NECA 407-2015

Standard for

Installing and Maintaining Panelboards
NOTICE OF COPYRIGHT

This document is copyrighted by NECA

Reproduction of these documents either in hard copy or soft (including posting on the web) is prohibited without copyright permission. For copyright permission to reproduce portions of this document, please contact NECA Standards & Safety at (301) 657-3110 ext. 546, or send a fax to (301) 215-4500.

OR

National Electrical Contractors Association
3 Bethesda Metro Center, Suite 1100
Bethesda, Maryland 20814
(301) 657-3110
# Table of Contents

**Foreword**

1. **Scope**
   - 1.1 Products and Applications Included
   - 1.2 Products and Applications Excluded
   - 1.3 Regulatory and Other Requirements
   - 1.4 Mandatory Requirements, Permissive Requirements, Quality and Performance Recommendations, Explanatory Material, and Informative Annexes

2. **Definitions**

3. **Safety Procedures**
   - 3.1 General
   - 3.2 Safe Work Practices
   - 3.3 Personal Protective Equipment (PPE)
   - 3.4 De-Energizing Electrical Equipment

4. **Receiving, Inspecting, Handling and Storage**
   - 4.1 Receiving
   - 4.2 Inspection
   - 4.3 Handling
   - 4.4 Storage

5. **Installation**
   - 5.1 General
   - 5.2 Environmental Considerations
   - 5.3 Installation of Cabinets
   - 5.4 Installation of Raceways and Cables
   - 5.5 Installation of Panelboards
   - 5.6 Installation of Conductors
   - 5.7 Grounding and Bonding
   - 5.8 Accessories
   - 5.9 Panelboard Pre-Checks

6. **Cleaning, Testing, and Commissioning**
   - 6.1 Cleaning
   - 6.2 Inspections
   - 6.3 Acceptance Testing
   - 6.4 Installation of the Front Cover
   - 6.5 Energizing Panelboards
NECA 407 Standard for Installing and Maintaining Panelboards

6.6 Balancing Loads ................................................................. 15

7. Closeout ................................................................................ 17
7.1 Test Data and Manuals ................................................................ 17
7.2 Training ............................................................................... 17
7.3 Spare Parts and Special Tools ................................................. 17

8. Inspections and Maintenance .................................................. 18
8.1 Frequency of Inspections and Maintenance ........................ 18
8.2 Record Keeping ..................................................................... 18
8.3 Routine Inspections .............................................................. 18
8.4 Cleaning .............................................................................. 19
8.5 Infrared Scan ....................................................................... 19
8.6 Inspections .......................................................................... 19
8.7 Terminations, Connections, and Lugs ................................. 20
8.8 Conductors and Raceways .................................................. 20
8.9 Switches ............................................................................ 20
8.10 Circuit Breakers ................................................................. 21
8.11 Electrical Tests ................................................................... 22
8.12 Re-energizing Panelboards ................................................ 22

9. Inspection and Re-Energization After Adverse Operating Conditions ........................................... 23
9.1 Inspection and Testing Following a Short-Circuit or Ground-Fault .............................................. 23
9.2 Panelboards Soaked By or Submersed Under Water ................................................................. 23

10. Testing Procedures .................................................................. 25
10.1 Insulation Resistance Testing ............................................... 25
10.2 Ground Resistance Testing .................................................. 25
10.3 Primary Current Injection Testing of Circuit Breakers (Optional) ........................................ 25
10.4 Infrared Scan .................................................................... 26

Annex A: Reference Standards ................................................ 27
National Electrical Installation Standards (NEIS) 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:

Panelboards shall be installed and maintained in accordance with NECA 407-2015, Standard for Installing and Maintaining Panelboards (ANSI).

Use of NEIS is voluntary, and the National Electrical Contractors Association 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:

NECA Codes and Standards
3 Bethesda Metro Center, Suite 1100
Bethesda, MD  20814
(301) 657-3110
(301) 215-4500 fax
www.neca-neis.org
neis@necanet.org

To purchase National Electrical Installation Standards, contact the NECA Order Desk at (301) 215-4504 tel, (301) 215-4500 fax, or orderdesk@necanet.org. NEIS can also be purchased in .pdf download format from www.neca-neis.org/standards
download format from www.neca-neis.org/standards

Copyright © 2015, National Electrical Contractors Association. All rights reserved. Unauthorized reproduction prohibited.

National Electrical Installation Standards, NEIS, and the NEIS logo are registered trademarks of the National Electrical Contractors Association. National Electrical Code and NEC are registered trademarks of the National Fire Protection Association, Quincy, MA.
1. Scope

1.1 Products and Applications Included
This standard describes installation and maintenance procedures for panelboards, and special procedures used after adverse operating conditions such as a short-circuit, ground-fault, or immersion in water.

This standard applies to panelboards rated 600 Volts (AC and DC) or less, with main disconnects or lugs, and with feeder or branch circuit overcurrent devices.

This publication applies to single panelboards and multi-section panelboards that are installed in the field and used for distributing power for commercial, institutional, and industrial loads in nonhazardous locations both indoors and outdoors.

1.2 Products and Applications Excluded
This publication does not apply to panelboards that are factory-installed as part of a Listed enclosure or assembly, live-front panelboards, or panelboards employing cast enclosures for hazardous or special service conditions.

1.3 Regulatory and Other Requirements
All information in this publication is intended to conform to the National Electrical Code, NEC (ANSI/NFPA 70). Installers shall follow the NEC, applicable state and local codes, manufacturer’s instructions, and contract documents when installing panelboards.

Only qualified persons as defined in the NEC familiar with the construction and installation of panelboards shall perform the technical work described in this publication. Administrative functions such as receiving, handling and storing required in Section 4, 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 A.

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

Mandatory Requirements. Mandatory requirements in manufacturer’s instructions, or of Codes or other mandatory Standards that may or not be adopted into law, are those that identify actions that are specifically required or prohibited and are characterized by the use of the terms must or must not, shall or shall not, or by the use of positive phrasing of mandatory requirements. Examples of mandatory requirements may equally take the form of, “equipment must be protected . . .,” “equipment shall be protected . . .,” or “protect equipment . . .,” with the latter interpreted (understood) as “(it is necessary to) protect equipment . . .”

Permissive Requirements. Permissive requirements of manufacturer’s instructions, or of Codes or other mandatory Standards that may or not be adopted into law, are those that identify actions that are allowed but not required, are normally used to describe options or alternative means and methods, and are characterized in this Standard by the use of