

# **Power Frequency Testing in Cable, Accessory, & Cable System Standards**

**Nigel Hampton**

**Joshua Perkel**

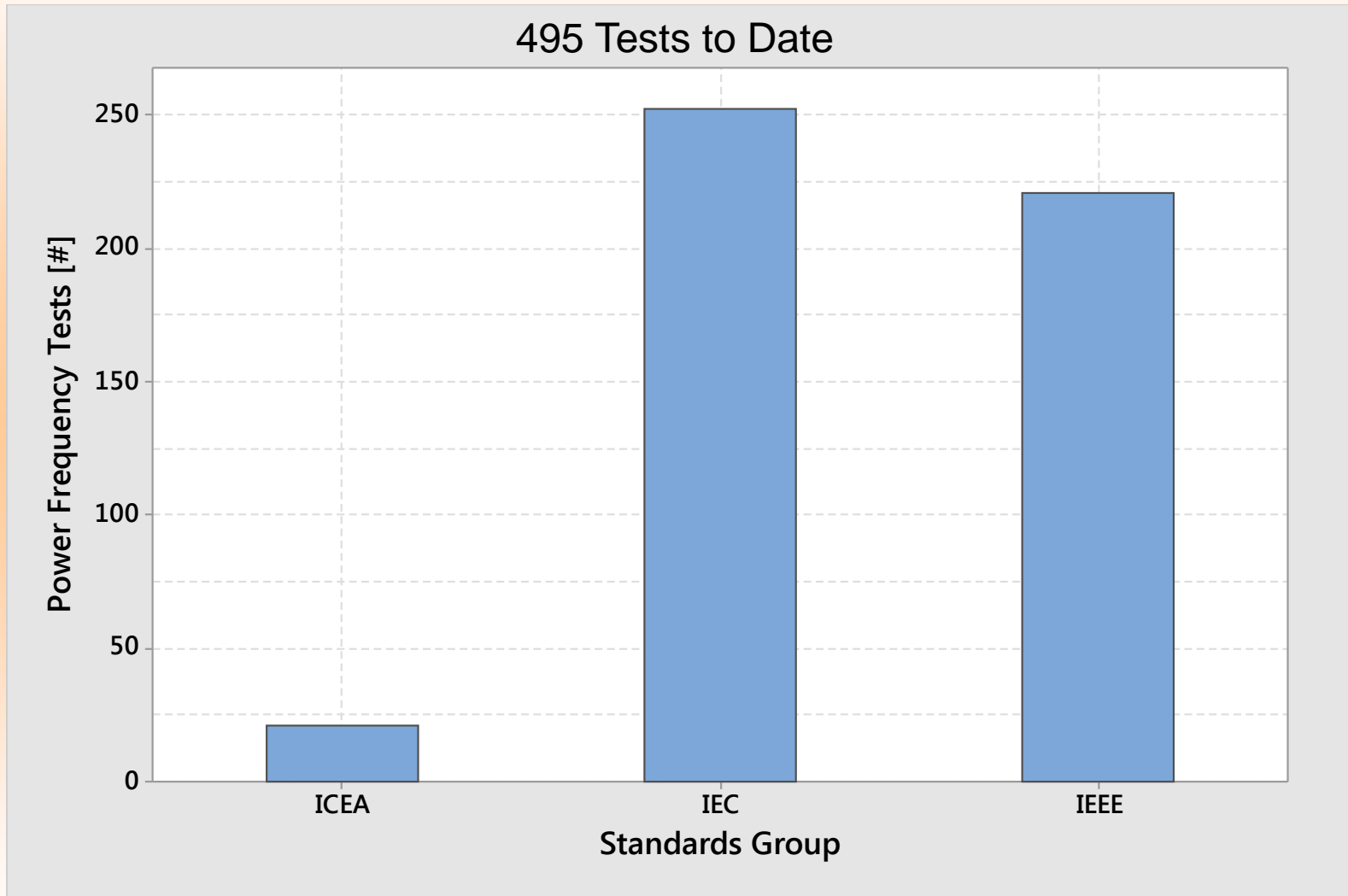
**Caryn Riley**

**NEETRAC**

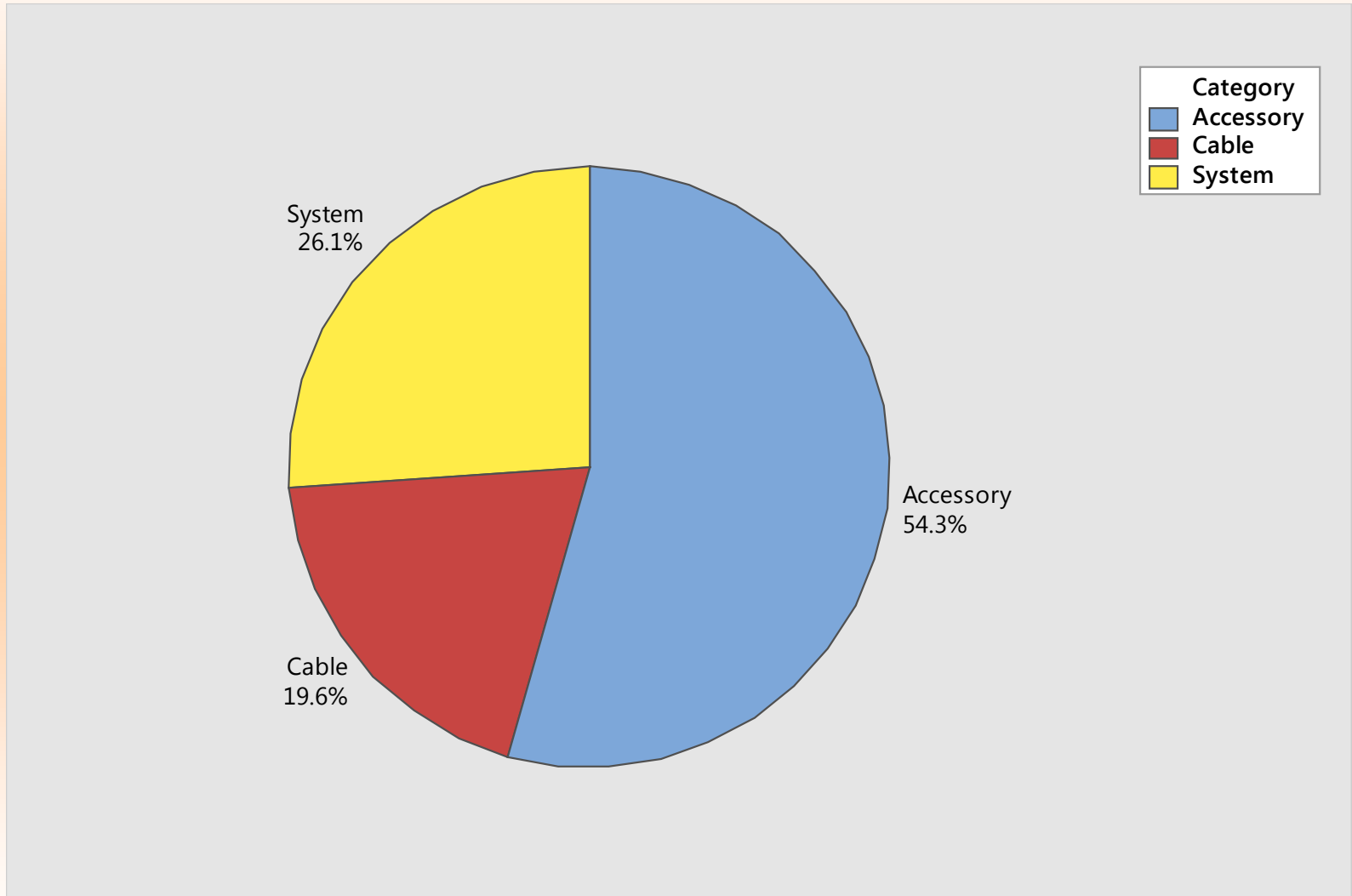
# Standards

- IEEE
  - 48
  - 386
  - 404
- IEC
  - 60502
  - 60840 (AEIC CS9)
  - 62067 (AEIC CS9)
- ICEA
  - S-108-720
- More to include...
  - CSA?
  - Cenelec?
  - Other ICEA?

