NEW ICEA STANDARDS AND AEIC SPECIFICATION FOR MEDIUM-VOLTAGE POWER CABLES

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Outline

• Existing NEMA/ICEA standards
• Changes to ICEA standards
• New ANSI/ICEA and ANSI/NEMA/ICEA standards
• AEIC specifications
• Availability of standards and specifications
Changes to ICEA Standards

- Four major standards were based on insulation material

- All new standards are application oriented
Withdrawn Standards

- NEMA WC 7-1988/ICEA S-66-524
  Crosslinked Polyethylene Insulated Wire & Cable

- NEMA WC 8-1988/ICEA S-68-516
  Ethylene Propylene Rubber Insulated Wire & Cable
New Standards

- Combined TR-XLPE/XLPE (ICEA S-66-524) and EPR (ICEA S-68-516)
- ANSI/ICEA S-94-649-2000 Concentric Neutral Cables Rated 5 – 46 kV
Other Standards

Significant Changes

• Added utility user requirements to ICEA standards
• Previously insulation thicknesses were minimum average and minimum point
• Deleted requirement for minimum average wall thickness.
Significant Changes

- Raised the minimum point wall thickness
- Added maximum point thickness
- Insulation shield stripping tension requirement: 3 - 24 lbs for all discharge-free cable designs
Manufacturer’s Perspective

• ICEA diameters differ from AEIC

• ICEA minimum diameters based on minimum point thickness and lower than AEIC CS8 minimum diameters

• ICEA maximum diameters compared to AEIC CS8:
  – most are the same
  – some are 5-15 mils less
  – a few are 5 mils
## Point Thickness Requirements for Insulation Wall

<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>Old ICEA and AEIC</th>
<th>New ICEA and AEIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>15</td>
<td>158</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>198</td>
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</tr>
<tr>
<td>25</td>
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</tr>
<tr>
<td>28</td>
<td>252</td>
<td>none</td>
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<tr>
<td>35</td>
<td>311</td>
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</tr>
</tbody>
</table>
15 kV 175-mil Wall
Old AEIC Requirements

158 234

AEIC allowed insulation wall thickness to vary between these limits.
15 kV 175-mil Wall
Old AEIC Requirements

Although AEIC limited the variation between min and max point thickness, that could vary over a wide range.
15 kV 175-mil Wall
Old AEIC Requirements

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The new ICEA/AEIC requirements limit the wall thickness within a specific minimum and maximum point thickness.
Effect of New Dimensional Changes

- Manufacturers will supply a more consistent insulation wall thickness.
- New ICEA diameters will result in lower material usage.
- Consult accessory manufacturer for proper selection
Old AEIC Specifications

- Were supplements to ICEA standards
  - CS5-94 (TR-XLPE/XLPE) was supplement to NEMA WC 7-1988/ICEA S-66-524
  - CS6-96 (EPR) was supplement to NEMA WC 8-1988/ICEA S-68-516
New AEIC Specification

- CS8 combined CS5 (TR-XLPE/XLPE) and CS6 (EPR)
- Supplement to S-94-649 and S-97-682
- Shielded 5 kV through 46 kV
Sections Kept in CS8

- Only six sections from CS5 and CS6 were kept in CS8
- A. Preface
- G. Internal Irregularity Test (Hot Oil)
- H. General
  - Procedures, CTRs, Testing Frequency and Repairs
Sections Kept in CS8

- J. Shipment and Reels
- K. Guarantee
- M. Qualification Tests
  - Tree count
    - Reduced number of wafers to count for each test
    - Added tree counts for 180 and 360 days
Sections Kept in CS8

– Part of Thermomechanical Qualification Test
– Dissipation Factor Classification in the CV Extrusion Qualification (Periodic Qualification Test)
  • All other sections were either deleted or a sentence was added referring to the ANSI/ICEA standard
Other Changes to CS8

- Insulation Shield Field Strippability Test performed once per cable core extruder run at two temperatures
- Appendixes - Same diameter tables as previously in CS5 and CS6
User’s Perspective

– AEIC maintained these diameters for compatibility with cable accessories
– Common usage of these tables by cable accessory manufacturers
Range of 1000 kcmil 25 kV Cable and Splices

<table>
<thead>
<tr>
<th>Diameter in mils</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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<tr>
<td>1515</td>
<td>1665</td>
<td>1660</td>
<td></td>
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<td>1710</td>
<td>255</td>
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</tr>
<tr>
<td>1800</td>
<td>1850</td>
<td>160</td>
<td></td>
</tr>
</tbody>
</table>
User’s Perspective

- Accessory manufacturers will have splices that meet the ANSI/ICEA standards.
- After that, AEIC intends to drop tables and use ANSI/ICEA tables.
- Utilities must examine the new diameters with respect to their present accessories.
Conclusions

- ANSI/ICEA utility cable standards are now nationally accredited
- AEIC CS8 still supplements the ANSI/ICEA utility cable standards
- ANSI/ICEA standards have provided a way to greatly simplify the AEIC specifications
- Cable engineers must ensure cable specs are designed for accessories.
Availability of ICEA Standards

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Availability of AEIC Specifications

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