SED Safety Inspection Items for Energy Storage

For energy storage to a electrical grid.



Is an overall safety plan in place?

- [ ] Does the facility have a safety plan documented?
- [ ] Does it address manmade and natural disasters like wildfire, earthquake, flood, chemical spill, toxic gas release, explosion, terrorism, etc.?
- [ ] Does it include outreach to first responders and local authorities? i.e. conduct periodic drill with fire, police, hazmat, etc.
- [ ] Does it include training?
- [ ] Are signage and safety placards compliant with American National Standards Institute, National Fire Protection Association, and other applicable standards?
- [ ] Does the facility have a monthly in-service inspections and maintenance checklist?
- [ ] Does the facility have maintenance records, such as a preventative maintenance log?
- [ ] Does the facility have an appropriate access protocol?

Is the facility inspected regularly by the company or utility per manufacturer's recommendations?

- [ ] Battery Modules - Inspection of cables and wiring, Torque check of bolted connections (when applicable), Insulation resistance measurement (per industry standards), Heater resistance, Battery residence.
- [ ] Cable run - IR or Ultrasound inspection of terminals, Insulation resistance measurement (per industry standards)
- [ ] SO2 detector if applicable.
- [ ] Control cabinet - Inspection of cables and wiring.

- [ ] Total system - Protection relay test

Is the facility inspected regularly by the company or utility, per manufacturer's recommendations? (flywheels only)

- [ ] At commissioning, are flywheel units properly installed, with civil design per manufacturer specification?
- [ ] Inspection of cables and wiring.
- [ ] Insulation resistance measurement of cables.
- [ ] Run automated control system test. Verifies control connectivity, functionality of internal sensors within each flywheel unit – voltage, current, vibration sensing, and vacuum system state. Test carried out from control center.

SED inspectors have examined the following

Interconnection equipment

- [ ] Inspect interconnection equipment for visual defects, i.e. insulator bushing intact and clean (shiny, not broken or chipped).
- [ ] Interconnection equipment includes, but not limited to the following:
- [ ] Transformer (check nitrogen tank supply if nitrogen-blanketed, inspect connector / enclosure for hotspot, inspect bushing for defect, review oil samples for dissolved gases, moisture and particulate).
- [ ] Circuit breaker (oil-filled, vacuum, or SF6).
- [ ] Disconnect switch (observe any apparent binding on gear linkages).
- [ ] Lighting arrestor and bus-bar (inspect for visual defect).
- [ ] Test remote operability of interconnection equipment.

Storage facility

- [ ] Observe any signs of break-in, intrusion, or vandalism.
- [ ] Inspect facility for appropriate fire protection system, i.e. CO2 suppression (gas cylinders securely fastened per OSHA), sprinkler, fire alarm, detector, extinguisher (C for electrical fire and D for metal (lithium) fire). Review inspection records per NFPA.
- [ ] Inspect SO2 detector /ask worker to perform operational test. Check if gas sensor and/or vacuum pump (integral to detector) are in working order (Applicable to NaS storage only).
- [ ] Check for wind sock and ensure it is in good condition (Applicable to NaS storage only).
- [ ] Check ambient temperature and humidity to ensure proper operating condition is maintained. Question: Is facility wired to alarm if operating conditions fall out-of-range?
- [ ] Check facility for onsite spares (for frequently failed components). Does facility have a periodic parts replacement list? Are spare parts replenished as needed?
- [ ] Inspect conditions of facility walking and working surfaces, including stairs and railings.

Battery enclosure

- [ ] Observe signs of localized overheating (if enclosure shows different color shades or if metal surface is warped, this is indicative of overheating and problem with the battery module inside). Inspect enclosure for damage or signs of structural defect.
- [ ] Inspect air fan/conditioner and filter. Check if fan is running quietly, not squealing or shaking violently. Inspect filter for cleanliness.
- [ ] Check if enclosure is weather-proof and properly grounded.
- [ ] Inspect all electrical and control panel terminal connections for hotspots, corrosion, looseness, or physical damage.
- [ ] Inspect inverters for hotspots, mechanical, and/or structural defects.
- [ ] Inspect certifications of all energy storage equipment/component. Are they certified per latest National Electrical Code, Underwriters Laboratory, and applicable standards?

Battery module (varies by technology)

- [ ] Observe any unusual smell, leak or spill. Feel any unusual heat flux.
- [ ] Check that modules are generally intact and not damaged.
- [ ] Check that wire connectors are clean (not corroded) and not loose or damaged. Perform a heat scan if needed.
- [ ] Ensure all protective relays are tested and calibrated; check calibration stickers.
- [ ] Ensure all cable is secured and in good conditions (not frayed, melted, cut, bended, or otherwise damaged).

Hazardous materials policy and management program if applicable

- [ ] Are all records kept and maintained per the requirements of the regulations for the site? For example, training.
- [ ] Has a manifest of hazardous material kept on site been generated?
- [ ] Are SDSs available for all hazardous materials kept on site?
- [ ] Is proper hazardous waste disposal in place if required?
- [ ] Are the hazardous materials handled and stored per the regulations?
- [ ] Do the hazardous materials emergency response plan and the equipment to respond to it meet the policy and management program?

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