

Tan Delta Testing: Effect of Terminations

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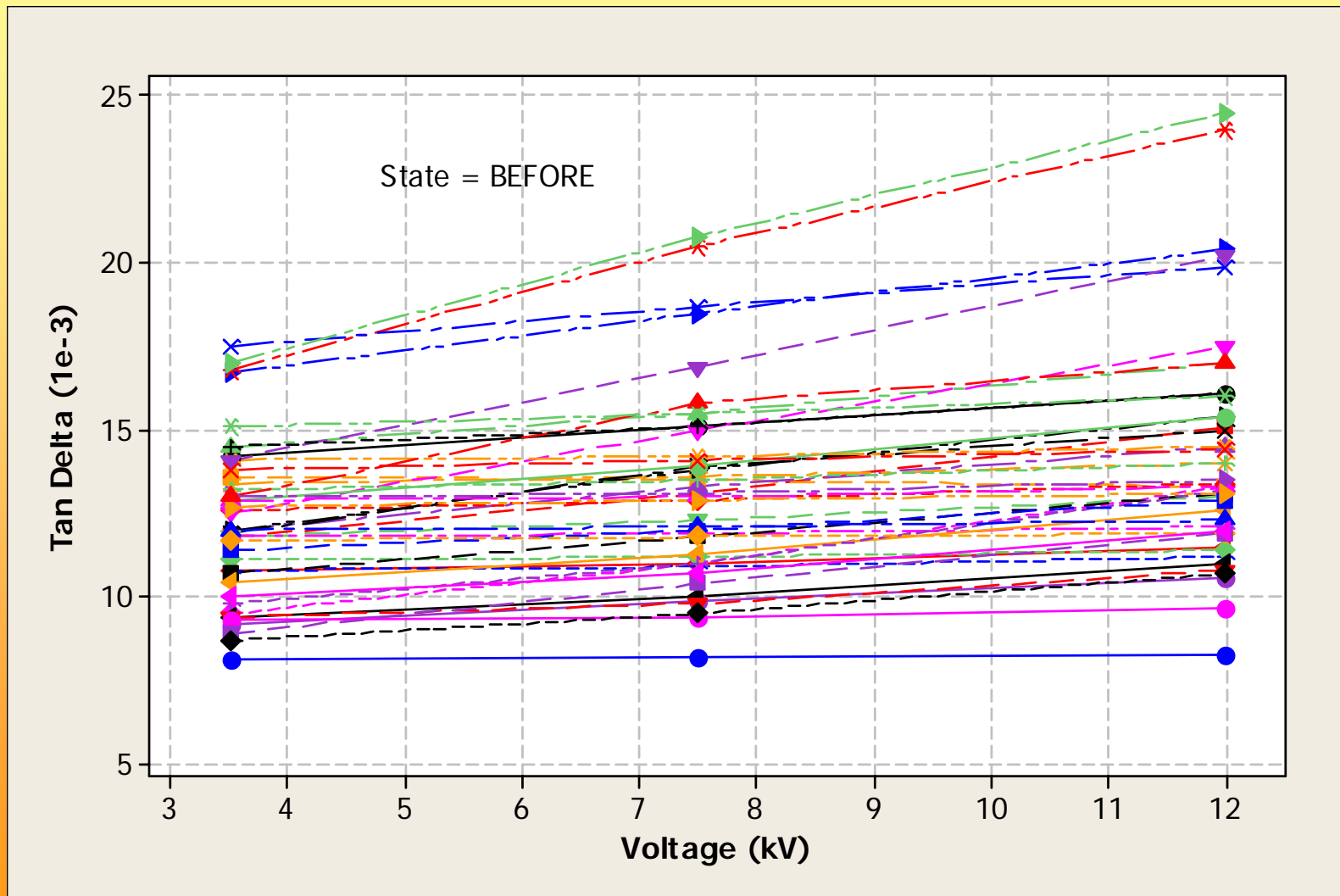
Effect of Terminations

- The effect of terminations on Tan Delta measurements has been discussed many times.
- Little measured data has been presented on this effect
- Here we will present
 - Effect of changing terminations
 - Loss ascribed to termination types

