safety

NEMA has four Field Representatives located in regional offices around the country. Their regions of coverage are aligned with the International Association of Electrical Inspectors (IAEI) Section Regions. The representatives are:



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NFPA Requirements for Industrial Control Panels

NFPA Requirements for Industrial Control Panels

NFPA 79 – Electrical Standard for Industrial Machinery

- 2021 Edition issued on 10/5/2020
- Aligned with Article 670 of the NEC
- Chapter 9 covers “Control Circuits and Control Functions”
- Chapter 10 covers “Operator Interface and Control Devices”
- Chapter 11 covers “Control Equipment”

NFPA Requirements for Industrial Control Panels

NFPA 70 – National Electrical Code

- 2020 Edition issued on 8/25/2019
- 4,006 Public Inputs submitted to the 2023 NEC (First Draft Meetings being held 11/30/2020 through 1/23/2021)
- Article 409 covers “Industrial Control Panels”
  - Other applicable requirements of the NEC are found in Table 409.3
  - All requirements in Article 90 and Chapters 1-4 apply
  - Part I: General, Part II: Installation, Part III: Construction Specifications
  - Applicable to ICP intended for general use and operating at 1000 volts or less

NEC Article 409

Part II. Installations

- **409.20**: Supply Conductors = 125% of full-load currents for heating loads and the highest rated motor + 100% all other loads operating simultaneously

- **409.21**: Overcurrent Protection
  - (A) shall comply with Parts I, II, and IX of Article 240
  - (B) located ahead of the of ICP or within the ICP
  - (C) rated not greater than the sum of the largest branch-circuit overcurrent device in the ICP + 125% of full-load currents for heating loads + 100% of all other loads operating simultaneously

NEC Article 409

Part II. Installations

- **409.22**: Short-Circuit Current Rating
  - (A) the SCCR must exceed the available fault current
  - (B) where the SCCR is required to be marked per 409.110(4), the available fault current and calculation date shall be documented and made available to those authorized to inspect, install, or maintain the ICP
- **409.30**: Disconnecting Means = shall comply with Part IX of Article 430 where motor loads are supplied
- **409.60**: Grounding = multi-section ICP shall be bonded together with an EGC sized per Table 250.122 and used to connect all EGCs. An equipment grounding termination point is also required in single-section ICP

NEC Article 409

Part III. Construction Specifications

- **409.100**: Enclosures = comply with Table 110.28 (NEMA 250)
- **409.102**: Busbars and Conductors
  - (A) shall be protected from physical damage and be held firmly in place
  - (B) phase arrangements shall be “A, B, C” front to back, top to bottom, or left to right.
- **409.104**: Wiring Space
  - (A) max fill of 40% for feed-through or tapped conductors entering the ICP / max fill of 75% for the conductors, splices and taps (312.8)
  - (B) wiring bending space shall comply with 430.10(B)
- **409.106**: Spacings = comply with Table 430.97(D)

NEC Article 409

Part III. Construction Specifications

- **409.108**: Service Equipment = shall be suitable for use as service equipment and provided with main bonding jumper capabilities
- **409.110**: Marking
  - (1) manufacturer's name and trademark
  - (2) voltage, number of phases, frequency, full-load currents
  - (3) to indicate that more than one disconnecting means is required to de-energize
  - (4) short-circuit current rating (SCCR)
  - (5) as suitable for use as service equipment (SUSE rated)
  - (6) electrical wiring diagram
  - (7) enclosure type number (110.28 / NEMA 250)

Opportunities and Challenges in the Field

Opportunities:

- Industry Resource Development (Engineering Bulletins, Whitepapers, Training Presentations, Article Publication)
- Live Training Webinar Collaboration
- Industry Partnership Development

Challenges:

- OSHA 1910, Subpart S (1910.303a and 1910.399)
- “We only approve listed equipment” states and local jurisdictions
- SUSE, SCCR, AFC, AIR, FLC = “Too Many Acronyms”

Setting Standards for Excellence

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THANK YOU FOR YOUR ATTENDANCE!