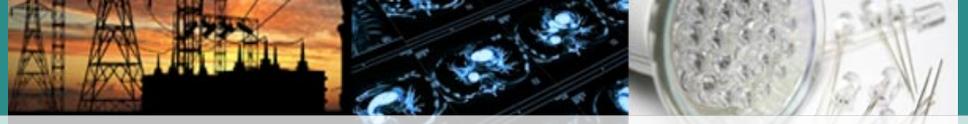


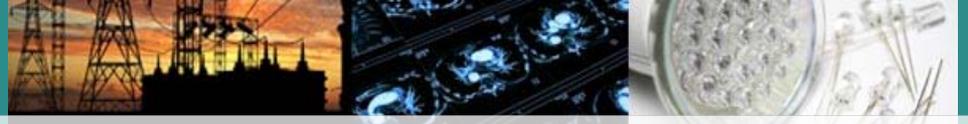


The Association of Electrical and
Medical Imaging Equipment Manufacturers



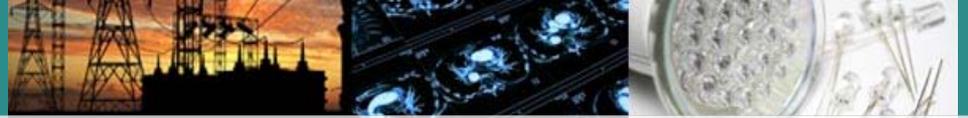
Electrical Safety System Infrastructure For the United States of America

Gene Eckhart
March 22, 2011
Senior Director, International Operations



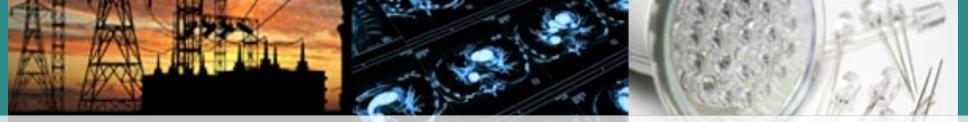
To be discussed...

