



**Batteries and energy
storage systems (ESS)**

Who we are



CERE was originally set up as a Certification Entity for Renewable Energies.

CERE was created to be the access key on the target countries for Renewable Energies, where certification of components, full installations certificates, modeling and software validation of renewable Power Plants, were required.

The company is accredited as Testing Laboratory and Certification Body.

Our services include Testing and Certification according Safety, EMC, Grid Quality, grid connection requirements, design certification and complete installations Certificates, complementary simulations, modelling validation, electromagnetic transient analysis.

This full process includes Inspection, Testing and Certification of Components such as PV modules, Wind and PV converters, trackers, transformers, string boxes, combiner boxes, etc., and the Certification for full Power Plants according particular country, DSO or TSO requirements and / or According Client Requests

CERE Profile

The Company is managed by Miguel Martínez. Its team has a large experience in Certification for more than 10 years, including renewable energy's components and installations for worldwide grid integration, design, safety, EMC and grid quality, among others.

During the last 6 years **CERE** has grown exponentially, diversifying its services until the actual company structure:



- Certification
- Converters
- Grid Code & safety
- Simulation
- Trackers
- Batteries
- EMC

- Electrical Vehicle Charger
- Transformers
- Medical devices
- Electric and Electronic devices
- Quality System certification

CERE Capabilities

CERE's Facilities in Getafe, Madrid, Spain has the following installations:

- Test site up to 500kVA for all kind of converters and Battery testing
- Test site up to 250kVA for all kind of converters including frequency variators up to 400Hz
- Test site up to 100kVA for DC-AC converters
- Test site up to 50kVA for all kind of converters and Battery testing. The source can act as DC source and AC source and electronic loads
- Test site up to 10kVA for single phase and three phase converters
- Passive loads up to 100kVA
- Electronic loads for Anti-islanding up to 500kVA
- EMC Chamber and EMC laboratory
- Safety laboratory
- Simulation laboratory including Power Factory, PSSE and MATLAB

What's CERE Batteries?



CERE Batteries is a department created to cover the demand of services for batteries and storage systems inside of CERE (Certification Entity for Renewable Energies)

CERE Batteries was created to provide support and trust at any stage of certification and testing of batteries and storage systems

Our services include Testing and Certification according Safety standards. This process includes testing, certification and verification of batteries and storage systems and their components.

CERE's Accreditations

- **CERE** is accredited by ENAC and a2La (IAF/ILAC members) as Certification Body According ISO 17065 and Testing Laboratory according ISO 17025 for Power Generating Units. This fact ensures a deep knowledge in international requirements for components and Renewable Energies Power Plants.
- **CERE** is also CBTL and NCB for the IEC Scheme.
- MET approval for the North American market
- Sunspec approval
- SII approval for Israel
- RETIE approved certification body for PV inverters (Colombia)
- Corean Approval

CERE's Accreditation can be checked in:

<http://www.cerecertification.com/accreditations>



Applicable Standards

CERE is accredited as Certification Body and Testing Laboratory for batteries and storage systems according the following standards:

Safety Standards for UL Market

Standard **UL 9540:2020**: Energy Storage Systems and Equipment

Standard **UL 9540A:2019**: Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

Standard **NEMA 250:2014**: Enclosures for Electrical Equipment (1000 Volts Maximum)



Applicable Standards

CERE is accredited as Certification Body and Testing Laboratory for batteries and storage systems according the following standards:

Safety Standards for International Market

Standard **IEC 62933-2-1:2017**: Electrical energy storage (EES) systems - Part 2-1: Unit parameters and testing methods - General specification

Standard **IEC 62399-5-1:2017**: Electrical energy storage (EES) systems - Part 5-1: Safety considerations for grid-integrated EES systems - General specification