# How many power frequency tests are there?



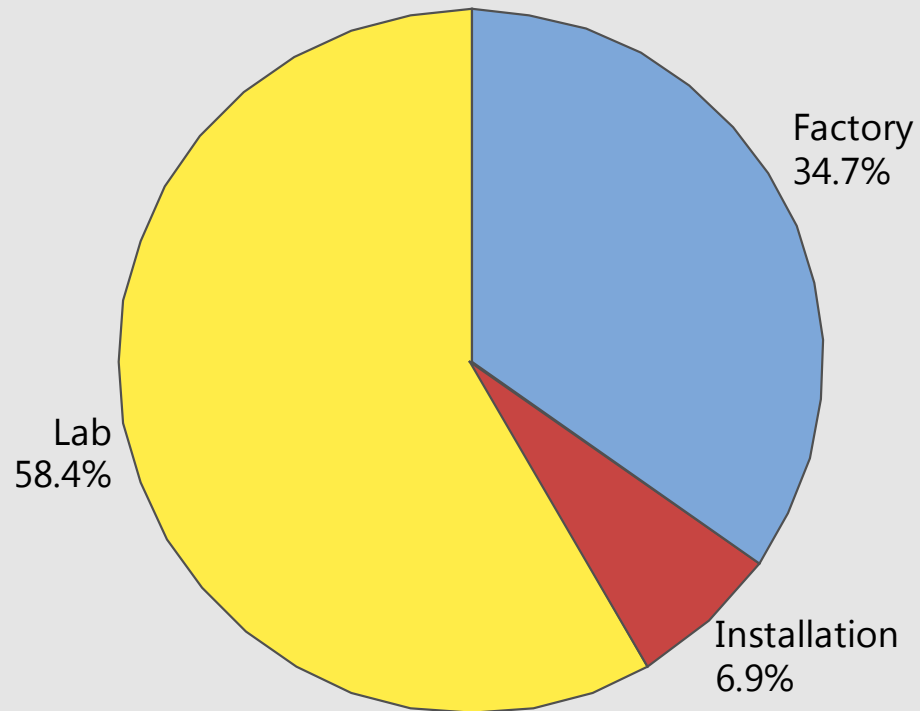
# Equipment Split



# Definitions

- Factory – tests on components before they leave the factory
  - Routine
  - Sample
  - Production
- Installation – field test on complete cable systems
- Lab – tests done in laboratory to ensure components can function as designed and manufactured
  - Qualification
  - Prequalification
  - Design

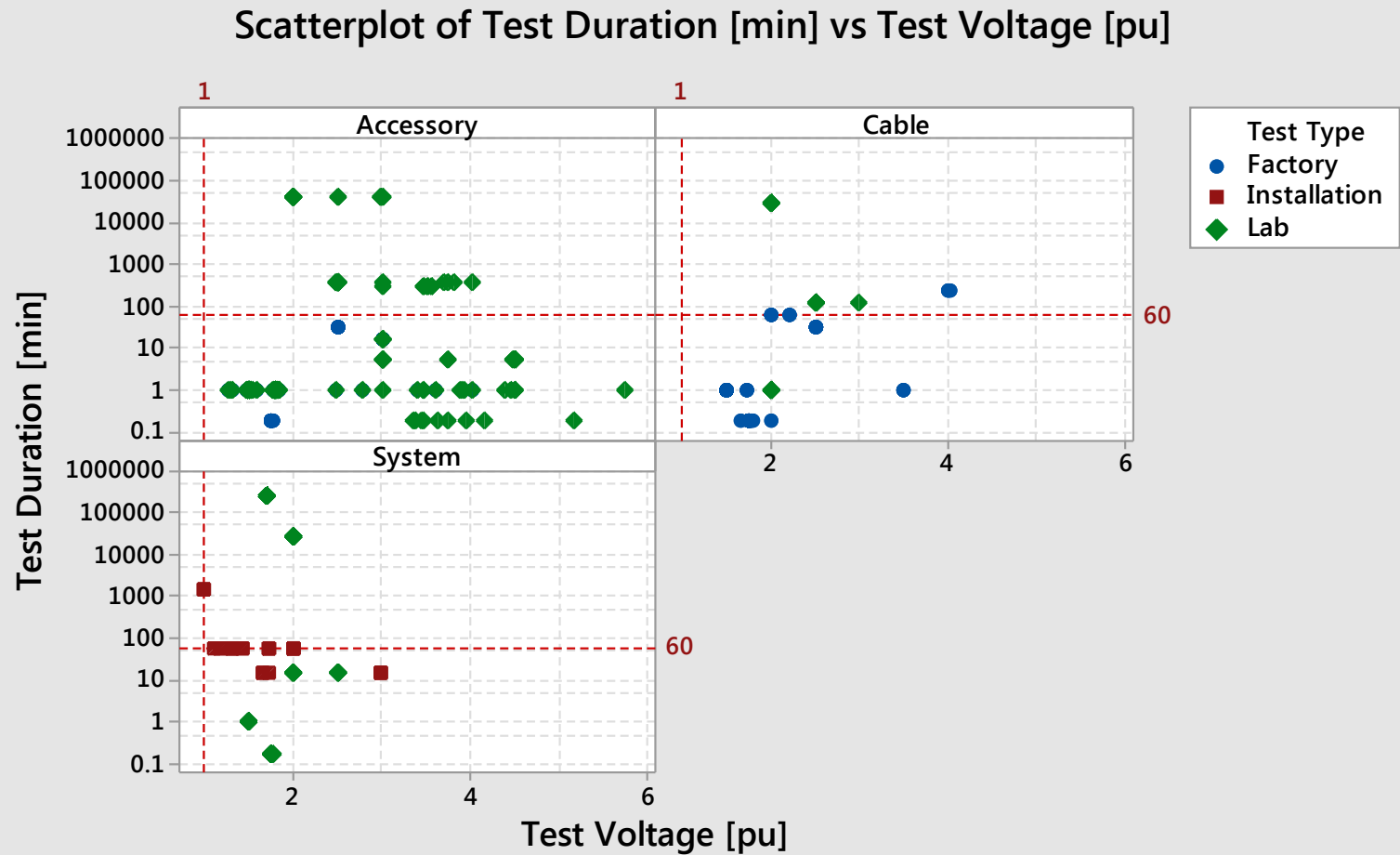
# Factory, Lab, or Installation?



