SAFE ELECTRIFICATION CHECK LIST
ENERGY STORAGE SYSTEM

FEEDS
Forum for European Electrical Domestic Safety

INTRODUCTION

The safe electrification check lists initiated by the Forum for European Electrical Safety (FEEDS, www.feedsnet.org) aim to provide the installer and the user with essential information regarding the electrical safety of the installation.

DESCRIPTION

An energy storage system, often abbreviated as ESS, is a device or group of devices assembled together, capable of storing energy in order to supply electrical energy at a later time. Batteries are the most common type of new ESS installation that enable energy from renewables, like solar, to be stored and then released when the power is needed most. Battery storage systems will play an increasingly pivotal role, including into a domestic environment, between green energy supplies and responding to electricity demands.

BEFORE INSTALLATION

CLIENT

- Make sure to ask for a qualified and, where relevant, certified installer.
- Check the existence of an electrical inspection report. The report can assess the safety, the readiness to accept new equipment. If no report is available, or if the existing report doesn't give the useful information, it is recommended to ask one if the electrical installation has more than 5 years.
- Check with the installer the place where batteries are likely to be installed: a clear space, ventilation, distances regarding heat sources are key elements.
- Check if and which subsidies are available, and if electrical upgrades are covered.

INSTALLER

- If client has a photovoltaic system, propose implementation of smart control of loads via an energy management system (In this case the battery will be better optimized, and perform fewer cycles, thus extending its lifespan).
- Control earthing system.
- Plan cables paths and ensure all cables have the appropriate cross-section (See annex) and that all necessary electrical protection devices will be installed.

DURING INSTALLATION

INSTALLER

- Follow the recommendations given by the manufacturer, they can differ from one to another.
- Follow the relevant standards and legal requirements for installation available at national level.
- Use the cables size and specification in accordance with relevant standards (see annex) and legislation.
- Pay particular attention to:
  - mechanical protection of the terminals
  - protection against overcurrent for:
    - the battery cable
    - the cable powering the regulator
    - the DC cable
    - the cables (converter) inverter DC/AC
    - the cable of the termination DC box
  - emergency battery cut-off for:
    - the battery
    - the DC part of the installation
    - the other DC &AC sources in the battery room
  - sectioning DC and AC sides of the installations
  - identification of DC & AC parts

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AFTER INSTALLATION

CLIENT

- Declare the installation to all relevant counterparties (landlord, condo administrator, the local fire brigade, the insurance company, Distribution System Operator - DSO).
- Keep carefully the documentation provided, related to the equipment and its installation and follow the maintenance plan.

INSTALLER

- Test and control of the new installation, this final check can be performed by a third party and can be mandatory depending on the country.
- Specific attention shall be given to cables, connections, earthing, protection devices.
- Communicate a maintenance plan (including requirements from the manufacturer and/or national regulations).
- Provide the maintenance plan with key information visible on the equipment.
- Supply to the client all information and documents necessary to declare the installation to the relevant counterparties.
- Explain to the customer how the system works, and how to ensure its safety (e.g. that the battery should not be covered or used as a shelf).
- Complete the existing inspection report.

ANNEX: CABLE SIZING

To avoid losses and risks of overheating, it is crucial to choose the right cables diameter for the electrical installation. The cables cross section is determined according to the intensity of the current (A) and the distance to be covered. Here, it is necessary to distinguish the DC and AC parts of the installation.

DC: Minimum cable section which must be respected between the power generator (PV panels, ...) and the ESS considering 5% voltage drops.

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Minimum cable section for 24V installations

12V and 48V tables are available here:

Peak power (Wp)	100	160	320	450	640	800	960	1120	1250	1440	1600	1920
Intensity (A)	3	5	10	15	20	25	30	35	40	45	50	60
Length (m)	Cable section (mm²)											
4	4	4	4	4	4	4	4	4	6	6	6	10
5	4	4	4	4	4	4	6	6	6	10	10	10
6	4	4	4	4	4	6	6	6	10	10	10	16
7	4	4	4	4	4	6	6	10	10	10	10	16
8	4	4	4	4	6	6	10	10	10	16	16	16
9	4	4	4	4	6	10	10	10	16	16	16	16
10	4	4	4	6	6	10	10	10	16	16	16	25
15	4	4	6	6	10	16	16	16	25	25	25	35
20	4	4	6	10	10	16	25	25	25	35	35	35

AC: For cables from batteries inverter to the meter, it is also possible to consider cable optimisation that allows a better energy efficiency along the installation life time according to IEC 60 287-3-2 standard.

Electrical power (kW)	Power supply type	Cable lengths (m)	Minimal cross section (mm²)	Optimised cross section (mm²)
2	1-phase	10	2.5	4
2	1-phase	25	2.5	4
5	1-phase	50	4	10
5	1-phase	10	6	10
5	3-phase	25	2.5	4
5	3-phase	50	2.5	4
10	3-phase	10	2.5	6
10	3-phase	25	2.5	6
10	3-phase	50	2.5	6