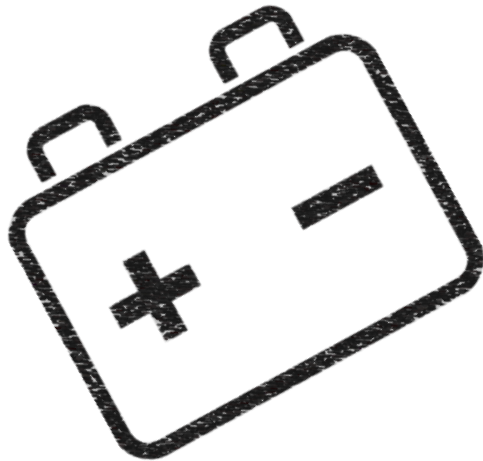
Standard **IEC 62399-5-2:2020**: Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems



Applicable Standards

CERE Batteries and ESS has a wide expertise in the field of testing.

Some of the most important projects carried out recently are located in Spain.



The offered testing includes*:

- ✓ Bonding Conductor Test (Earth current test)
- ✓ Spacings and Insulation resistance test
- ✓ Mechanical Assembly
- ✓ Temperature (Heating) Test
- ✓ Dielectric voltage withstand and Impulse test
- ✓ EMC tests (Immunity and emissions)

(* among other test required in the certificates)

CERE Batteries

ESS testing requirements

- ✓ Temperature test (normal operation)
- ✓ Salt mist test
- ✓ Vibration test
- ✓ Thermal runaway
- ✓ Communication loss tests
- ✓ Short-circuit protection
- ✓ Overcharge
- ✓ Enclosure impact (including IK)
- ✓ IP and NEMA tests
- ✓ Corrosion tests
- ✓ Nominal Energy capacity and Efficiency
- ✓ Sound level (Noise)
- ✓ Lifting test
- ✓ etc

Grid Connection Reference Standards for ESS according the different countries

CERE is accredited as Certification Body and Testing Laboratory for batteries and storage systems according the following standards:

Grid code

General guidelines:

- **EN 50549-1:2019**: Requirements for generating plants to be connected in parallel with distribution networks - Part 1: Connection to a LV distribution network - Generating plants up to and including Type B
- **EN 50549-2:2019**: Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network - Generating plants up to and including Type B
- **IEC 61727:2004**, Photovoltaic (PV) systems - Characteristics of the utility interface
- **IEC 62116:2014**, Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures.
- **UNE-EN 50438:2014**, requisitos para la conexión de microgeneradores en paralelo con redes generales de distribución de baja tensión.

Grid Connection Reference Standards for ESS according the different countries

CERE is accredited as Certification Body and Testing Laboratory according the following standards:

Grid code

Germany:

- **BDEW Guideline 2008 (Adap 2009, 2010, 2011 and 2013)**
- **VDE-AR-N-4105: 2018:** Generators connected to the low-voltage distribution network – Technical requirements for the connection to and parallel operation with low-voltage distribution networks
- **VDE-AR-N 4110: 2018-11:** Technical requirements for the connection and operation. Of customer installations to the medium voltage network (TAR medium voltage)
- **VDE-AR-N4120:2018:** Technical requirements for the connection and operation of customer installations to the high voltage network (TCR high voltage)
- **VDE-AR-N 4130: 2018:** Technical requirements for the connection and operation. Of customer installations to the extra high voltage network (TCR extra high voltage)
- **DIN V VDE V 0126-1-1:** Automatic disconnection device between a generator and the public low-voltage grid.
- **Technical Guidelines for Power Generating Units and Systems PART 3 (TG 3):** Determination of the Electrical Characteristics of Power Generating Units and Systems in Medium-, High- and Extra-High Voltage Grids; Revision 25; Dated 01/09/2018
- **Technical Guidelines for Power Generating Units and Systems PART 4 (TG 4):** Demands on Modelling and Validating Simulation Models of the Electrical Characteristics of Power Generating Units and Systems; Revision 09; Dated 01/02/2019
- **Technical Guidelines for Power Generating Units, Systems and Storage Systems as well as for their Components PART 8 (TG 8):** Certification of the Electrical Characteristics of Power Generating Units, Systems and Storage Systems as well as their Components on the Grid; Revision 09; Dated 01/02/2019