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

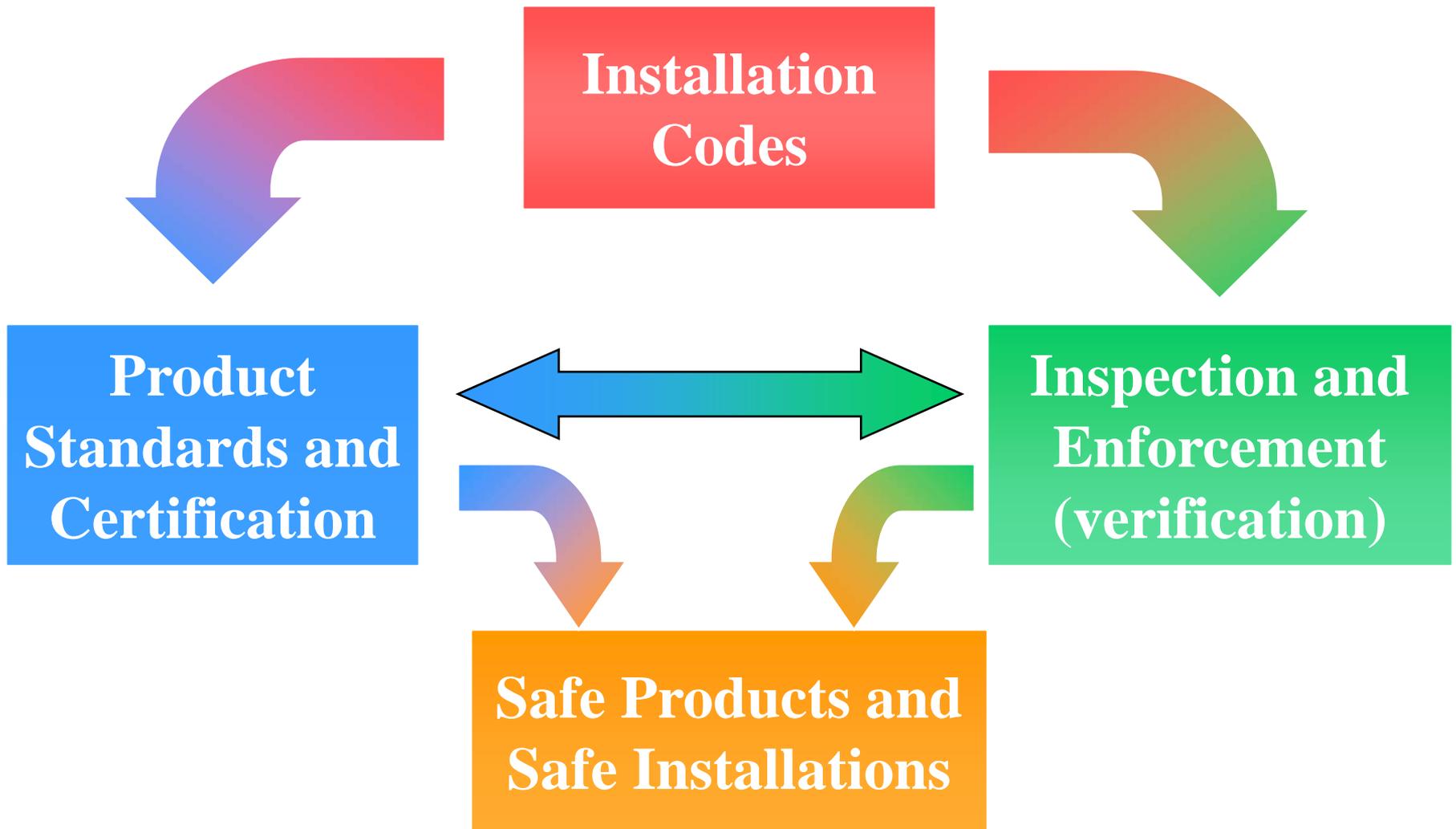


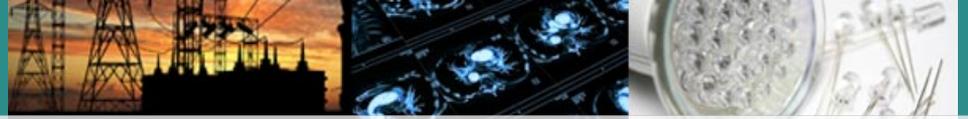
Electrical Safety in the US

-  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



The US Electrical Safety System

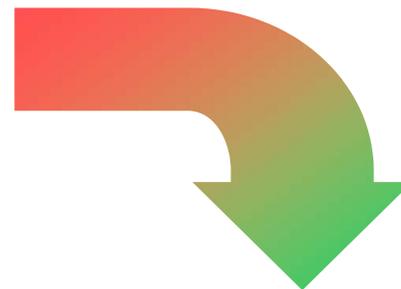


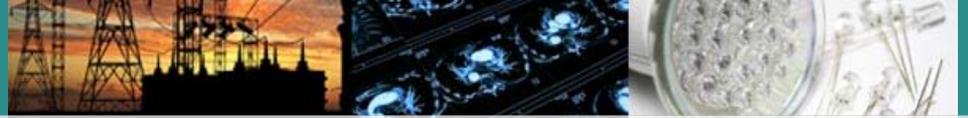


Installation Codes



**Installation
Codes**





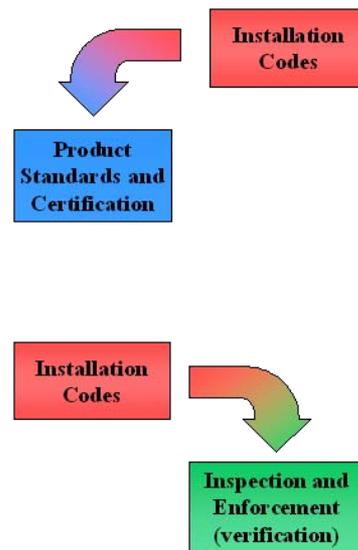
Installation Code

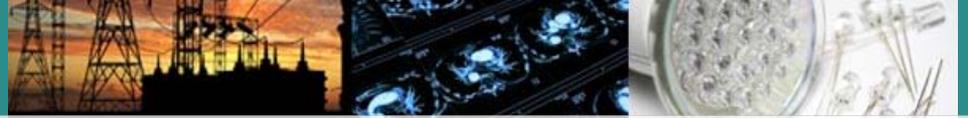
Importance

- Directs the safe installation of products and systems
- Helps to ensure use of “safe products”

Tie to other parts of the safety system

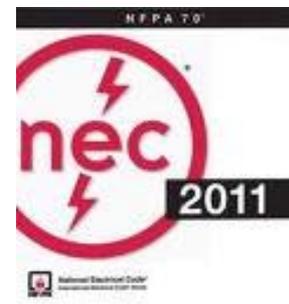
- Influences requirements in product standards
- Used by the enforcement official to inspect an installation

