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Electrical Safety System Infrastructure for the United States

Submitted by: Schneider Electric

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Electrical Safety System Infrastructure For the United States of America

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Schneider Electric
May 25, 2011

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To be discussed...

- An overview of the United States electrical safety system infrastructure
- What are the key elements
- How do the key elements work together

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Electrical Safety in the US

- The system covers established risks for fire and electric shock
- The system handles over 3.8 trillion kWh of electricity annually
- Common practice and principles across the entire country
- Key standardizing bodies have existed for over 100 years

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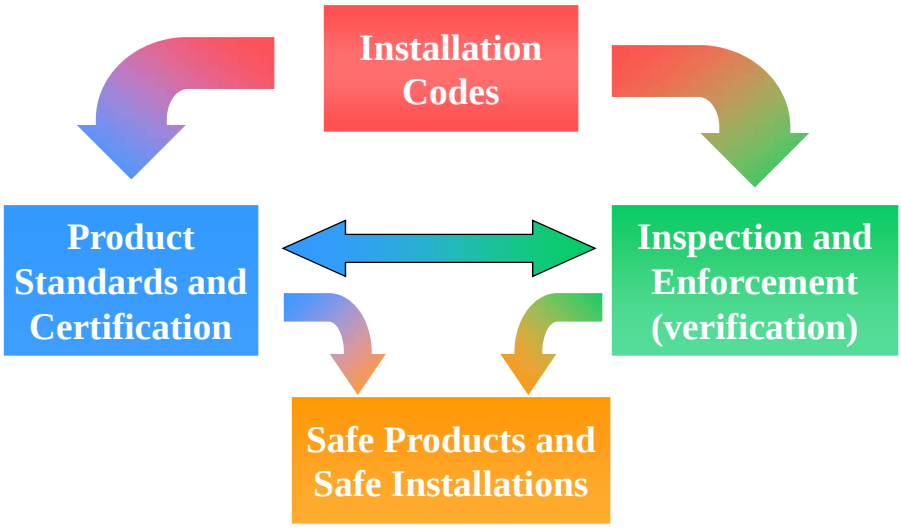
The US Electrical Safety System



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Installation Codes

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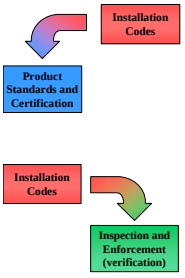
Installation Codes

- Importance
  - Directs the safe installation of products and systems
  - Helps to ensure use of “safe products”
- Tie to other parts of the safety system
  - Influences requirements in product standards
  - Used by the enforcement official to inspect an installation



Installation Codes

- Primary document is the National Electrical Code®
- Developed and published by the National Fire Protection Association (NFPA)
- Revised and published every three years
- 1st edition was in 1897
- Wide public review and input

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The National Electrical Code®

- Adoption occurs at the local (state, city, county, etc.) level
- Some local laws permit amendments to the NEC, however these are very limited due to the broad acceptance of the document as developed
  - local amendments typically have public hearings to accept input on the amendments

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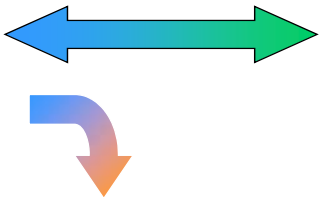
Product Standards/Certification

Product Standards and Certification



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Product Standards/Certification

- Importance
  - product standards set design, performance, construction, and certification requirements for products
  - provide basic requirements for “safe products”

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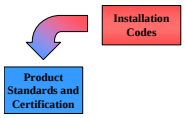
Product Standards/Certification

- Tie to Other Parts of the Safety System
  - certified compliance with standards indicates suitability for installation and use in accordance with the installation Code.
  - inspectors rely on compliance to product standards to approve a particular product for installation
- The standards are not "government regulated" or government developed



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Product Standards/Certification

- Voluntary standards - some examples:
  - Underwriters Laboratories (UL) (consumer and low voltage products)
    - compliance with UL Standards through UL (or another recognized body) results in LISTING
  - Institute of Electrical and Electronic Engineers (IEEE) (medium and high voltage products)
    - IEEE only develops the standards and does not do product evaluation
  - NEMA

Certification Aspects

- Conformity Assessment Requirements
  - No government mandated conformity assessment at the time of design/manufacture
  - Under the voluntary standards system, the product standards can have both design tests as well as production tests for the product

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3rd Party Certification

- Selection of the certifier is at the discretion of the manufacturer, but...
- The certifier must be one acceptable at the local level due to conformity assessment requirements at the time of installation

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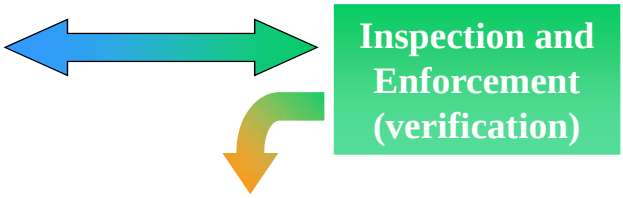
Inspection/Enforcement



