

Electrical Engineering Topics in Distributed Generation

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Topics

Insulation coordination

Protective device coordination

Grounding Design/Study

Arc flash

Effective Grounding and Grounding Transformers

Transfer trip

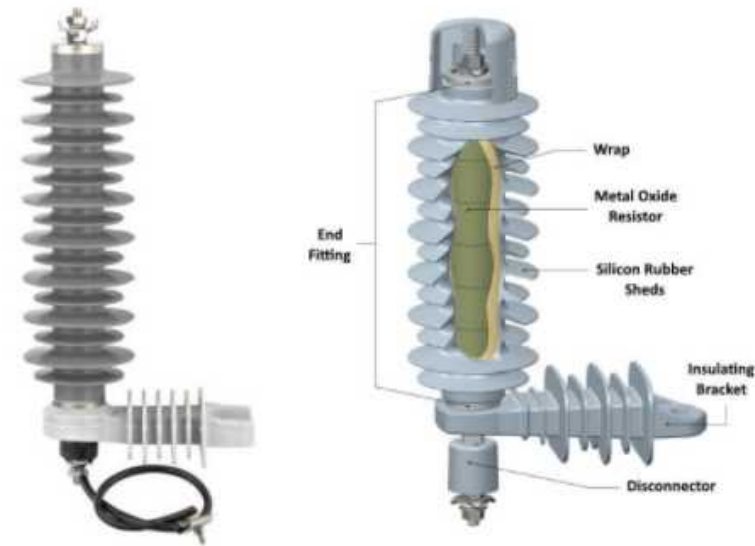
Harmonics/Transients

Open phase testing/anti-islanding

Other topics

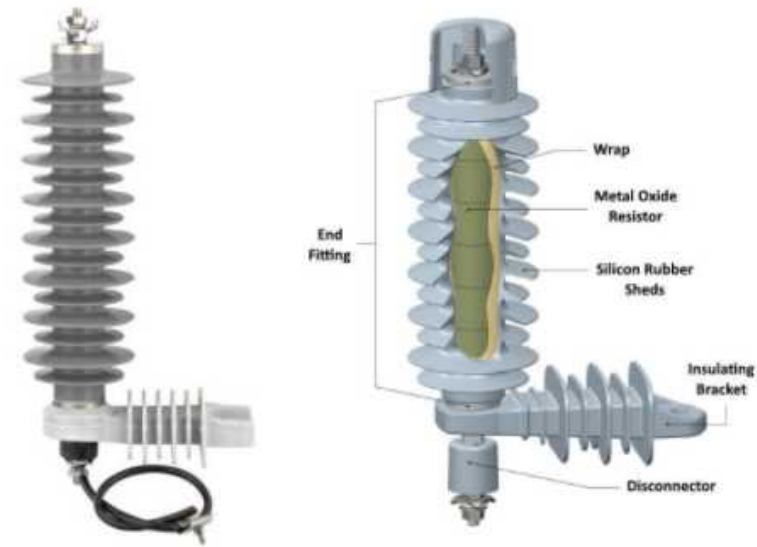
Insulation Coordination

- Selection of lightning arresters in coordination with the insulation levels of the specified equipment.
- Performed with reference to IEEE C62.22 Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems.
- Selection of arresters related to grounding effectiveness of the system.



