

# Envirotemp FR3 Fluid: Relative Insulation Life Testing

This section provides information on insulation life testing of FR3 fluid and paper insulation systems. The following documents are included:

- CPS Reference Bulletin R900-20-04: Transformer Insulation Life.
- CPS Engineering Development Report: Dielectric fluid Relative Thermal Performance
- CPS Engineering Development Report: IEEE Loading Guide A & B Factors for FR3 Fluid and TUK Insulation
- CPS Engineering Development Report: Comparative Loading, Thermal, and Aging Performance of TUK paper in Mineral Oil and FR3 Fluid.
- CPS Engineering Development Report: Overview of Transformer Life, Loading, and Thermal Operation
- IEEE PES T&D Presentation: Aging of Paper Insulation in Natural Ester Dielectric Fluid. This technical paper present accelerated aging results per IEEE C57.100.
- CPS Bulletin 04003: Insulated Paper Aging Comparison Envirotemp® FR3® fluid vs. mineral oil
  - **Conclusion: Insulation paper aging rate is dramatically reduced when aged in FR3 fluid compared to aging in mineral oil. For thermally upgraded kraft paper, FR3 fluid allows a transformer operating temperature increase of 21°C without a decrease in relative paper insulation life. For non-thermally upgraded kraft paper, the increase is estimated to be at least 30°C.**