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Inspection/Enforcement

- Importance
  - inspector verifies that installation complies with Code
  - provides for systematic checks and balances in the system
  - uniform interpretation of the installation code
  - products that do not comply with required standards will most likely not be used

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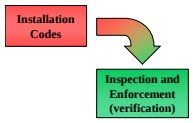
Inspection/Enforcement

- Tie to Other Parts of the Safety System
  - certified compliance with standards is evidence for the inspector that a product can be safely installed and used in accordance with the installation code
  - 3rd party product certifiers must be acceptable to the local authority
  - enforcer of the installation code



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Inspection/Enforcement

- Key organization for inspectors
  - International Association of Electrical Inspectors (IAEI)

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Authority Having Jurisdiction

- The organization, office or individual responsible for approving equipment, an installation, or a procedure.
- At the local level this is typically the electrical inspector

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Approved

- Acceptable to the authority having jurisdiction

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Federal -

- Occupational Safety and Health Administration (OSHA)
  - Legislated by "29 Code of Federal Regulations 1910 Subparts A (General) and S (Electrical)"
  - the OSHA act covers safety in the workplace and not product certification itself
- OSHA adopted the voluntary system (private sector codes and standards) that was in place

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"Local" Implementation

- "Local" refers to the state, city or other municipality level of the United States

Inspection/Verification

- Electrical installations are governed by local laws and typically required to be inspected by a recognized inspection body
- Inspectors can be publicly employed or privately employed and recognized by the local jurisdiction

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Inspectors and Product Acceptance

- Most inspectors will require products to be LISTED before granting approval of the installation
  - liability of the inspector
  - legal system structure
  - ensures compliance with the product standards

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Process of Inspection

- Process
  - Plan review (larger installations)
  - Installation permit
  - Rough-in inspection
  - Final inspection
  - Issuance of Certificate of Occupancy

- For electrical products, the inspector will look for the acceptable third-party certification mark and ensure that the manufacturer's instructions for installation are followed

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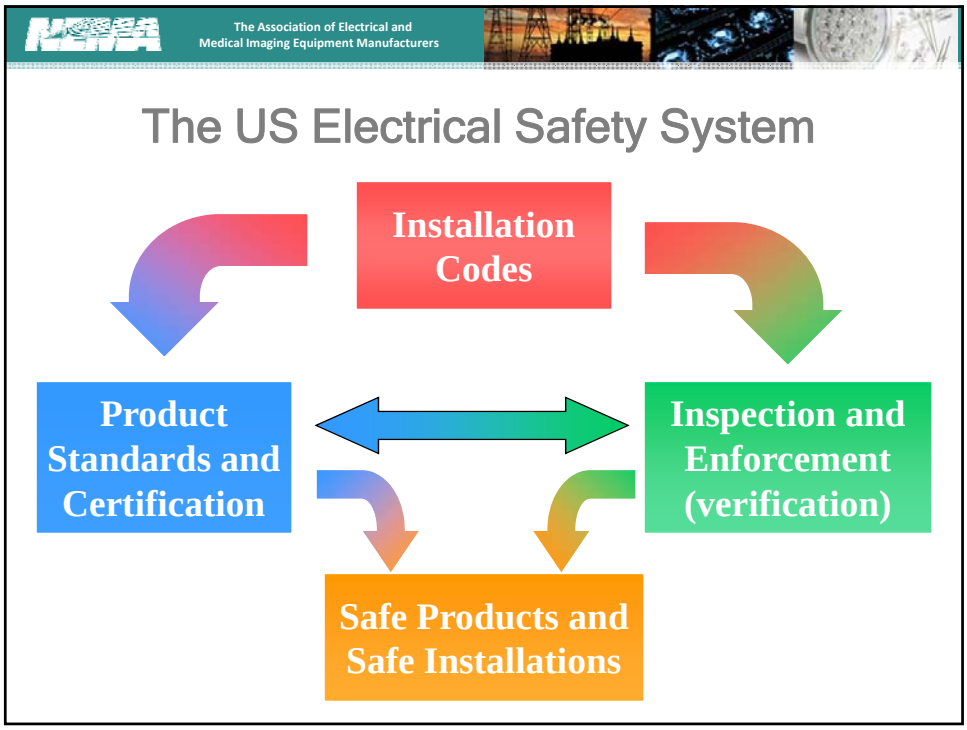
Enforcement Results

- If violations of the Code or improperly installed products are found the inspector will write a violation notice or can require that the product be removed
- Certificate of Occupancy will not be issued until violations are corrected
- Electrical utilities will not connect power until a valid Certificate of Occupancy is in place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The US Electrical Safety System
Installation Codes
Product Standards and Certification
Inspection and Enforcement (verification)
Safe Products and Safe Installations