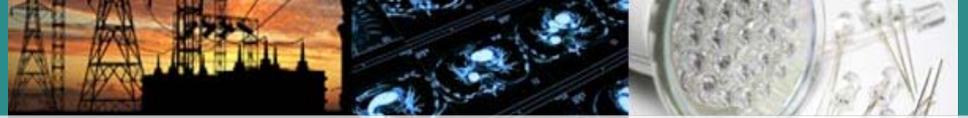




Installation Code

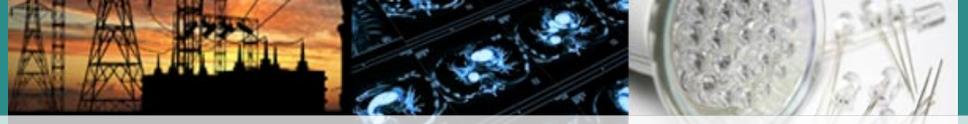
- 💡 Primary document is the National Electrical Code®
- 💡 Developed and published by the National Fire Protection Association (NFPA)
- 💡 Revised and published every three years
- 💡 1st edition was in 1897
- 💡 Wide public review and input





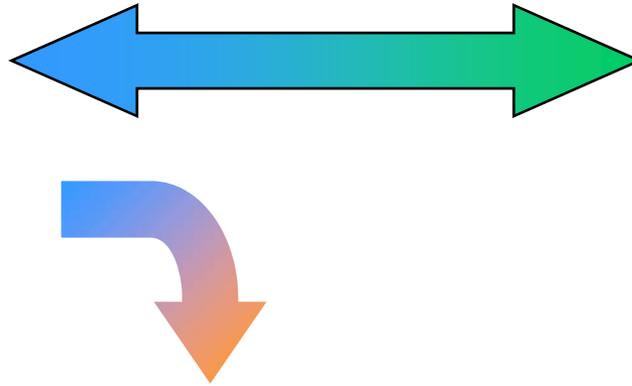
The National Electrical Code®

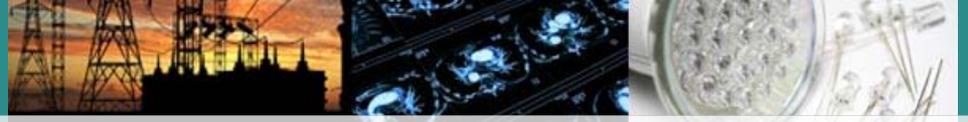
- ❏ Adoption occurs at the local (state, city, county, etc.) level
- ❏ Some local laws permit amendments to the NEC, however these are very limited due to the broad acceptance of the document as developed
 - local amendments typically have public hearings to accept input on the amendments