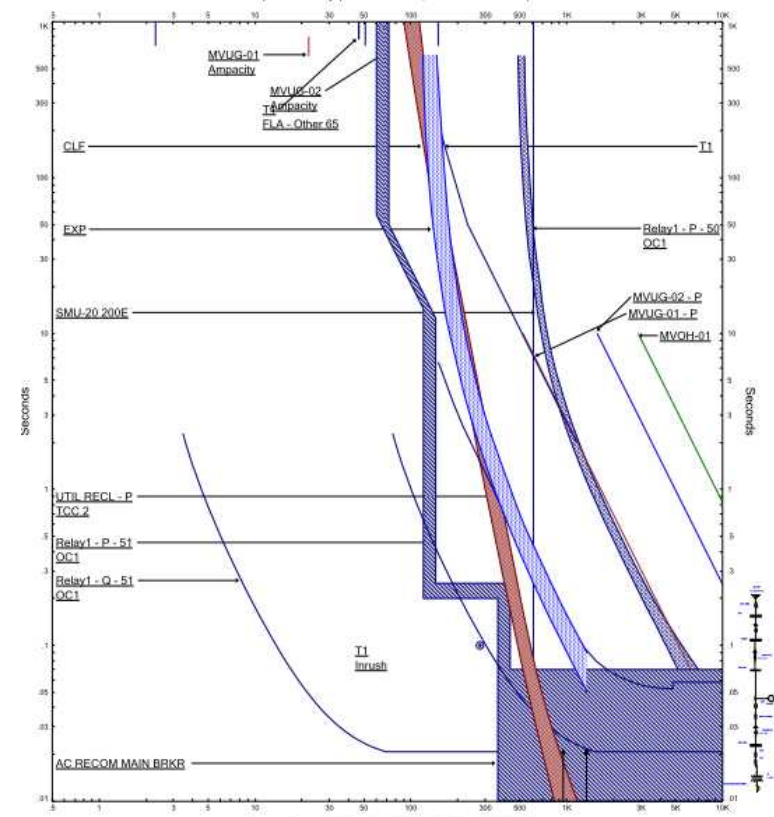
Insulation Coordination

- Are engineers performing insulation coordination calculations or simply matching utility parameters?
- Is there evidence of arrester failures due to steady state or temporary over voltages?



Protective Device Coordination

- Are projects typically fuse protected or do they employ reclosers/breakers?
- Are there challenges in coordinating multiple protective devices?
- How are voltage/frequency protections coordinated between inverters and interconnection?

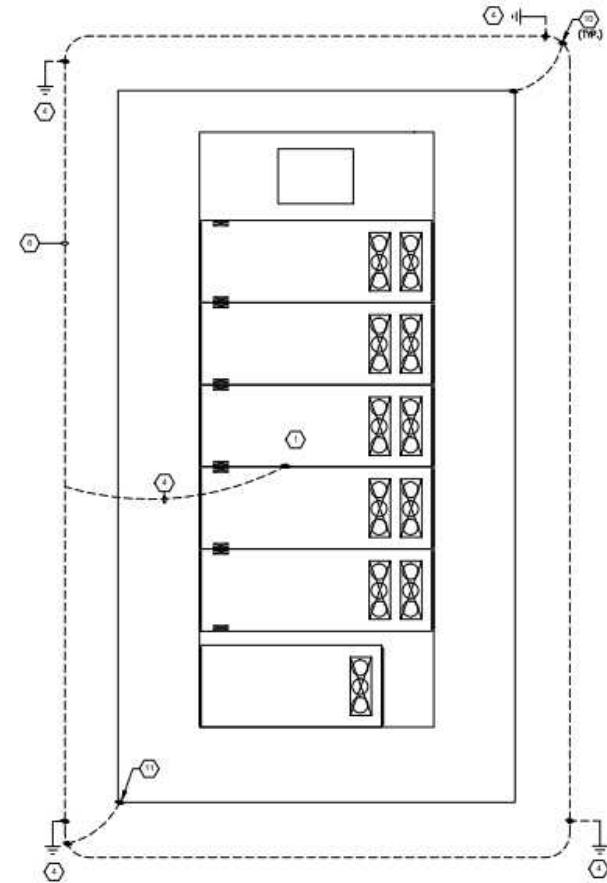


Grounding Studies

- Analysis of Touch and Step Potential, typically under guidance of IEEE Std. 80
- Evaluates hazardous potentials arising during ground faults.
- Hazards can be substantial in ground-mounted solar arrays, which don't typically have ground rings in the vicinity of solar racks.