# Voltage Classes

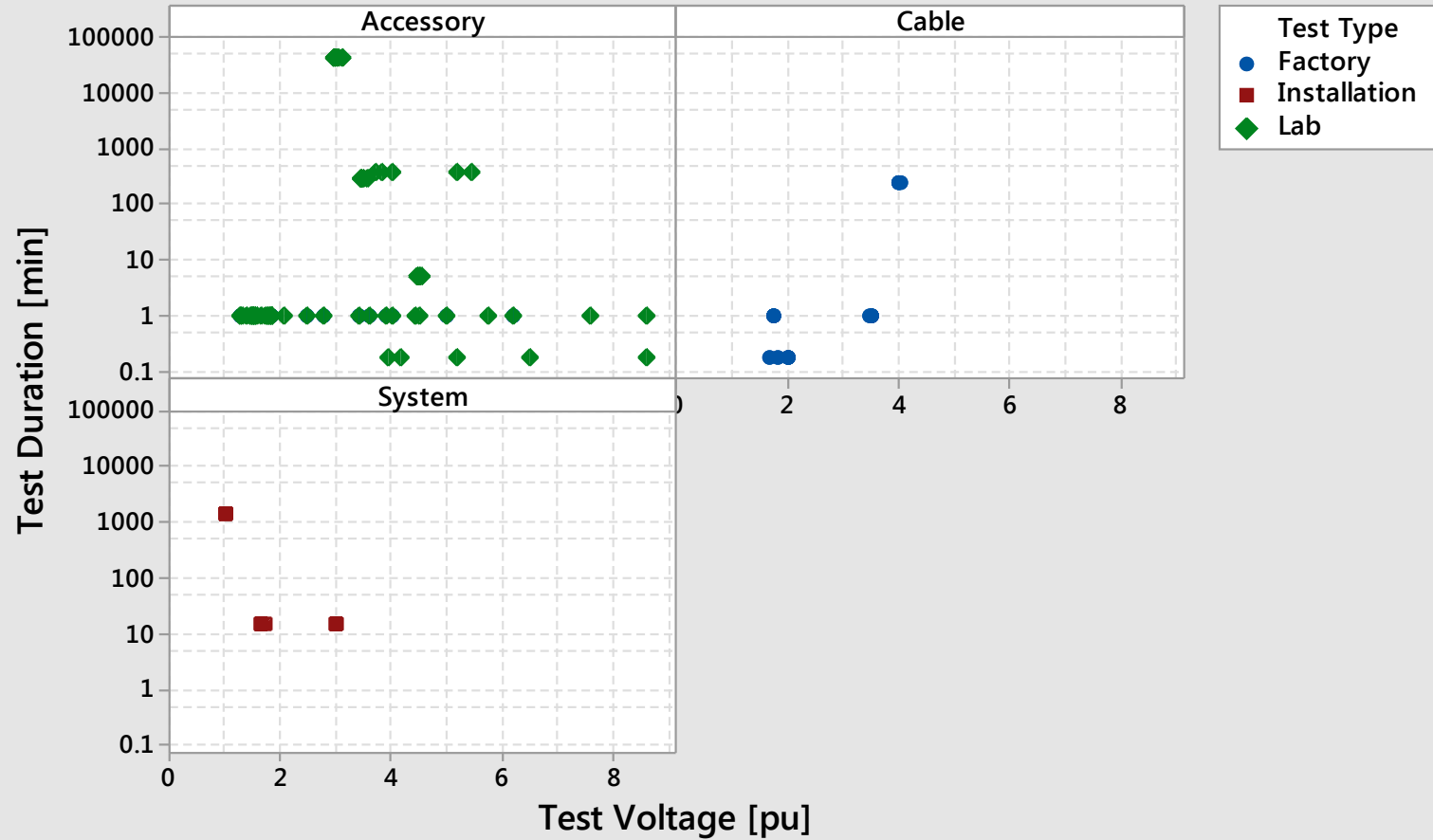
<b>Class</b>	<b>Voltage Class</b>
Medium Voltage (MV)	5 kV – 35 kV
High Voltage (HV)	46 kV – 161 kV
Extra High Voltage (EHV)	230 kV – 500 kV