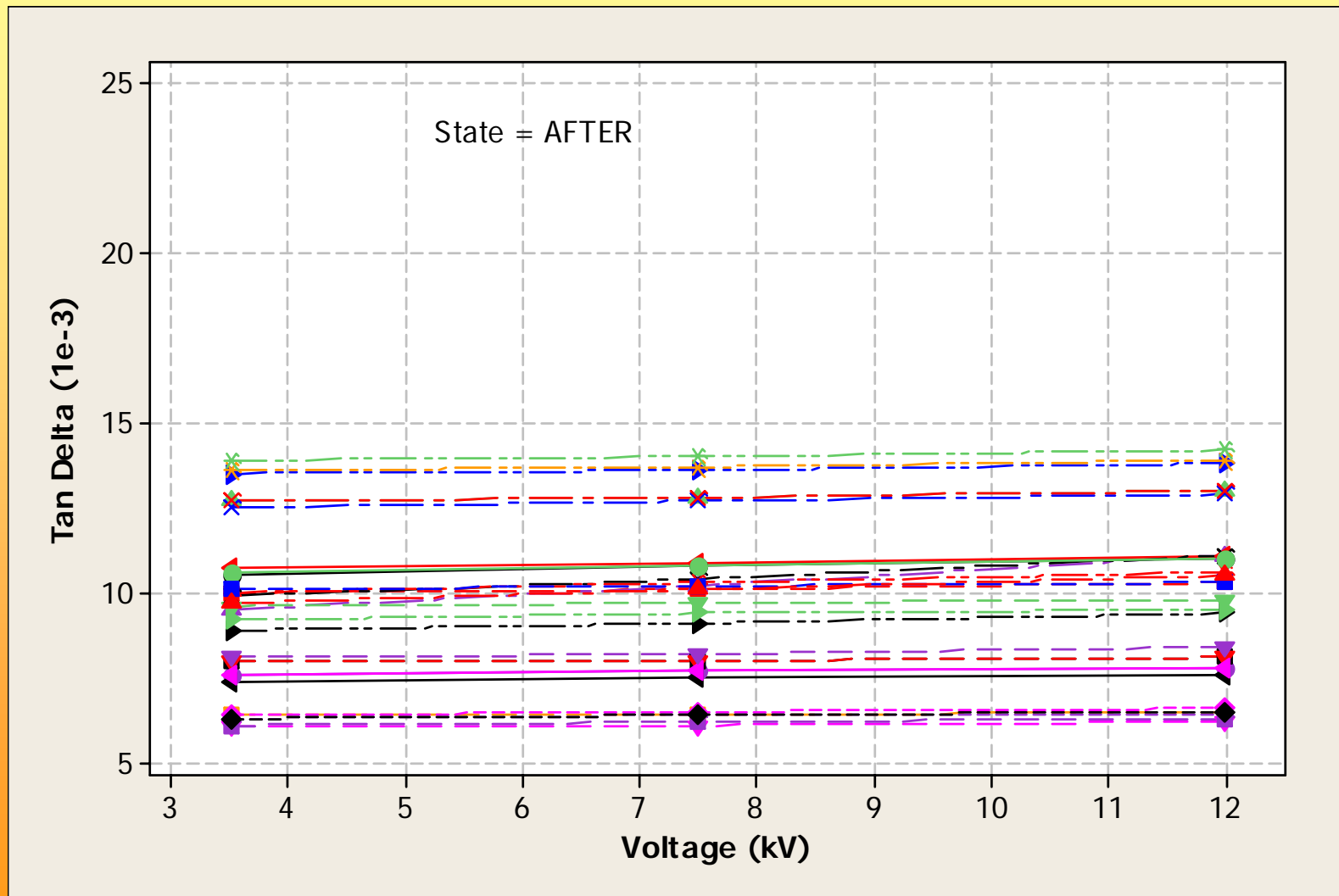
System Info

- EPR Cable
- Semiconducting Shields
- 45 sections measured (15 three phase sections)
- Tan Delta measured before as function of voltage
- 30 sets of terminations replaced
- Tan Delta measured after as function of voltage
- Goal was to minimise voltage dependence - Tip Up

