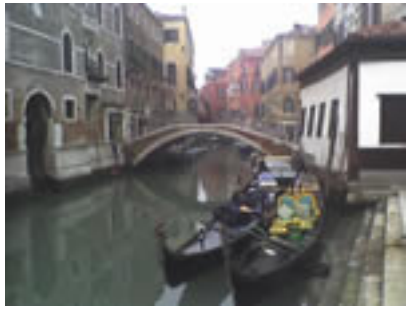
UIE working group
Power Quality

Voltage Dip Immunity of Equipment and Installations

TUTORIAL



The First International Conference on Smart Grids, Green Communications and IT Energy-aware Technologies

ENERGY 2011

May 22-27, 2011 - Venice/Mestre, Italy

Global Voltage Dip Statistics (Part 6)

Global Voltage Dip Statistics GOALS

- To obtain statistical information for making decisions concerning immunity requirements
- By means of:
  - Wide range of sites at several voltage levels and different geographical regions
  - Integration of measurements in a consistent database for statistic analysis

Global Voltage Dip Statistics Data Sources (1)

- 1175 monitoring sites
- Sites from Canada, Portugal, UK, South Africa, USA, Australia, Spain…
- All data within the same database
- Presentation as Contour Charts by:
  - voltage level,
  - dip type and
  - percentile value

Global Voltage Dip Statistics Data Sources (2)

- LV, MV and HV sites.
- Phase-to-neutral, phase-to-earth or phase-to-phase.
- RMS values, no waveforms.
- Three channels or just worst channel recordings.

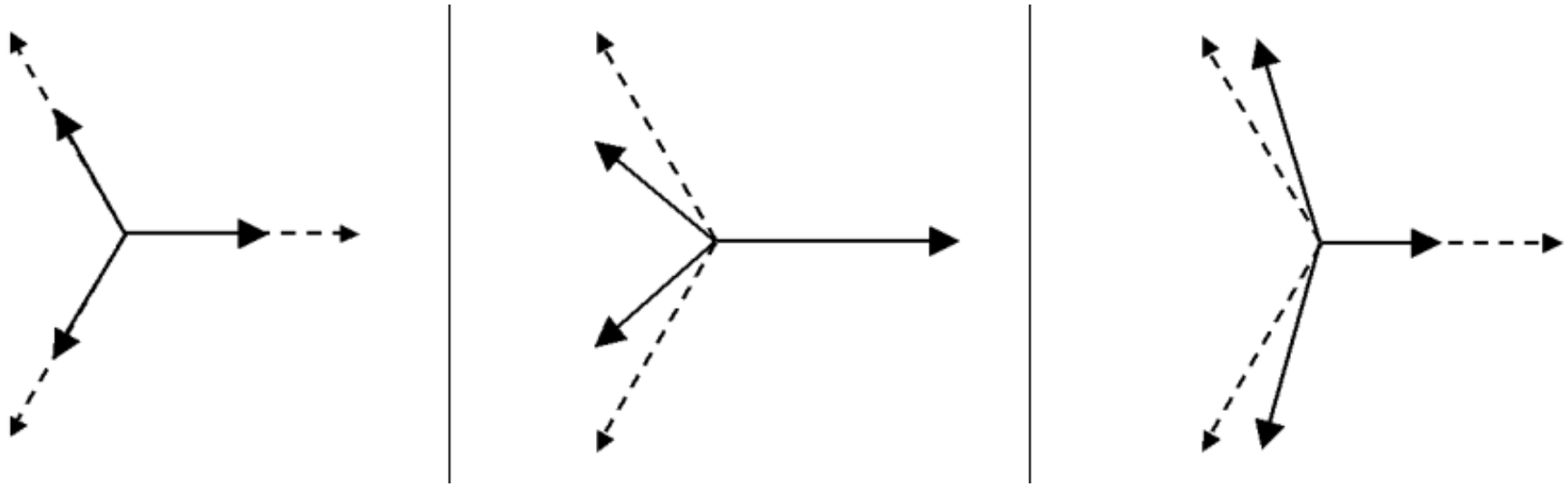
Global Voltage Dip Statistics Algorithms

- Conversion from phase-to-earth into phase-to-phase.
- Type I, II or III.
- Characterisation according to IEC 61000-4-34 (3A, 3B or 3C).

Global Voltage Dip Statistics
How Dips Should be Measured?

- Between active conductors:
  - At LV → phase-to-neutral.
  - At MV and HV → phase-to-phase.
- At MV and HV some phase-to-earth records are converted into phase-to-phase measurements.