Product Standards/Certification

**Product
Standards and
Certification**

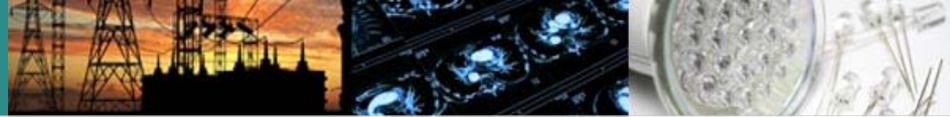




Product Standards/Certification

Importance

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

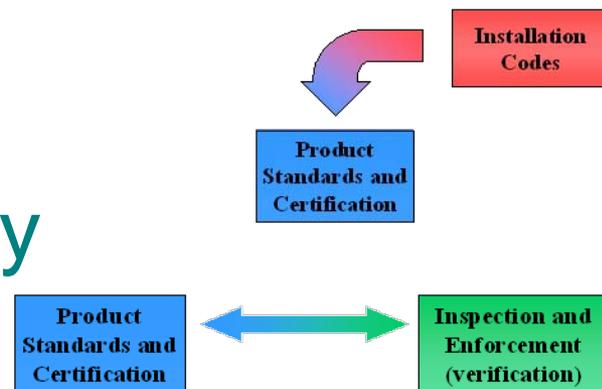


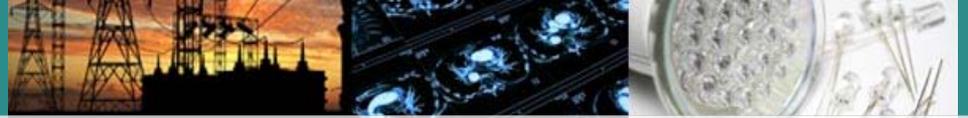
Product Standards/Certification

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



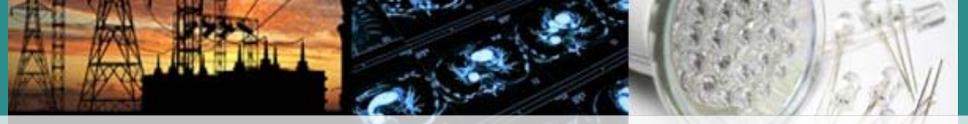


Product Standards/Certification

Voluntary Standards

- 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

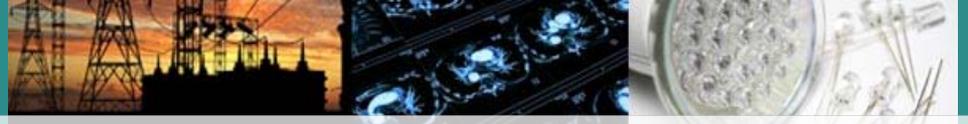




Certification Aspects

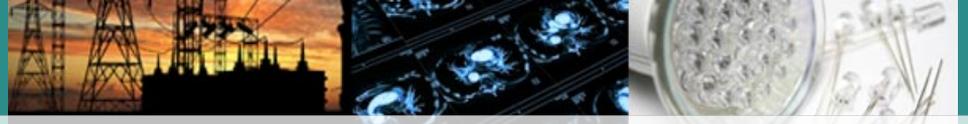
Conformity Assessment Requirements

- 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

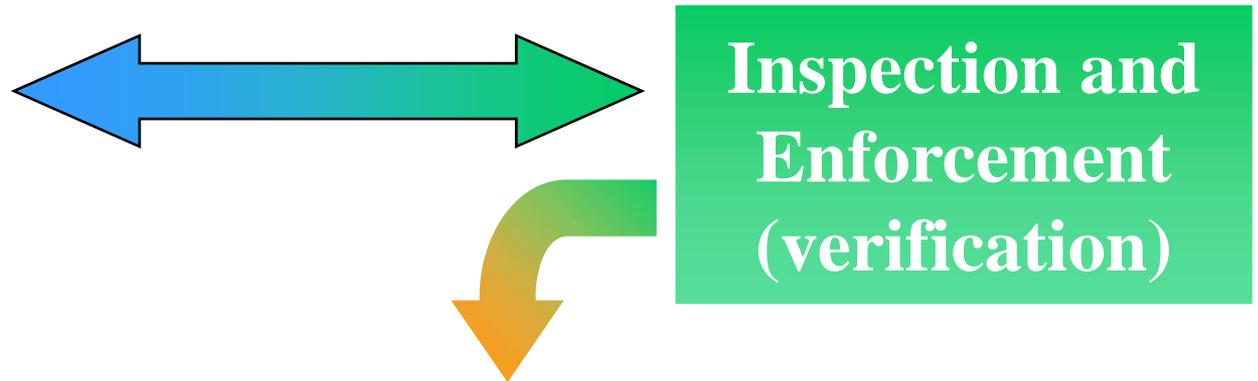


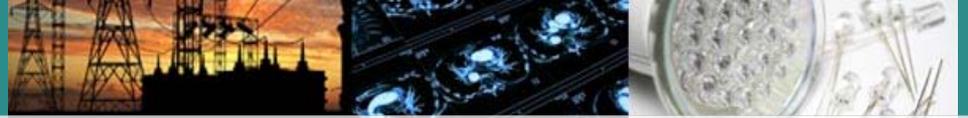