Grid Connection Reference Standards for ESS according the different countries

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Grid code

Philippines:

- **Philippine grid code 2016**

India:

- **CEA 2019:** Central Electricity Authority (CEA) notification 2019
- **Indian Electricity Grid Code**

Jordan:

- **IRR-DCC-MV:2015:** IRR-DCC-MV:2015 Intermittent Renewable Resources (Wind and PV) distribution Connection Code (DCC) at Medium Voltage (MV)
- **IRR-TIC:2014:** Intermittent Renewable Resources (IRR) Transmission Interconnection Code (TIC)

Portugal:

- **AMBIENTE E AÇÃO CLIMÁTICA 73/2020:** Requisitos não exaustivos para ligação dos módulos geradores à Rede Elétrica de Serviço Público.

Grid Connection Reference Standards for ESS according the different countries

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Grid code

Spain:

- **Real Decreto 244/2019:** de 5 de abril, por el que se regulan las condiciones administrativas, técnicas y económicas del autoconsumo de energía eléctrica.
- **UNE 217001:2020:** Ensayos para sistemas que eviten el vertido de energía a la red de distribución.
- **UNE 206007-1:2013:** Requisitos de conexión a la red eléctrica. parte 1: inversores para conexión a la red de distribución.
- **UNE 206007-2 IN:** Requisitos de conexión a la red eléctrica. Parte 2: Requisitos relativos a la seguridad del sistema para instalaciones constituidas por inversores.
- **UNE 217002:2020:** Inversores para conexión a la red de distribución. ensayos de los requisitos de inyección de corriente continua a la red, generación de sobretensiones y sistema de detección de funcionamiento en isla.
- **UNE-EN 60601-1:2006/A1:2013:** Equipos electromédicos. Parte 1: Requisitos generales para la seguridad básica y funcionamiento esencial.

Grid Connection Reference Standards for ESS according the different countries

CERE is accredited as Certification Body and Testing Laboratory according the following standards:

Grid code

France:

- **Guide pratique UTE C 15-712-1:2013:** Installations photovoltaïques connectées au réseau public de distribution.
- **Arrêté du 9 juin 2020:** relatif aux prescriptions techniques de conception et de fonctionnement pour le raccordement aux réseaux d'électricité.

Italy:

- **CEI 0-16. 04-2019:** Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica.
- **CEI 0-21 2019:** Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica.

Thailand:

- **PEA** (Provincial Electricity Authority) Regulation on the Power Network System Interconnection Code: 2016
- **MEA** (Metropolitan Electricity Authority) Grid-connected Inverter Regulation: 2013

Grid Connection Reference Standards for ESS according the different countries

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Grid code

United Kingdom:

- **ENA-EREC G99:** Engineering recommendation. 16.05.2018. Requirements for the connection of generation equipment in parallel with public distribution networks on or after 17 May 2019.
- **ENA-EREC G98:** Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019
- **ENA-EREC G59:** Recommendations for the Connection of Generating Plant to the Distribution Systems of Licensed Distribution Network Operators.
- **ENA-EREC G83:** Recommendations for the Connection of type tested Small-scale Embedded Generator (Up to 16A per Phase) in Parallel with Low-Voltage Distribution System.

Kenya:

- **Kenya Electricity Grid Code**
- **Official Gazette Communiqué - Number 28783:** Communiqué on implementation of the regulation related with unlicensed electricity generation in electricity market.

Grid Connection Reference Standards for ESS according the different countries

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Grid code

Malasya:

- **MS 1837:2015:** installation of grid-connected photovoltaic (PV) system.