Global Voltage Dip Statistics
Type I, II and III Dips

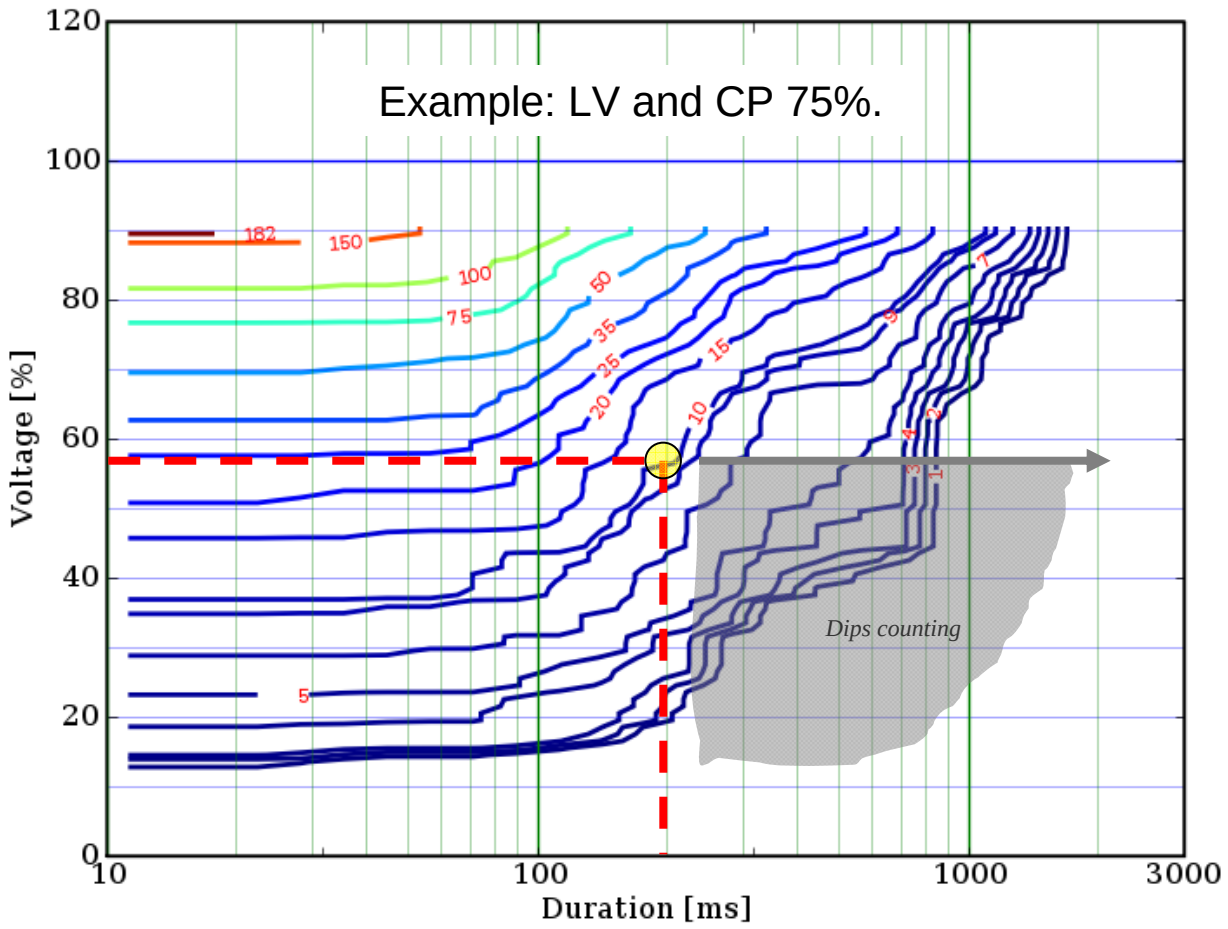


Type III

Type II

Type I

Global Voltage Dip Statistics Contour Charts (1)



Global Voltage Dip Statistics Contour Charts (2)

- For each point *(V-t)*: number of dips per year and site, deeper than *V* and longer than *t*, not exceeded by 75% of sites.
- Allows easy calculation of the amount of dips outside a specific *V-t* curve.