# Test Voltages and Times - All



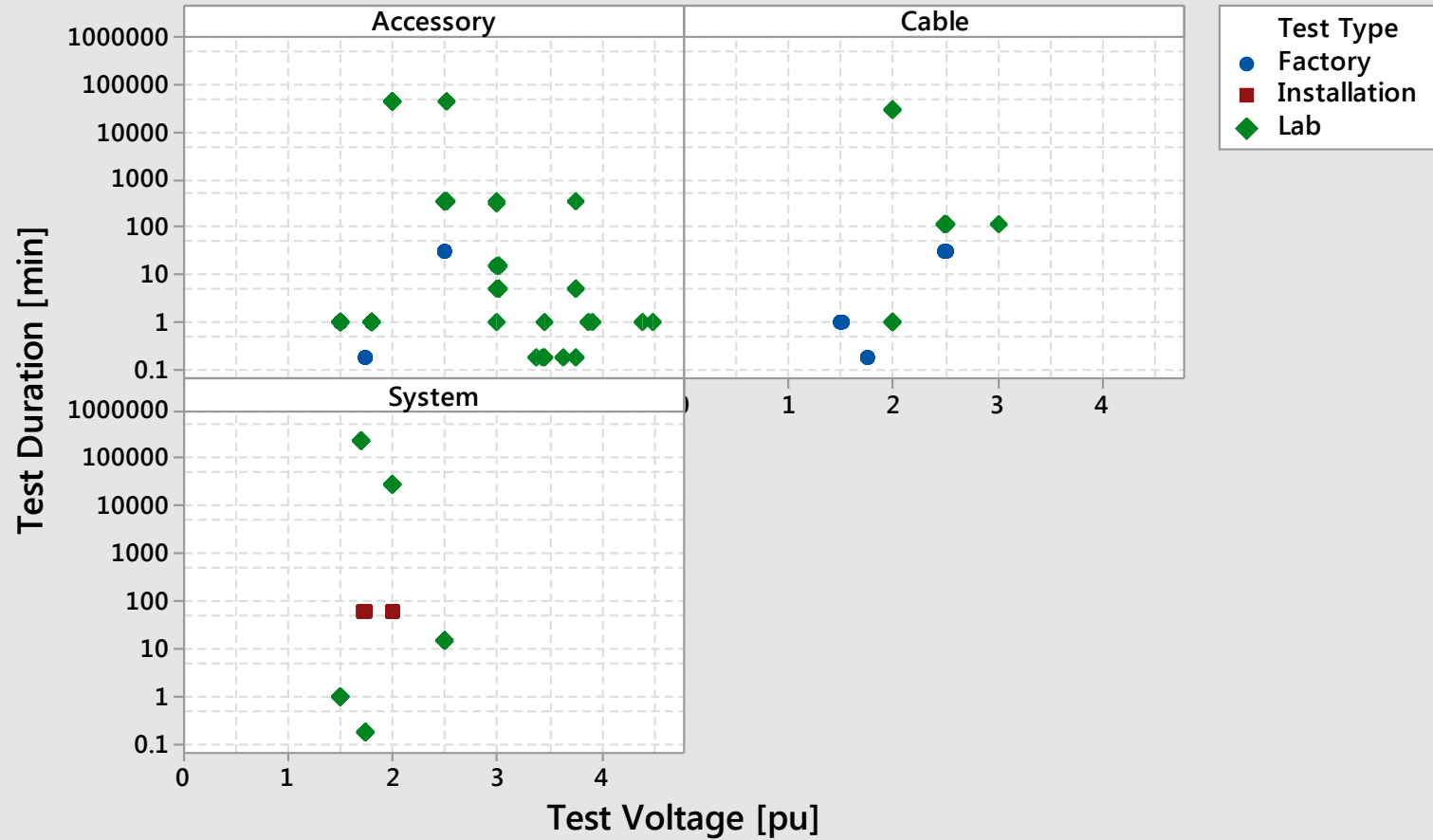


# Test Voltages and