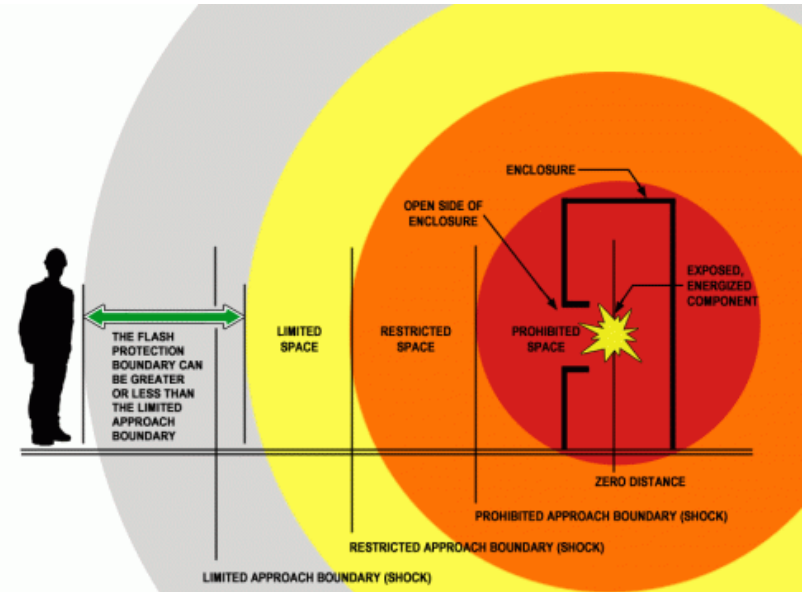
Grounding Design/Studies

- Are engineers performing grounding studies on projects typically?
- Do studies rely on software calculations or simplified IEEE methods?
- To what extent do studies result in increased grounding equipment installed?
- What are typical fence grounding practices?



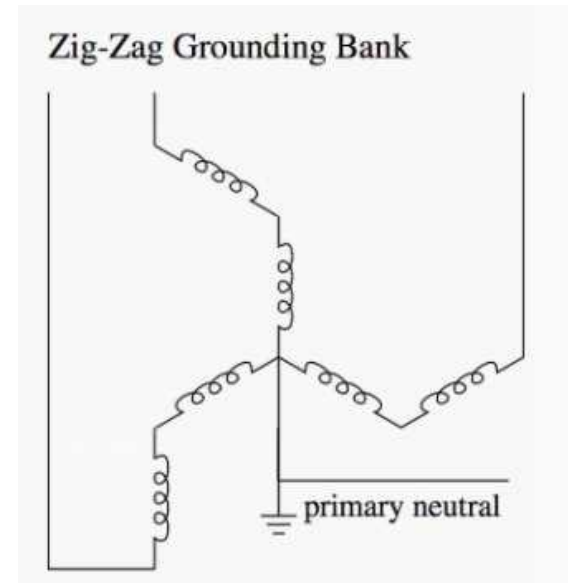
Arc Flash

- Are engineers performing arc flash incident energy calcs on all DG projects typically, or using other methods through NFPA 70E?
- What are the challenges? Obtaining utility protective information?
- Do high incident energy levels typically create issues for project testing/commissioning?



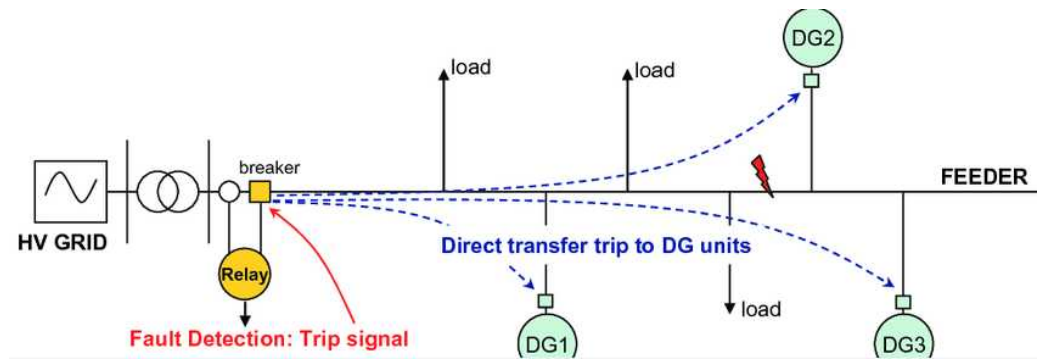
Effective Grounding and Grounding Transformers