Brazil:

- **NDU 013:2019:** Critérios para a Conexão em Baixa Tensão de Acessantes de Geração Distribuída ao Sistema de Distribuição.
- **NDU 015:2012:** critérios para a conexão de acessantes de geração distribuída ao sistema de distribuição da energia- conexão em média tensão.
- **ABNT NBR 16149:2013:** Sistemas fotovoltaicos (FV) – Características da interface de conexão com a rede elétrica de distribuição.
- **ABNT NBR 16150:2013:** Sistemas fotovoltaicos (FV) – Características da interface de conexão com a rede elétrica de distribuição - Procedimento de ensaio de conformidade.
- **INMETRO ordinances 004/2011:** Portaria nº004/2011
- **INMETRO ordinances 357/2014:** Portaria nº 357/2014

Grid Connection Reference Standards for ESS according the different countries

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Grid code

Peru:

- **COES SINAC:2013:** Procedimiento técnico del comité de operación económica del SEIN. Aprobado mediante Resolución OSINERGMIN N°035-2013-OS/CD.

Belguim:

- **C10/11:2019:** Specific technical prescriptions regarding power-generating plants operating in parallel to the distribution network.

Egypt:

- **Egyptian Transmission Grid Code:2017:** Solar Energy Plants Grid Connection Code.
- **Egyptian Transmission Grid Code:2014:** Wind Farm Grid Connection Code.

Panama:

- **Código de Redes fotovoltaico, Resolución NA No.8774-elec:2015:** normas técnicas, operativas y de calidad, para la conexión de los sistemas de centrales solares y centrales solares con tecnología fotovoltaica al sistema interconectado nacional (sin).

Grid Connection Reference Standards for ESS according the different countries

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Grid code

Chile:

- **NTCO:2019:** norma técnica de conexión y operación de PMGD en instalaciones de media tensión.
- **NTSyCS:2020:** norma técnica de seguridad y calidad de servicio.

Nigeria:

- **Nigerian Grid Code 2014:** The Grid Code and guidelines shall be called the Grid Code for the Electricity Industry of Nigeria.

Mexico:

- **CRE-3025:** manual regulatorio de planeación del sistema eléctrico nacional.

Romania:

- **ORDIR 30/2013:** Technical conditions for connection to power grids of public interest for photovoltaic power plants.

Grid Connection Reference Standards for ESS according the different countries

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Grid code

South Africa:

- **RPPS:2019:** Grid connection code for Renewable Power Plants (RPPS) connected to the electricity transmission system (TS) or the distribution system (DS) in South Africa.
- **NRS 097-2-1:2010 ed.2:** Grid interconnection of embedded generation Part 2: Small-scale embedded generation.

Morocco:

- **Moroccan Grid Code:2014:** Conditions de raccordement des éoliennes et parcs solaires a base de PV au réseau national de transport.

Dubai:

- **DEWA:2016:** standards for distributed renewable resources generators connected to the distribution network.

Grid Connection Reference Standards for ESS according the different countries

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Grid code

Austria:

- **TOR Erzeuger:** Anschluss und Parallelbetrieb von Stromerzeugungsanlagen des Typs A und von Kleinsterzeugungsanlagen. Version 1.1
- **TOR Erzeuger:** Anschluss und Parallelbetrieb von Stromerzeugungsanlagen des Typs B. Version 1.1

Australia:

- **AS/NZS 4777.2:2015:** Grid connection of energy systems via inverters Part 2: Inverter requirements
- **AS/NZS 4777.3:2005:** Grid connection of energy systems via inverters – Grid protection requirements
- **AS/NZS 3100:2009 + amd2:2012:** Approval and test specification – General requirements for electrical equipment