3rd Party Certification

-  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



Inspection/Enforcement

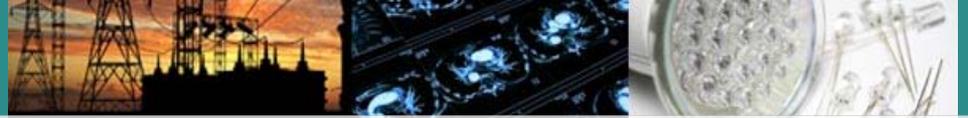




Inspection/Enforcement

Importance

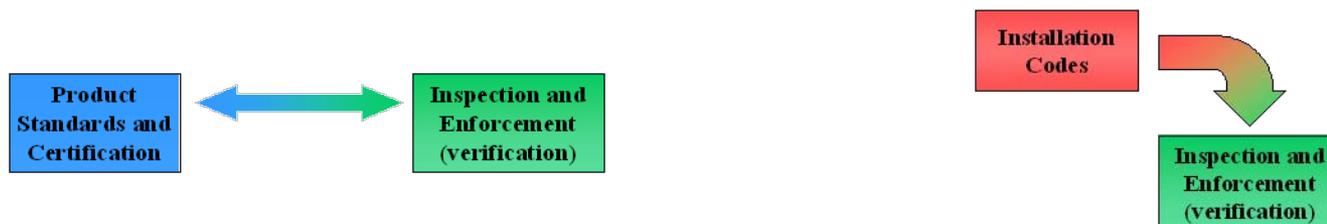
- inspector verifies that installation complies with Code
- provides for systematic checks and balances in the system
- uniform interpretation of the installation code
- products that do not comply with required standards will most likely not be used

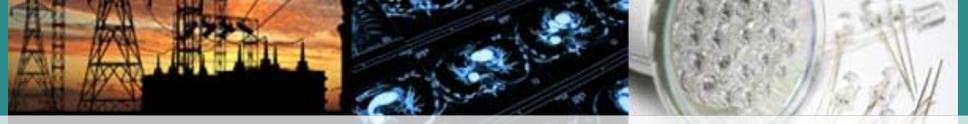


Inspection/Enforcement

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





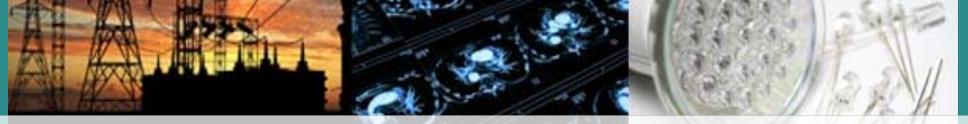
Inspection/Enforcement



Key organization for inspectors

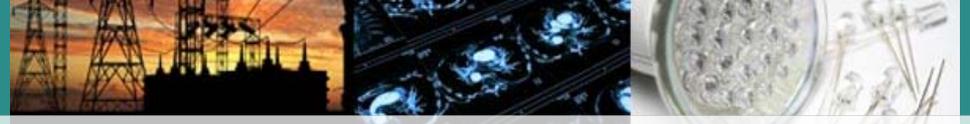
- International Association of Electrical Inspectors (IAEI)