- What standards for effective grounding are engineers encountering?
- Are utilities forgoing grounding transformer/reactor requirements in some cases?
- Are inverter manufacturers engaging in this topic?



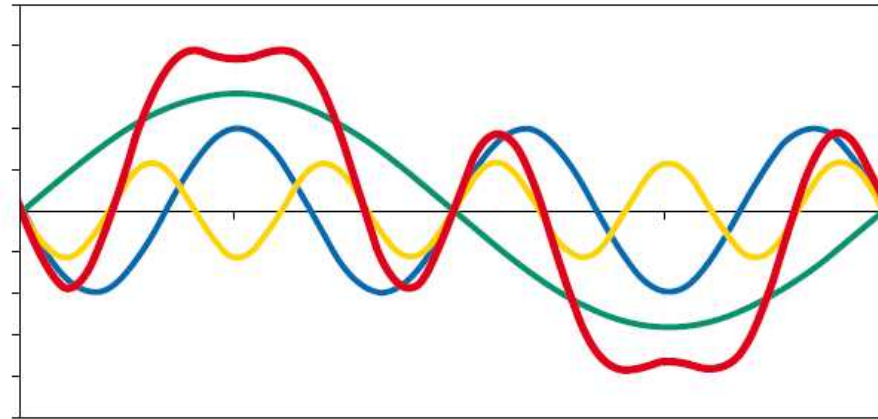
Transfer Trip

- How commonly is transfer trip being required on DG projects?
- What criteria are being used to demonstrate need?
- Have engineers implemented direct transfer trip or permissive transfer trip schemes?
- What other approaches are considered to address anti-islanding concerns?



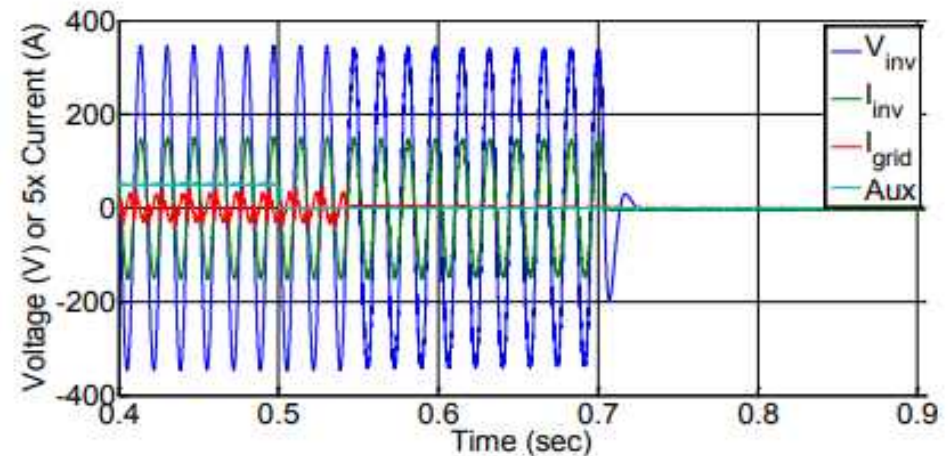
Harmonics/Transients

- How often are desktop studies being performed during engineering prior to construction?
- When do utilities perform their own desktop studies?
- How often are issues seen either prior to or post-construction?



Open Phase Testing/Anti-Islanding

- What lessons have been learned from performing anti-islanding tests?
- What methods have been used to detect an open phase?
- Under what circumstances have tests failed?
- Is monitoring typically performed on the low voltage or medium voltage side?



Other Topics?



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