Times - MV



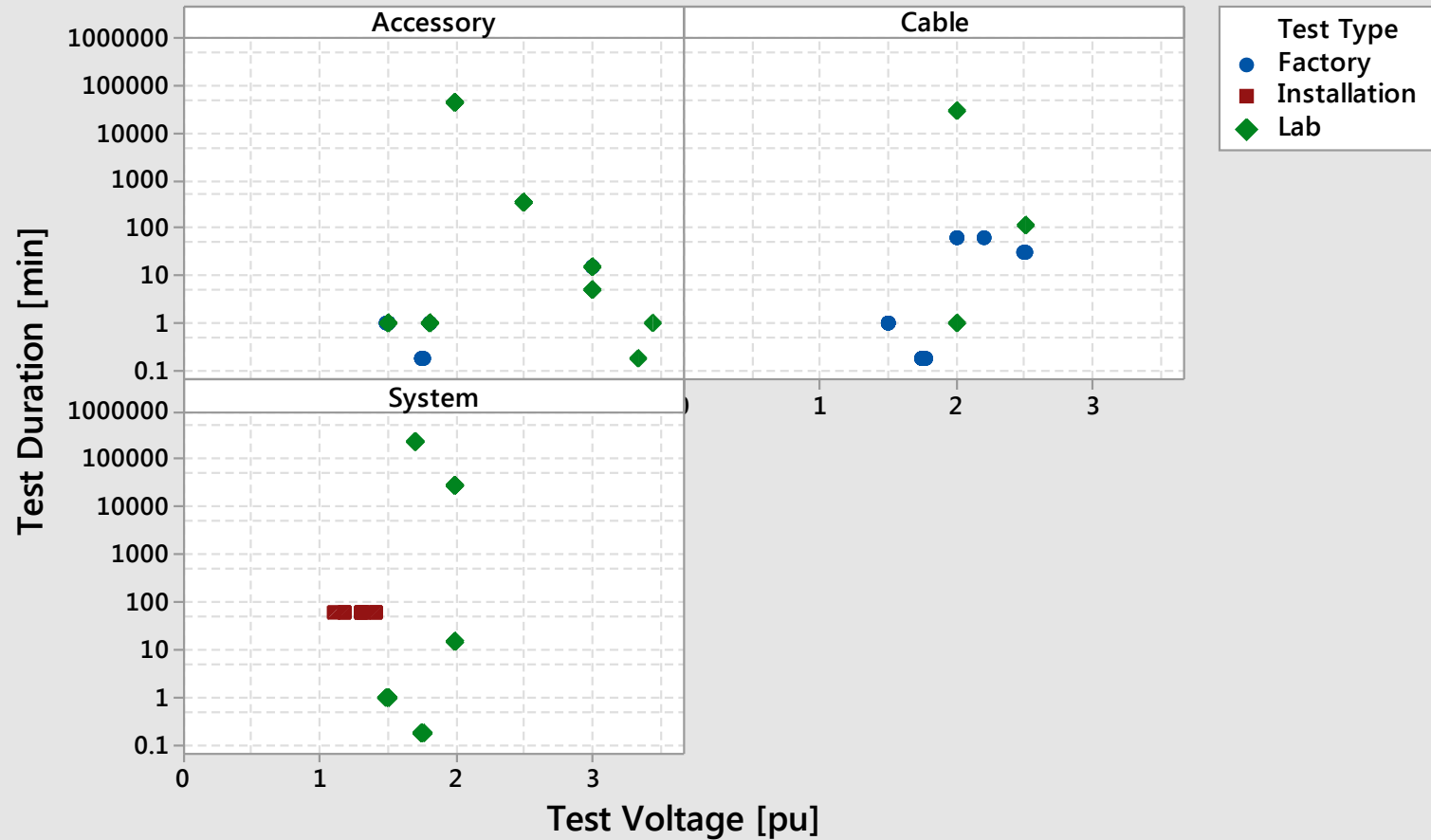
Panel variable: Cable / Accessory / System