Authority Having Jurisdiction

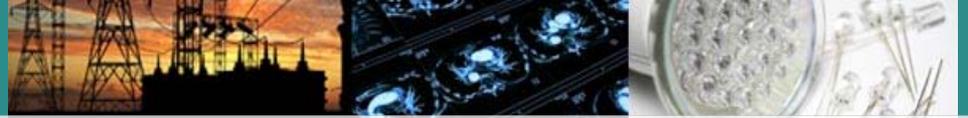
-  The organization, office or individual responsible for approving equipment, an installation, or a procedure.
-  At the local level this is typically the electrical inspector



Approved

 Acceptable to the authority having jurisdiction





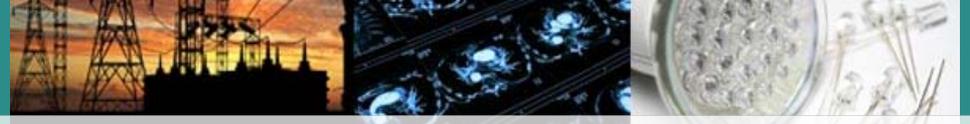
Federal -



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



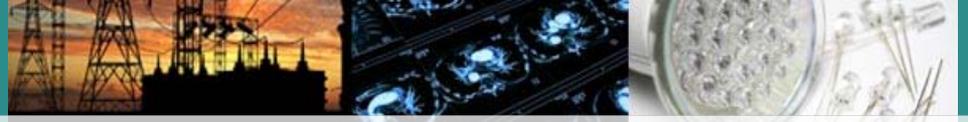
“Local” Implementation

 “Local” refers to the state, city or other municipality level of the United States



Inspection/Verification

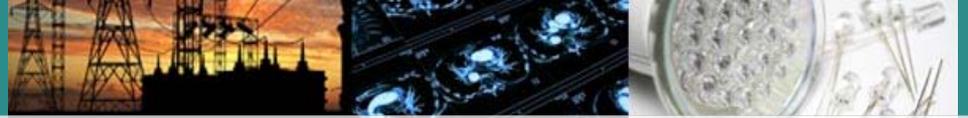
-  Electrical installations are governed by local laws and typically required to be inspected by a recognized inspection body
-  Inspectors can be publicly employed or privately employed and recognized by the local jurisdiction



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



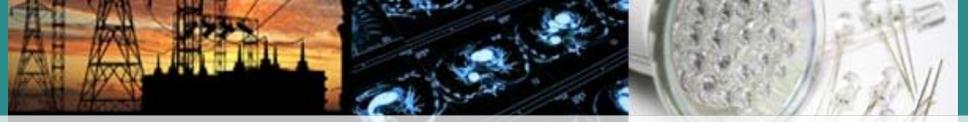
Process of Inspection

Process

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

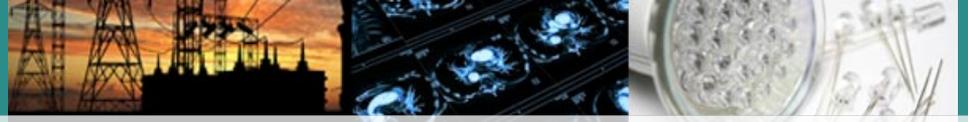


 For electrical products, the inspector will look for the acceptable third-party certification mark and ensure that the manufacturer's instructions for installation are followed



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



The US Electrical Safety System