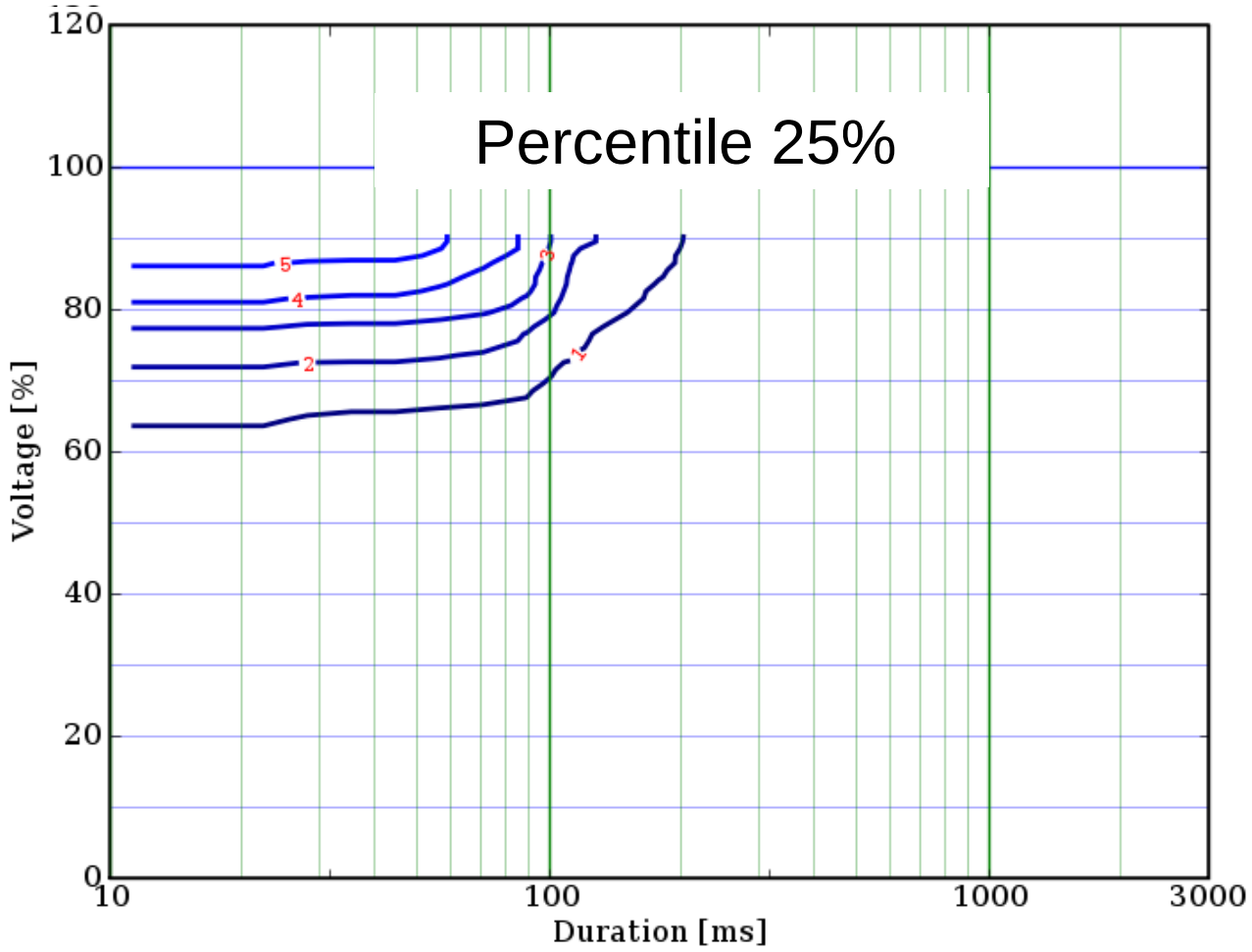
Global Voltage Dip Statistics
Worst and Typical Sites

- CP 95% excludes the “very bad” sites.
- CP 50% corresponds to the median or “average” site.
- CP 25% corresponds to the “quite good” sites.