Grid Connection Reference Standards for ESS according the different countries

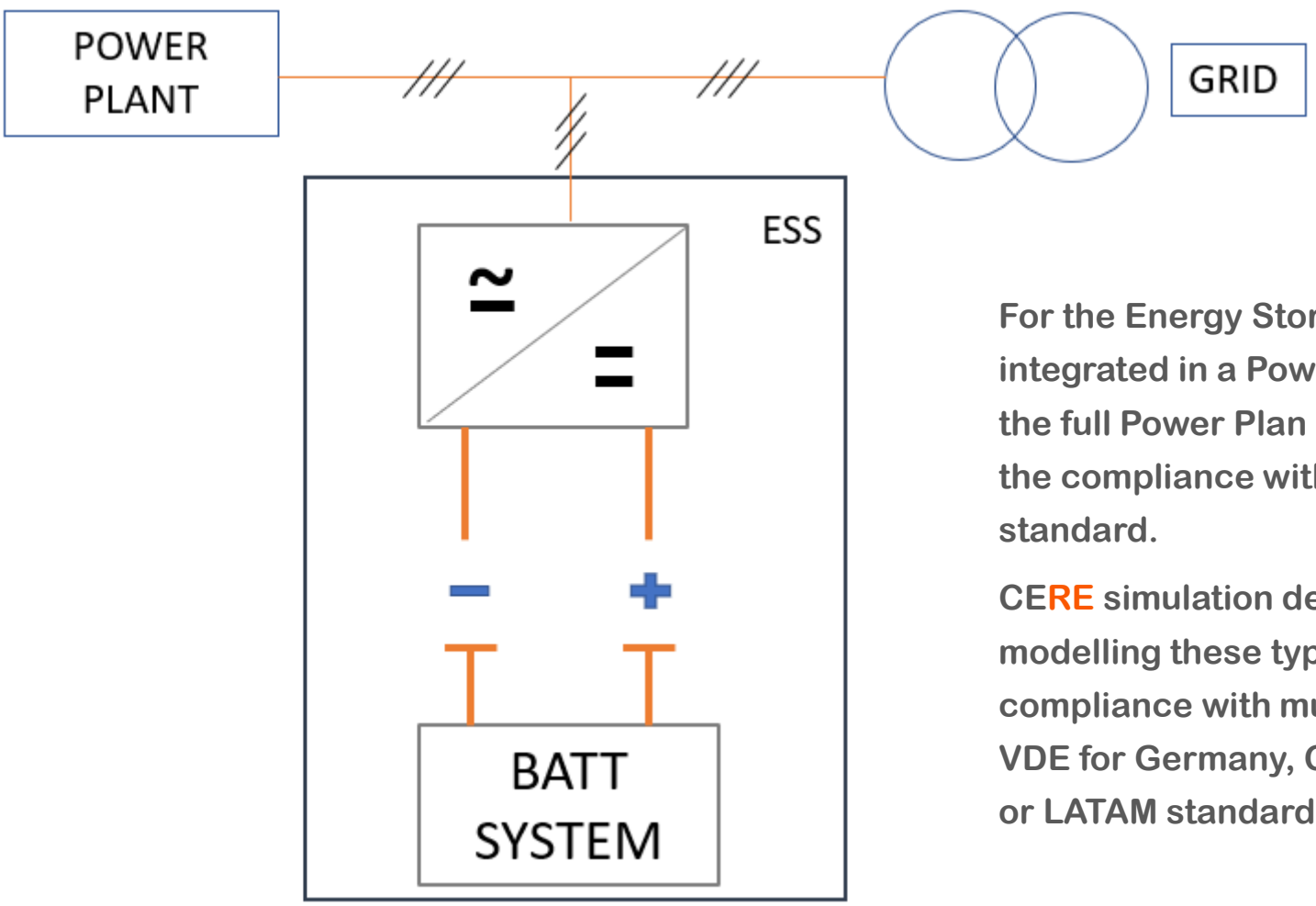
CERE is accredited as Certification Body and Testing Laboratory according the following standards:

USA

Grid Code:

- **UL 9540: 2020:** Standard for Safety Energy Storage Systems and Equipment.
- **IEEE Std 1547.1-2020:** IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces
- **Electric Rule 21:** generating facility interconnections.

Full Power Plan including ESS compliance



For the Energy Storage System certification integrated in a Power Plan it is necessary to model the full Power Plan including the ESS and simulate the compliance with the Grid Connection applicable standard.

CERE simulation department has a large experience modelling these type of installations and fulfilling compliance with multiple Grid Code worldwide as VDE for Germany, CEI for Italy, Australian standards or LATAM standards.



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