

IEEE 1547 influence on C37 standards Task Force (Innovation Subcommittee)

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Agenda

1. The new IEEE 1547 2018 and its follow-up
2. Process of the Task Force
3. Potential issues with C37 standards
 - a. Ref 4.11.2 Surge Withstand
 - b. Ref 4.11.3 Paralleling device, 220 % rated Voltage
 - c. Ref 6.3 EPS reclosing
 - d. Ref Tables 11, 12 and 13: Shall Trip requirements
 - e. Ref Tables 14 and 15: operation at 110% of V_n
4. Next step in C37 after discussion

1. The new IEEE 1547-2018 and its follow-up

- IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
 - By IEEE Standards Coordinating Committee 21
 - Urgent revision of IEEE 1547-2003
 - Requirements: performance, operation, testing, safety considerations, maintenance of the interconnection.
 - general requirements, response to abnormal conditions, power quality, islanding,
 - test specifications and requirements for design, production, installation, evaluation, commissioning, and periodic tests.
 - Universally needed for interconnection of DER, including synchronous machines, induction machines, or power inverters/converters
 - applicable to all DER technologies interconnected to EPSs at typical primary and/or secondary distribution voltages.
 - Main emphasis: Installation of DER on radial primary and secondary distribution systems
 - though DERs on primary and secondary network distribution systems is considered.
 - considering the DER is a 60 Hz source.
- Follow-up by IEEE 1547.1 – Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
 - Dates from 2005, should be replaced In 2019 , first draft end of 2018
- Remark: the IEEE 1547 people think almost solely Low Voltage

2. Process of the TF

- Analysis of potential issues from the IEEE 1547
- Interaction with people from that Working Group
 - Andy Hoke, NREL, chair IEEE 1547.1
 - Babak Enayati, Nat. Grid, VC
 - John Carr and Tim Zgonena, UL
- Both Committees will report to their constituency and come back to each other
- C37 people are invited to participate in the work and ballot of the IEEE 1547.1

3.A Ref Cl 4.11.2 Surge Withstand

“4.11.2 Surge withstand performance

The interconnection system shall have the capability to withstand voltage and current surges in accordance with the interconnection system ratings and environments defined in IEEE Std C62.41.2, IEEE Std C37.90.1, IEEE Std C62.45, or IEC 61000-4-5, as applicable.”

Issue: C62 exceeds C37 LV surge requirements

Remarks: in the 1547.1 draft both C62.41.1 & C62.45 are Recommended Practices and compliance is **not mandatory**

- In the C62.41.2 there are a number of tables proposing different values depending on the exposure and application

Follow-up: Share insights at the IEEE Sw.G.C. meeting

- Check whether we reference C62 documents
- Make sure that ultimate 1547.1 text is acceptable

3.b Ref Cl 4.11.3: Paralleling device, 220 % rated Voltage

4.11.3 Paralleling device

Where used for isolation of a DER unit that continues to produce voltage after isolation from the Area EPS, the DER paralleling-device shall be capable of withstanding 220% of the DER rated voltage across the paralleling device for an indefinite duration.

Issue: 220% is result of out of phase voltage. This may not be a concern for air gap switches, but solid dielectric likely will have the leakage concern.

Remarks: We should differentiate between switching devices that perform short term synchronization functions and those that perform long term separation between the utility and an islanded microgrid where the switching device will be exposed to up to 220% of rated grid voltage for long periods of time for up to months. Probably a one-day overvoltage requirement is more or less covered with the typical 1 min Hipot test.

Follow-up:

- The 1547.1 people will draft a new set of requirements – distinguish between different applications and the times of overvoltages but drop indefinite time
- TF to review the requirements, propose the validation tests for the switchgear.

3.c Ref Cl. 6.3: EPS reclosing

6.3 Area EPS reclosing coordination

Appropriate means shall be implemented to help ensure that Area EPS automatic reclosing onto a circuit remaining energized by the DER does not expose the Area EPS to unacceptable stresses or disturbances due to differences in instantaneous voltage, phase angle, or frequency between the separated systems at the instant of the reclosure (e.g., out-of-phase).

Issue: How is the tested? What field application is this trying to prevent?

Conclusion: This is related to the upstream reclosing device and has no influence on the paralleling device so not a big issue

Follow-up: Share in Switchgear Committee

3.d Ref Cl 6.4 Shall Trip requirements in Tables 11, 12 and 13

6.4.1 Mandatory voltage tripping requirements

In tables there are mandatory voltage tripping requirements

Issue: How does this affect programmable devices? Is this meant for the users and not the manufactures? .

Remarks: During these events the generation is typically controlled electronically and ceases its export by means other than opening or closing its output switchgear or contactors. The requirements have very tightly controlled timing windows of operation which is in part why the electronics are used for these control functions vs electromechanical switching.

Conclusion: This is part of system evaluation and not a component evaluation or performance requirements

Follow-up: Discuss in Switchgear Committee

3.e Ref Cl 6.4 continuous operations at 110% Un in Tables 14 and 15

6.4.2 Voltage disturbance ride-through requirements

Issue: Tables 14 and 15 allow continuous operation at 110% of the nominal system voltage. There is risk at the short circuit rating of the product the performance may be different at +10% (660V on 600V system), because today we test LV at not more than +5.8% (635V for 600V system).

Remarks: it doesn't say that if it goes to this level DERs should be on there, for instance National Grid requests plus or minus 5% and there may be infrequent violation during short period of time, this doesn't mean that the system voltage must be higher.

Note that the 1547 is almost only about LV, not much thought to MV

Follow-up: Discuss in Switchgear Committee

- Tables 14 and 15 are critical for LV and MV.
- The IEEE 1547 group will discuss so they can potentially create an optional evaluation for 110% components for switchgear, breakers and fuses.

4. Next step in C37

Question to the audience:
what next step after discussion?

- Describe in white paper
- or
- C37 guide