# Test Voltages and Times - HV



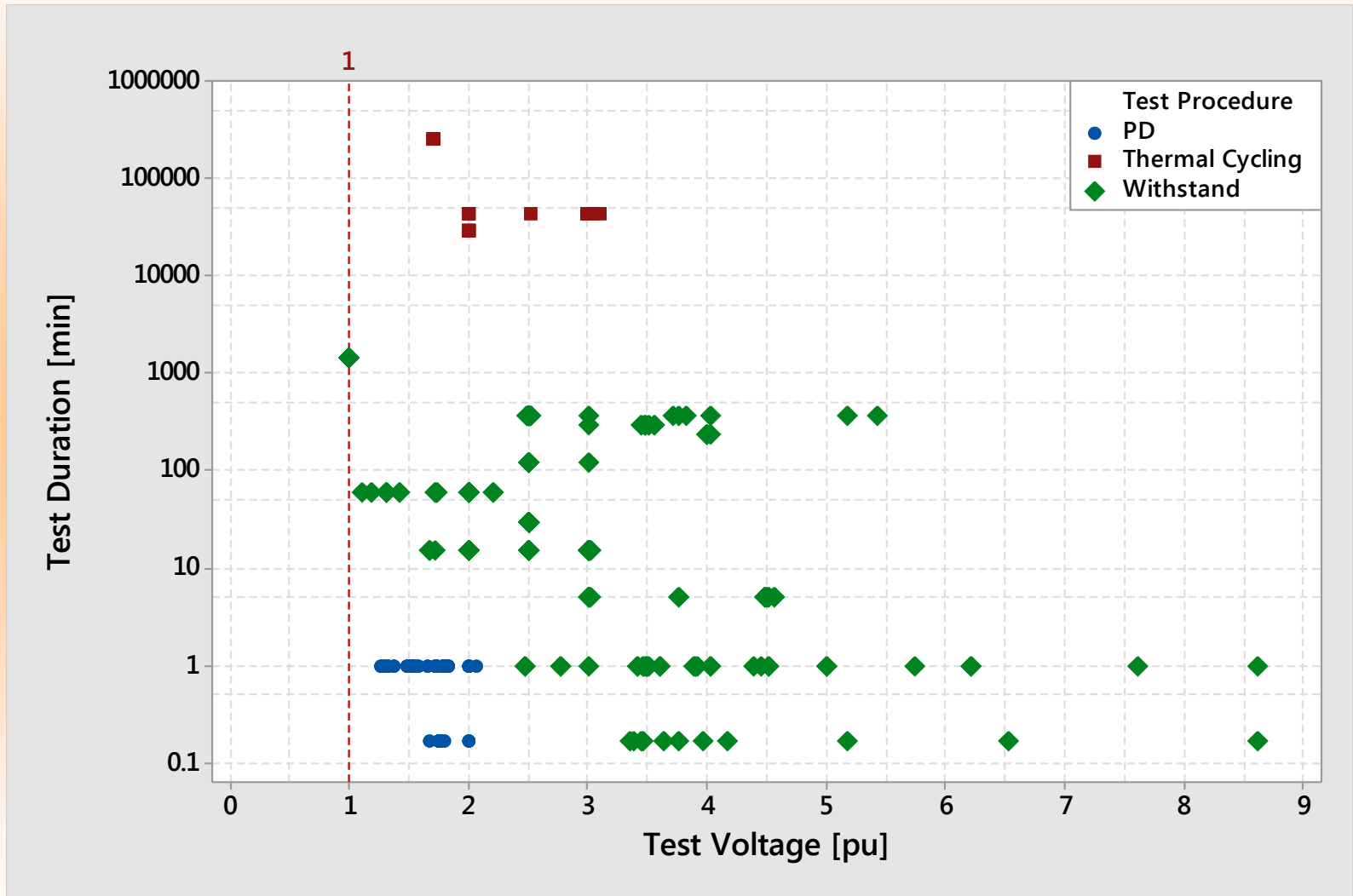
Panel variable: Cable / Accessory / System