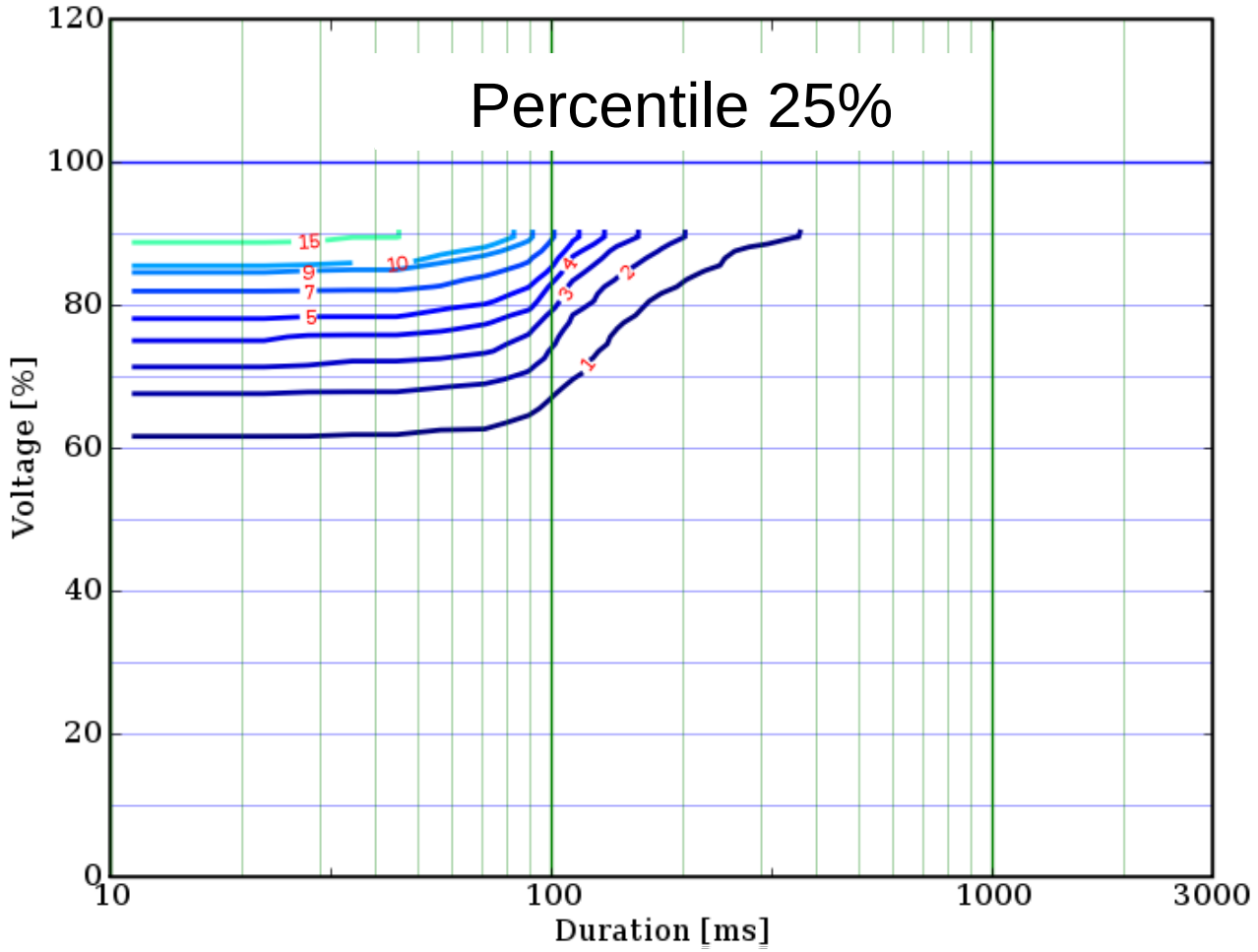
Global Voltage Dip Statistics
Some results

- Type III are around 20% of all dips
- Type II at MV+HV (51÷63%) are equivalent to type I at LV (54÷69%).

