Splices and Connectors

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Agenda

- IEEE-404 Requirements
- Connector applications
- Reasons for failures
- Summary

IEEE-404 Connector Requirements

- Section 7.14. Connector Thermal and Mechanical tests
  - Connectors used in cable joints used to join two aluminum conductors or an aluminum conductor to a copper conductor, shall meet all Class-A current cycle requirements given in ANSI C119.4

IEEE-404 Connector Requirements - continued

- 7.14 – continued
  - In addition, connectors to join two aluminum conductors or an aluminum conductor to a copper conductor, for use in any cable joint excluding pipe-type, laminated dielectric cable joints, shall meet all Class-2 partial tension requirements given in ANSI C119.4. The tensile strength requirements for connectors used in pipe-type cable joints must be established between the supplier and the end user.

IEEE-404 Connector Requirements - continued

- 7.14 – continued
  - The manufacturer should follow a similar test protocol to verify that connectors used between copper conductors will perform reliably in service.

IEEE-404 Design tests - Comments

- In section 7.4 of IEEE-404 states that the design tests in tables 5, 6, and 7 shall be performed on extruded, transition and laminated cable joints, respectively. Tests shall be made with production units and a report provided.
- In the test report, the details of the cable and assembly must be reported

IEEE-404 Design tests - Comments

- Since section 7.4 doesn’t specify what cable to test, joints can be qualified to meet the IEEE-404 standard on either copper or aluminum conductor cables
- Once joints meet the standard, they can be sold on either type of conductor cable

Comments on ANSI Connector Testing

- ANSI C119.4 specifies testing on bare conductor and requires that the connector temperature be lower than the conductor temperature at the end of the current cycles
- Verifies that the connectors will perform when installed properly, but doesn’t prove they will work when installed under a splice housing

Joint/Connector Considerations

- Overall design of system to dissipate heat generated
  - Connector mass
  - Joint configuration (i.e., amount of contact with connector, volume of air inside housing, etc.)
  - Thermal conductivity of joint material

  Only way to insure a connector works with a specific joint is to test together

Issues with Connectors

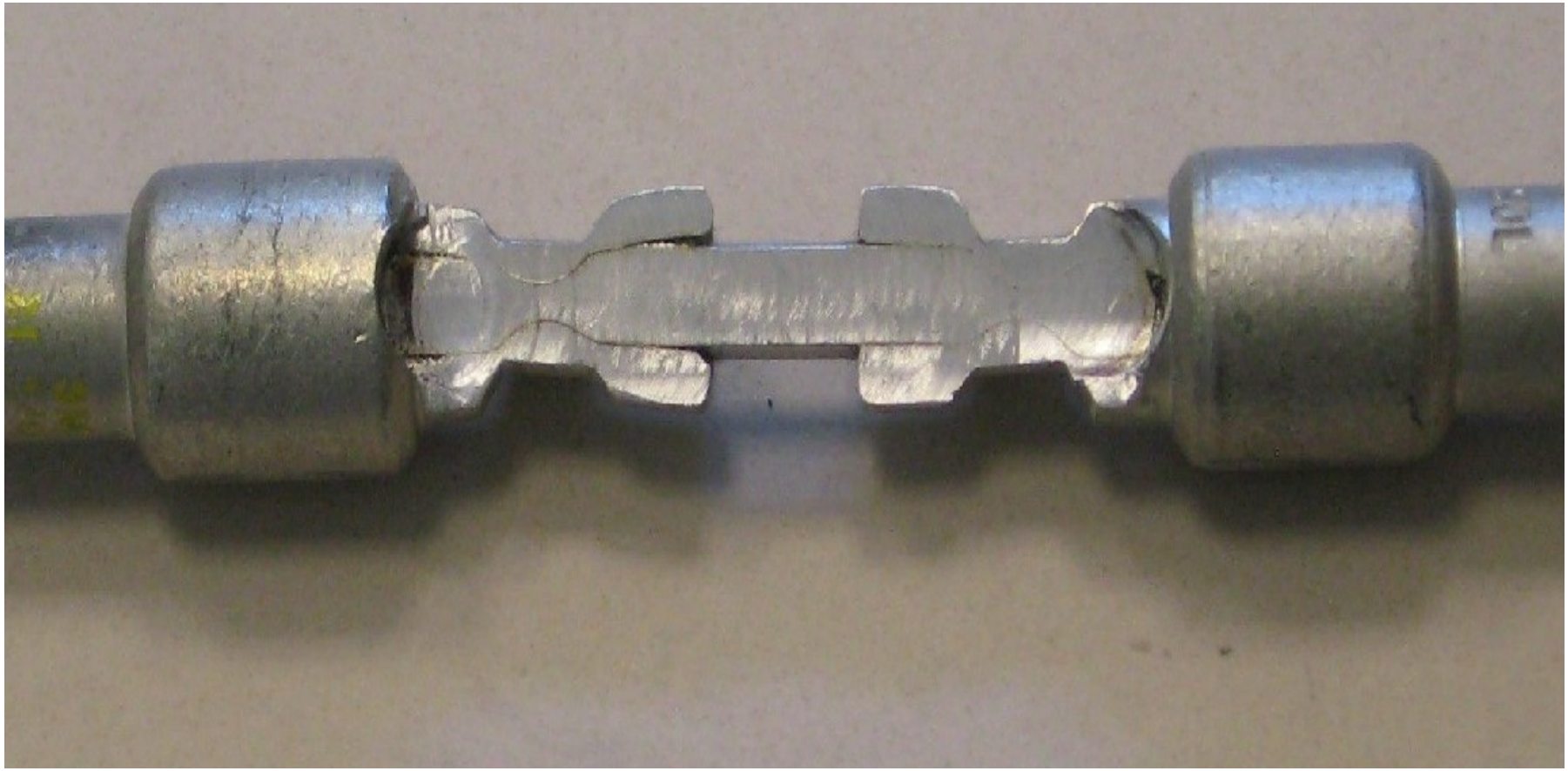
- Most of the connector issues observed in joints involve installation errors
- A few of these are shown in the following pictures.

Wrong Die Used – Thermal Runaway

Wrong Die Used – Thermal Runaway

Wrong Die Used - Overcrimp

Overcrimp



Summary

- When connectors are properly installed, they function well
- Some reports of issues with heavily loaded connectors on water block stranded cables. This is being investigated in discussion group at the ICC.
- Note: IEEE-48 doesn’t even mention lugs
- Thanks
- Questions?