मानकः पथप्रदर्शकः

COMPENDIUM OF INDIAN STANDARDS ON

ELECTRICAL ENERGY STORAGE SYSTEMS

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Introduction

Electrical Energy Storage Systems (EESS) play a pivotal role in enhancing the resilience, flexibility, and sustainability of modern power systems. These systems not only provide solutions for energy balancing, grid stability, and peak load management but also support the integration of renewable energy sources. In a rapidly evolving energy landscape, standardization ensures compatibility, safety, performance, and environmental compliance across various storage technologies. This compendium provides a consolidated reference to the Indian Standards developed under BIS for EESS, especially focusing on system-level aspects, safety, environmental impact, and performance.

Following are the scope and key features of each Indian standard relevant to Electrical energy storage systems:

IS 17067 (Part 1): 2018 — Vocabulary

This standard establishes a unified terminology for Electrical Energy Storage Systems (EESS), forming the linguistic foundation necessary for technical development, regulatory compliance, and industry-wide communication. It defines key terms relevant to various storage technologies and system operations, especially focusing on grid-connected systems that both absorb and discharge electricity. The vocabulary standard ensures consistency in documentation, design processes, and performance discussions within the sector.

By offering technology-agnostic terminology, the standard caters to all types of EESS, including electrochemical, mechanical, and thermal systems. It covers definitions related to components, charging and discharging processes, and energy conversion, emphasizing a system-level approach. As a base document, it also supports other standards by providing a common language, making it indispensable for future references in safety, testing, and environmental assessment.

IS 17067 (Part 2/Sec 1): 2019 — Unit Parameters and Testing Methods

This part of the standard outlines the essential unit parameters and standardized testing methodologies for evaluating the performance of EESS. It ensures consistency and comparability across different energy storage technologies by specifying key parameters such as capacity, efficiency, and response time. The standard aligns with international norms (IEC 62933-2-1:2017), enhancing compatibility in global markets and improving benchmarking practices.

Moreover, it provides clear instructions for conducting performance and reliability tests under diverse environmental conditions. It also introduces structured data reporting guidelines, promoting transparency and traceability of test outcomes. Safety elements are woven into the testing framework, ensuring that operational evaluations account for risk factors. Ultimately, this standard helps manufacturers, regulators, and end-users better understand and trust EESS capabilities.

IS 17067 (Part 4/Sec 1): 2019 — Environmental Issues

This standard addresses the environmental implications of EESS throughout their entire lifecycle—from production and operation to decommissioning and disposal. It encourages adopting a holistic environmental impact assessment framework to identify adverse effects associated with material usage, emissions, and end-of-life disposal. Key focus areas include sustainable resource utilization, emissions reduction, and minimizing ecological footprints.

The document also suggests best practices for sustainable design, advocating for recyclable materials, energy-efficient production methods, and lifecycle analysis. Environmental compliance is another major element, ensuring EESS products meet applicable local and international environmental regulations. Through continuous monitoring and reporting of environmental metrics, the standard promotes ecological accountability and sustainable innovation in the energy storage sector.

IS 17067 (Part 5/Sec 2): 2021 — Safety Requirements for Grid-Integrated Electrochemical EES

This standard defines safety criteria for electrochemical-based EESS systems that are integrated into the electrical grid. It aligns with international safety norms (IEC 62933-5-2:2020) and focuses on the design, installation, operation, and maintenance of such systems to prevent incidents like thermal runaway, electrical faults, and chemical hazards. It ensures that risks are addressed systematically at every stage of deployment.

It also elaborates on protective measures, emergency procedures, and grid interface requirements to safeguard both infrastructure and personnel. Emphasis is placed on maintaining synchronization with the grid and fault management during disturbances. The inclusion of rigorous inspection and maintenance practices further strengthens system reliability and operational safety, making the standard essential for urban and utility-scale deployments.

IS 17092: 2019 — General Safety Requirements for EES

This general standard covers safety principles for all types of EESS, irrespective of their energy storage technology. It provides broad-based guidelines that include design safeguards, fault protection mechanisms, and thermal management systems to ensure safe operation across varied applications. The standard aims to reduce the risk of electrical and thermal incidents through well-documented safety features.

Additionally, it prescribes installation best practices and maintenance protocols that minimize operational hazards. Regular inspections, emergency readiness, and compliance with testing requirements form the backbone of this document. Its cross-cutting scope makes it a critical reference point for manufacturers, integrators, and facility operators aiming to ensure reliable and secure energy storage operations.

IS 17387: 2020 — Safety and Performance of Battery Management Systems (BMS)

This standard sets out the functional and safety requirements for Battery Management Systems used within EESS. It outlines critical BMS responsibilities such as state-of-charge estimation, cell balancing, fault detection, and temperature regulation. These functionalities are essential for maintaining the safety, performance, and longevity of battery systems, especially under variable load and environmental conditions.

The standard also details testing methodologies to evaluate the robustness and accuracy of BMS components. Safety protocols to prevent overcharging, deep discharging, and thermal events are integral to the document. Furthermore, it specifies requirements for data logging and communication protocols, ensuring seamless interaction between the BMS and other subsystems. By regulating these control units, the standard ensures safe and intelligent operation of modern battery-based energy storage systems.