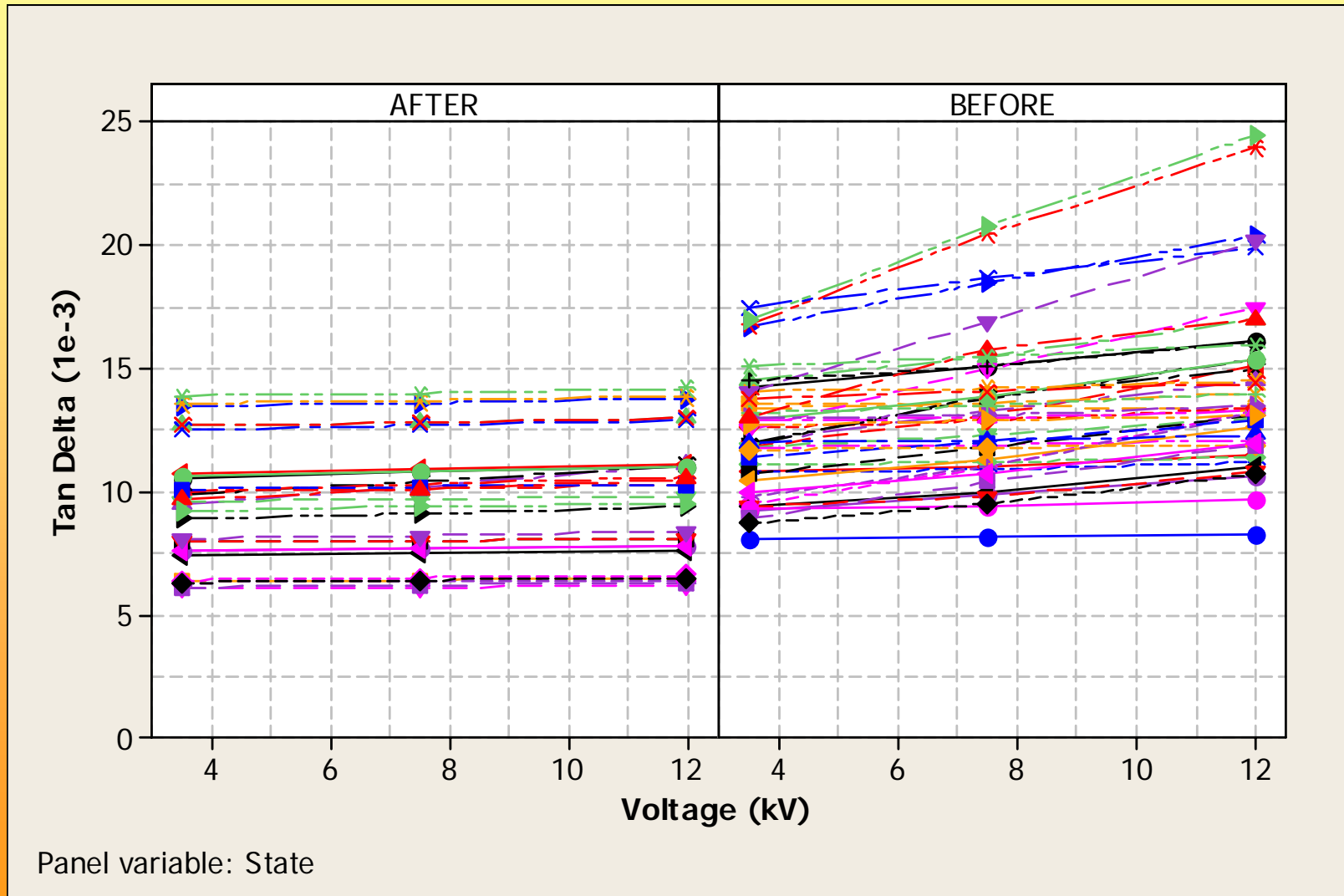
Initial Tan Delta



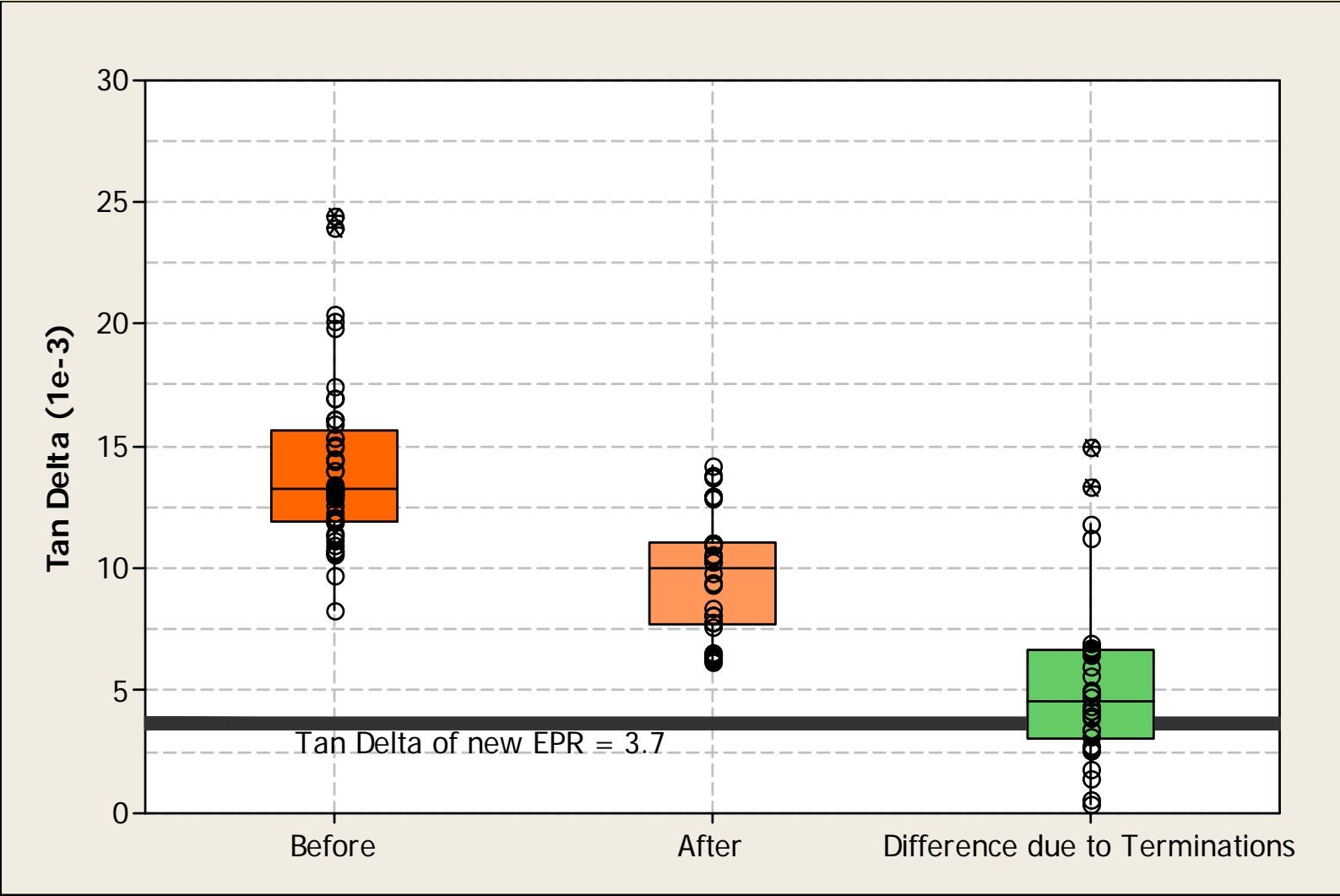
Tan Delta after changing terminations



Before and After



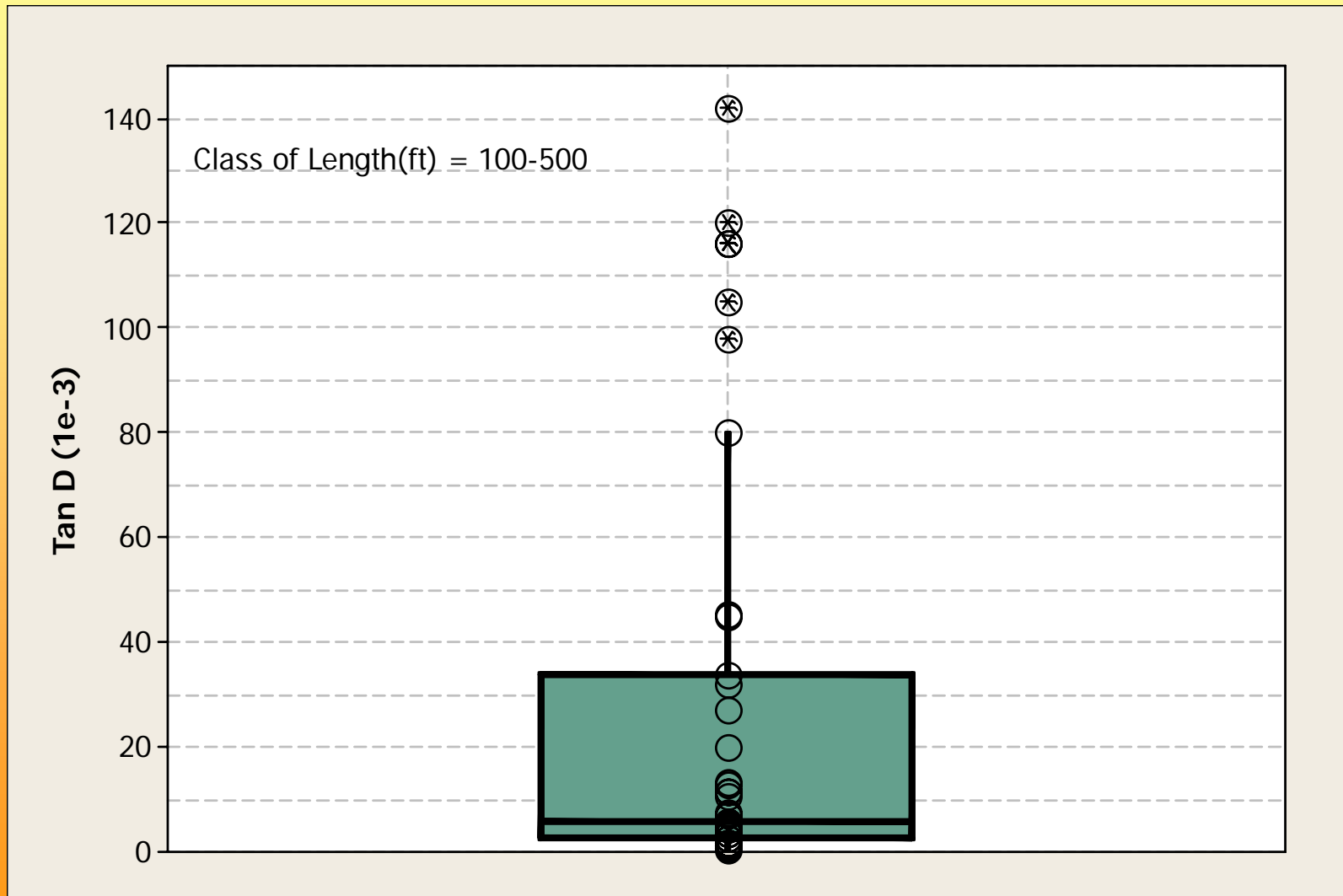
Effect at 12 kV



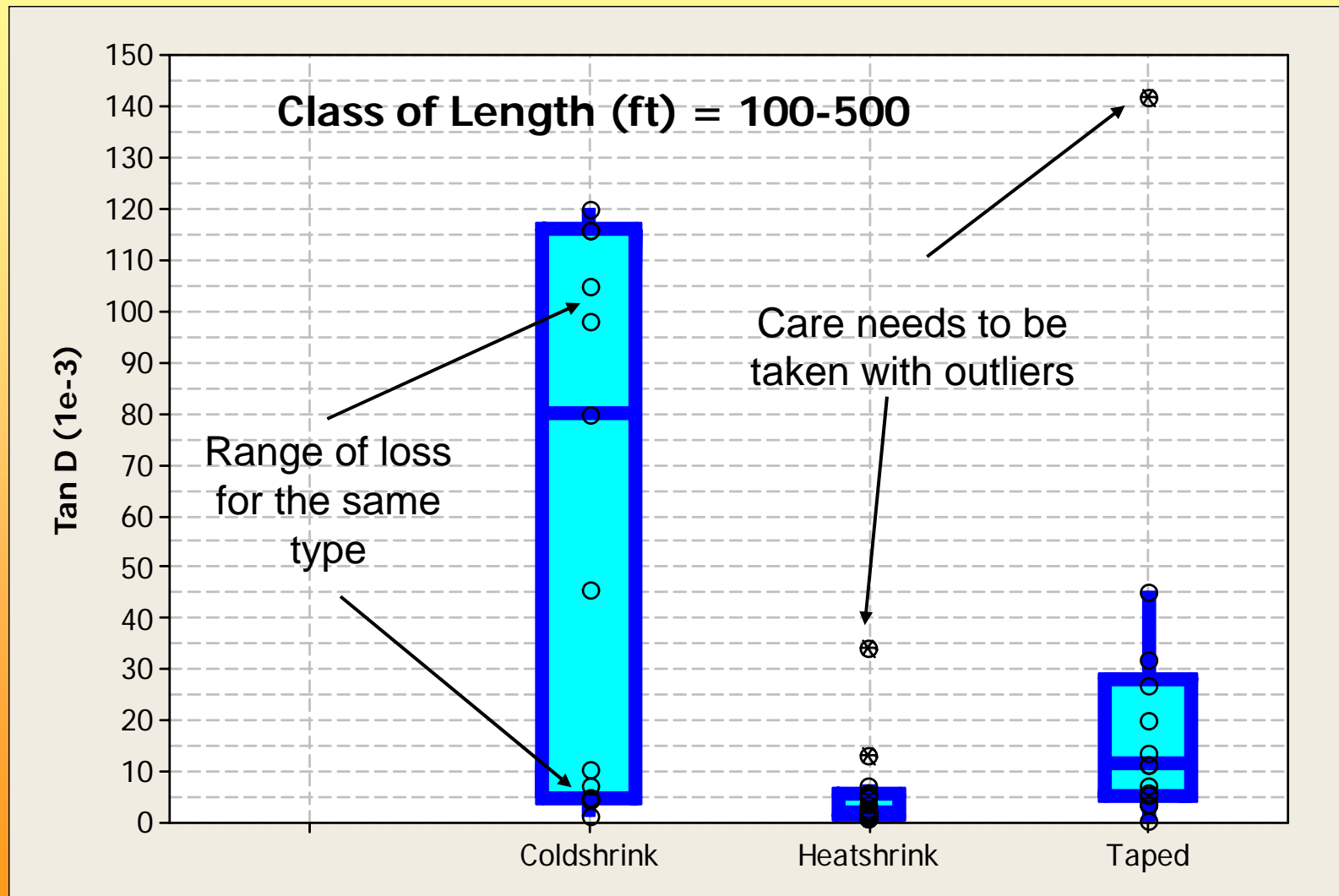
Large Study Analysis

- Field results from > 100 miles of testing
- Type of termination was noted
- Analysis of this data set (one length class to avoid length effects) allows us to look at how much of the variation might be ascribed to the different types of terminations.
- Note – this is a forensic analysis of a real data set rather than a designed experiment

Whole Distribution



Tan Delta Split by Termination Type



Summary

- Terminations can contribute to the Tan Delta level and the Tip Up
- Changing terminations improves the situation
- We would infer that similar effects would be seen in Splices as well
- Age and Poor installation likely to have larger influence than termination type

Acknowledgements

- NETA
- Power Products Inc
- CDFI – Cable Diagnostic Focused initiative