# Test Voltages and Times - EHV

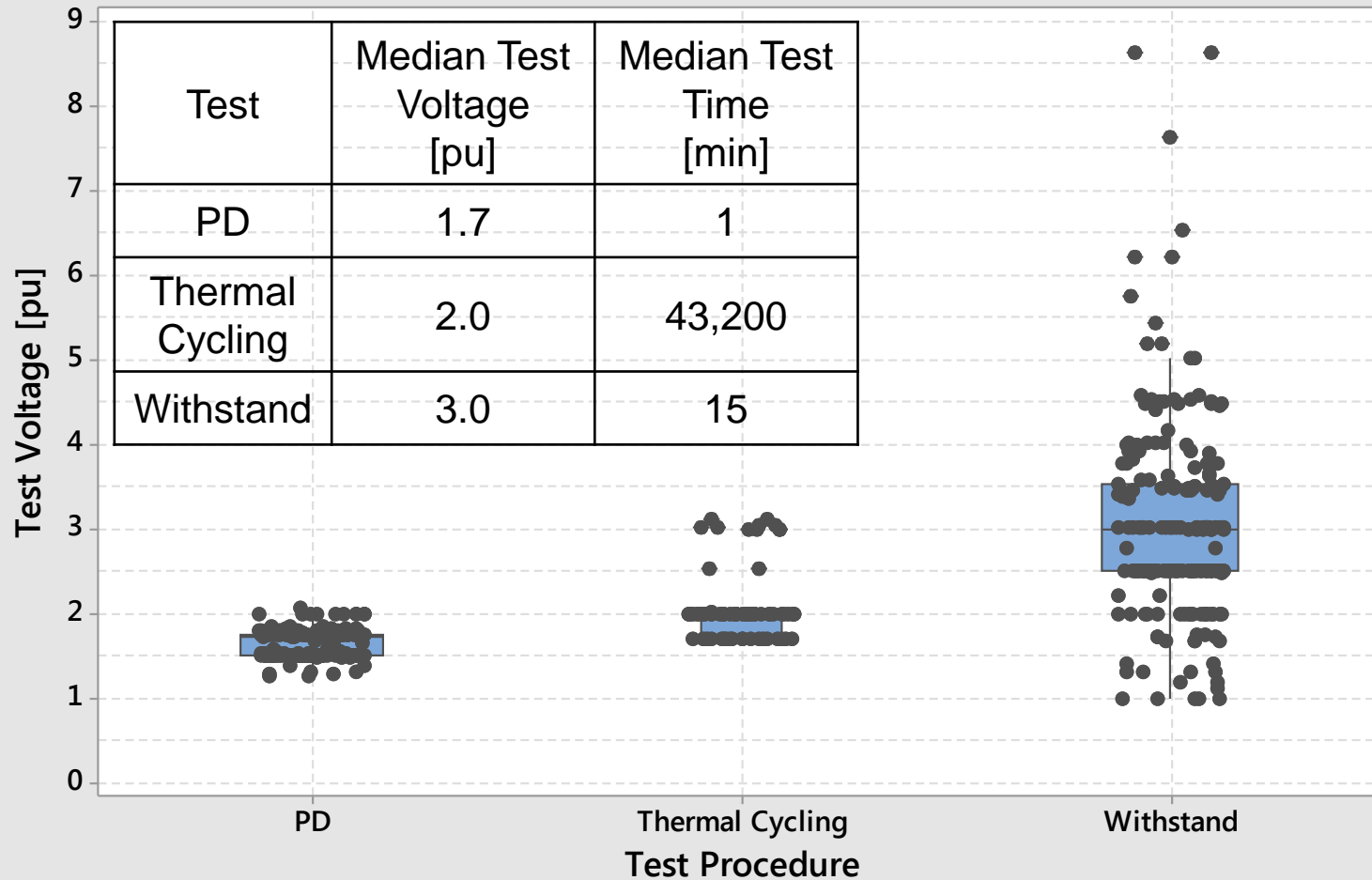


Panel variable: Cable / Accessory / System

# Test Types



# Voltage Distributions



# Summary

- Wide variety of test voltages and times for power frequency tests.
- Withstand tests tend to be highest elevated voltages while PD tests are at lowest elevated voltages
- Installation testing (i.e. field testing) requirements account for < 7% of observed power frequency tests