



NECA 416-2016

Recommended Practice for Installing

Energy Storage Systems (ESS)

AN AMERICAN NATIONAL STANDARD



Published by
National Electrical Contractors Association

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(This foreword is not a part of the standard)

Foreword

National Electrical Installation Standards™ are designed to improve communication among specifiers, purchasers, and suppliers of electrical construction services. They define a minimum baseline of quality and workmanship for installing electrical products and systems. *NEIS*® are intended to be referenced in contract documents for electrical construction projects. The following language is recommended:

Energy Storage Systems (ESS), including battery systems, flywheels, ultra-capacitors, and smart chargers for electric vehicle (EV) vehicle-to-grid (V2G) applications, shall be installed in accordance NECA 416, *Recommended Practice for Installing Energy Storage Systems (ESS)* (ANSI).

Use of *NEIS* is voluntary, and the National Electrical Contractors Association (NECA) assumes no obligation or liability to users of this publication. Existence of a standard shall not preclude any member or non-member of NECA from specifying or using alternate construction methods permitted by applicable regulations.

This publication is intended to comply with the National Electrical Code (NEC). Because they are quality standards, *NEIS* may in some instances go beyond the minimum safety requirements of the NEC. It is the responsibility of users of this publication to comply with state and local electrical codes and Federal and state OSHA safety regulations as well as follow manufacturers' installation instructions when installing electrical products and systems.

Suggestions for revisions and improvements to this standard are welcome. They should be addressed to:

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1. Scope

This Recommended Practice describes installation practices for Energy Storage Systems (ESS) such as battery systems, flywheels, ultra-capacitors, and smart chargers used for electric vehicle (EV) vehicle-to-grid (V2G) applications.

1.1 Products and Applications Included

Products and applications that are covered by this Recommended Practice include:

- Battery systems
- Flywheels
- Ultra-Capacitors
- Electric vehicle (EV) smart charger vehicle-to-grid (V2G) applications

While Compressed Air Energy Storage (CAES), Pumped Hydro Storage (PHS), and Thermal Energy Storage (TES) are not covered by this Recommended Practice (see Section 1.2), electrical equipment and components for use in CAES, PHS, and TES should be installed in accordance with this Recommended Practice.

1.2 Products and Applications Excluded

Products and applications that are not covered by this Recommended Practice, but that are discussed in informational Annexes, include:

- Compressed Air Energy Storage (CAES)
- Pumped Hydro Storage (PHS)
- Thermal Energy Storage (TES)

Electrical energy can be used to create hydrogen that can be stored for later use. Hydrogen is considered to be fuel rather than means of energy storage. As such, hydrogen is not covered by this Recommended Practice.

Additionally, Superconducting Magnetic Energy Storage (SMES) is not covered by this Recommended Practice due to the extremely short discharge time and limited energy capacity that restricts its application to power quality applications only, and not to longer-duration energy storage applications.

1.3 Regulatory and Other Requirements

All information in this publication is intended to conform to the NEC (ANSI/NFPA 70). Installers shall follow the NEC, applicable state and local codes, manufacturer's instructions, and contract documents when installing Energy Storage Systems (ESS).

Only qualified persons as defined in the NEC familiar with the construction and installation of Energy Storage Systems (ESS) and ESS devices and system components shall perform the technical work described in this publication. Administrative functions such as receiving, handling and storing, and other tasks may be performed under the supervision of a qualified person. All work shall be performed in accordance with NFPA 70E, *Standard for Electrical Safety in the Workplace*.

General requirements for installing electrical products and systems are described in NECA 1, *Standard for Good Workmanship in Electrical Construction* (ANSI). Other NEIS provide additional guidance for installing particular types of electrical products and systems. A complete list of NEIS is provided in Annex F.

1.4 Mandatory Requirements, Permissive Requirements, Quality and Performance Recommendations, Explanatory Material, and Informative Annexes

Mandatory requirements in manufacturer's instructions, or of Codes or other mandatory