SC 17 – Switchgear & Controlgear

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Agenda

- Introduction
- Standards
- Examples of significant differences
- Next steps
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• Introduction
• Standards
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• Next steps
• Approximately 6.8 Billion people on Earth.
• All humans…many differences (for example… men and women)
SC 17 – Switchgear & Controlgear

• Divided into 2 primary aspects:
  ▪ High Voltage
    – Components
    – Assemblies
  ▪ Low Voltage
    – Components
    – Assemblies

• This presentation will address only the Low Voltage aspect.
SC 17 – Switchgear & Controlgear

• Examples of Low Voltage Components
  Circuit Breakers
  Switches
  Contactors & motor starters
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• Examples of Low Voltage Assemblies
  Panelboards
  Switchboards
  Switchgear
  Motor Control Centers
  Busbar Trunking (Busway)
SC 17 – Switchgear & Controlgear

- Products used globally...
  ...but there are differences.
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SC 17 – IEC Standards for components

- IEC 60947-2: Circuit Breakers
- IEC 60947-3: Switches
- IEC 60947-4: Contactors & motor starters
SC 17 – UL Standards for components

- UL 489: Molded Case Circuit Breakers
- UL 98: Enclosed and Deadfront Switches
- UL 508: Industrial Control Equipment
SC 17 – IEC Standards for Assemblies

- IEC 60439-1: LV Switchgear and Controlgear Assemblies
- IEC 60439-2: Busbar Trunking Systems (Busways)
- IEC 60439-3: Distribution Boards (Access by unskilled persons)
SC 17 – UL Standards for Assemblies

- UL 67: Panelboards
- UL 891: Switchboards
- UL 1558: LV Switchgear
- UL 845: Motor Control Centers
- UL 857: Busway
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Examples of significant differences

- Size
  - Creepage & Clearance Distances
  - Wire Bending Space
- Allowable Temperature Rises
  - Conductor sizes and ampacities
National Electrical Code, NEC

- NFPA 70, contains “installation” rules
- 2008 Edition has 882 Pages
- Created by 19 NEC Code-Making Panels (CMP)
  - Balanced Representation (Manufacturers, Electricians, Inspectors, UL, etc.)
  - Represent Groups/Associations (Directed Votes)
  - K. Lippert – Alternate NEMA Rep. On CMP 10
- 3-year revision cycle
• Defines allowable conductor sizes and corresponding ampacities (Tables 310.16)
• Defines Wire Bending Spaces (Tables 312.6)
• Mentions “Listed” products
• References “Product Safety Standards” (Annex A)
Relationship between NEC, Standards, Conformity Assessment and Inspection

- National Electrical Code
- Installation Codes
- Product Standards and Certification
- Inspection and Enforcement (verification)
- Safe Products and Safe Installations

Relationships:
- NEC impacts Product Standards and Certification
- NEC impacts Inspection and Enforcement
- Inspection and Enforcement impacts Safe Products and Safe Installations
- Product Standards and Certification impacts Inspection and Enforcement
- Inspection and Enforcement impacts National Electrical Code
- National Electrical Code impacts Installation Codes
IEC 60364-1

- Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions

“IEC 60364-1 gives the rules for the design, erection, and verification of electrical installations. The rules are intended to provide for the safety of persons, livestock and property against dangers and damage which may arise in the reasonable use of electrical installations and to provide for the proper functioning of those installations.”
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Standards Harmonized through CANENA

- Circuit Breakers
- Switches
- Busway
- Switchboards
- Motor control centers
Harmonization efforts with IEC

• UL 60947-1
  (Contactors and control components)

• “Systematic” review of ALL requirements to assure safety

• Collaborate on IEC participation to obtain recognition of North American requirements
  - “Global Relevance”
Recognize “differences”

- Consider large installed base
- Regional Regulations
  - Installation Codes
  - Certifications
  - Inspections
Summary

• IEC and North American electrical safety systems are “different” - (Just as men are “different” from women)

• Neither is “good” nor “bad” but each is effective when implemented completely & properly

• Extreme caution should be taken if attempting to mix / max “pieces” of both systems
Questions And Comments

Thank You