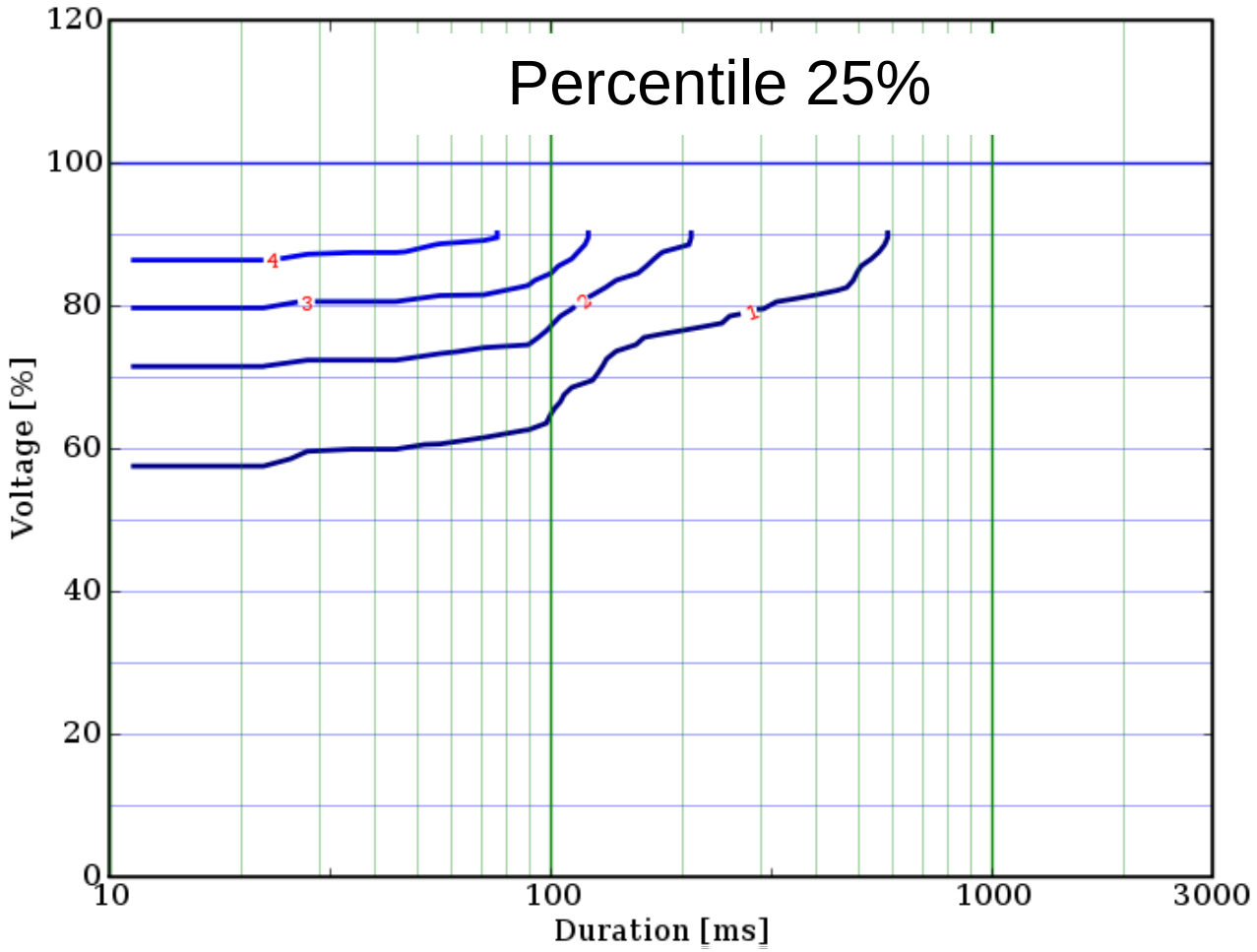
Survey Results: Type I Dips

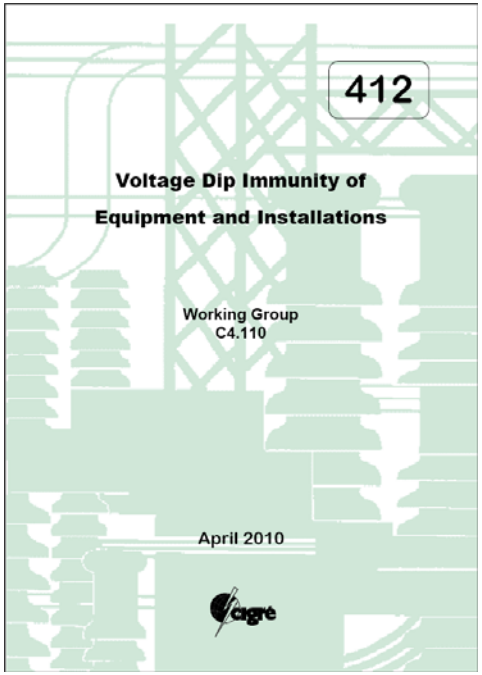


Survey Results: Type II Dips



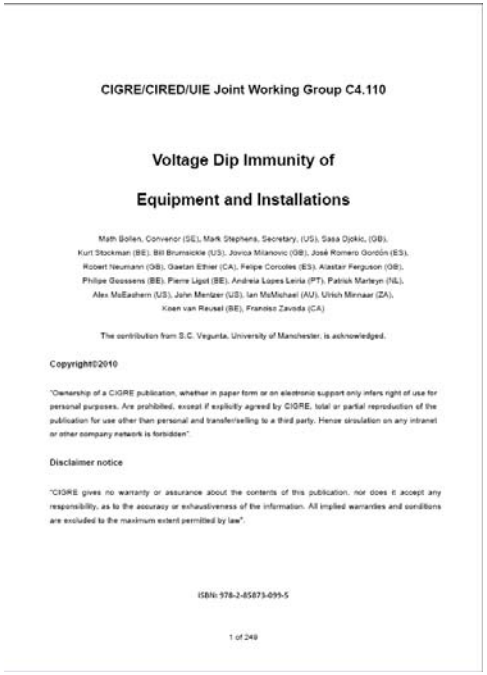
Survey Results: Type III Dips





The report can be obtained in electronic format for free from:
www.uie.org;

a hardcopy can be purchased from
www.e-cigre.org



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