



IEEE P650 Status

∩ **Working group**

∩ Dennis Dellinger Ametek Solidstate Controls

∩ Kenneth Caldwell Duke Energy, Catawba Station

∩ Reilly Schum Wyle Labs, Huntsville



Purpose of Standard IEEE 650

- ∞ To qualify inverters, battery chargers and ancillary equipment to meet the requirements for 1-E equipment.
- ∞ It is specific to mild environments outside of the containment.
- ∞ Addresses potential electrical, mechanical and environmental extremes.
- ∞ To prove that the battery chargers and inverters perform their safety function under specified service conditions.



Major changes to existing std.

The updates are not considered a change in direction, they are to be considered adjustments, to align to industry needs and parent standard updates.



Major Changes to Existing Std.

Abstract Addition

"These methods may also be used to qualify similar electronic equipment for use in mild environment applications outside containment, where specific standards for such equipment are not available."



Change to Purpose Statement

Added

“And the Associated Ancillary Equipment”

Reasoning for adding

Ancillary items such as distribution, switching panels and regulating transformers are supplied as part of the total package and may be integrated into the 1-E power system.



References

All references have been updated to latest revisions.

Several new references added.



Definitions

Change to Components

Replaced Transistors with
“Semiconductors”

Replaced Springs with
“Electromechanical Devices”



Environment (4.3.1)

- ⌚ **Clarified wording for Potential Temperature Conditions.**
- ⌚ **Altitude is also defined as:
Static Air Pressure.**
- ⌚ **Consideration of both RFI and EMI and the effects on equipment both as a transmitter and receptor.**



Figure 1 and Section 5.3.1.8

∞ Removed requirements for:

Post Seismic Environmental Stress Test.

Rational:

The environmental stress that occurs prior to the Design Basis Event can affect the operation of the unit, rendering it operationally challenged during the Seismic DBE. Once the DBE has occurred and the equipment functioned through it, additional stressors are not considered a factor.



Section 5.1.2.2.1

- ∩ **Change Mild Environment Radiation Dose to: “1E 10³ Rads” from 1E 10⁴ (also 5.3.1.3)**
- ∩ **For Surge Suppressors added “Transzorbs, MOV's, etc “(also changed in 5.2.2.7)**
- ∩ **Add “Radiation Tolerance Levels must be Verified by the Manufacturer / Qualifier.”**



Section 5.2.2.2.1 & 5.2.2.2.2

- ∩ Removed the requirement for 20% margin on cycling of Breakers and Switches.**

RATIONAL

Cycling of breakers and switches in this type of equipment is low over it's expected life. Typical cycling is limited to several times year. The total operational cycles the equipment is subject to is several magnitudes below manufacture ratings.



Section 5.2.2.4

Revised:

“Interconnections shall be aged”

TO:

“Interconnections shall be tested”



Section 5.2.2.2.11

- o **Add a section (5.2.2.2.11) for :**
- o **"Motors, Pumps, and/or Other Components"**

**Follows same Principals as outlined for other
Components and Materials.**



Section 5.3

∩ **Revised wording for: “includes some margin”**

∩ **To: “is conservative”**

∩ **Revised Wording for : “Except for”**

∩ **To: “with the inclusion of the”**

∩ **Revised: “margin”**

∩ **To: “conservatism”**



Sections 5.3.1.5 & 5.3.1.6

∩ **Revised numbering to match previous changes.**

∩ **Added Requirement to Test at Both “minimum and maximum loads”**



Section 5.3.1.8

- ∩ Removed Requirement for Post Seismic Stress Test (previously discussed)**
- ∩ Former 5.3.1.9 now becomes 5.3.1.8**



Section 5.3.2 & 6.3

Removed:

- ∩ **“specific test steps” from only requiring analysis**

Add:

- ∩ **“Any failure during the testing and qualification process” requires analysis.**



One Final Hurdle for Completion

∞ Reference to EPRI Documents

- **Options available**
 - **Leave as is, with new references**
 - **Remove new references to P650-D5 leaving references of past revisions intact**
 - **Remove all references including historical references.**



Plans for completion

- ∩ **Currently Undergoing Review by SC-2** completed
- ∩ **Incorporate SC-2 Comments** completed
- ∩ **Final Presentation and Review at SC-2 April Meeting** That's why we are here today!
- ∩ **Initiate Request to IEEE to form a Ballot Pool (April 05)**
- ∩ **Present to NPEC at Summer Meeting**
- ∩ **Submit for Ballot upon Approval from NPEC**