

NECA/NCSCB 600-2020

Standard for

Installing and Maintaining Medium-Voltage Cable

**An American
National Standard**



Published by
National Electrical
Contractors Association



Jointly developed with
National Cable Splicing
Certification Board (NCSCB)



Revision History	
NECA/MACSCB 600-2003	02/2003
NECA/NCSCB 600-2014	08/2014
NECA/NCSCB 600-2020	03/2020

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) 215-4549, or send a fax to (301) 215-4500.

CP

National Electrical Contractors Association
1201 Pennsylvania Ave. NW, Suite 1200
Washington, D.C. 20004
202-991-6300 • 202-217-4171 fax

Table of Contents

- Foreword..... iii**
- 1. Scope 1**
 - 1.1 Products and Applications Included 1
 - 1.2 Products and Applications Excluded 1
 - 1.3 Regulatory and Other Requirements 1
- 2. Definitions 2**
- 3. Safety 5**
 - 3.1 General 5
 - 3.2 Safe Work Practices 5
 - 3.3 De-energizing Electrical Equipment 6
 - 3.4 Excavations 7
- 4. Delivery, Handling, and Storage 8**
 - 4.1 Delivery 8
 - 4.2 Handling 8
 - 4.3 Storage 8
- 5. Installation 10**
 - 5.1 General 10
 - 5.2 Preparing Conduits and Ducts prior to Installing Cables 10
 - 5.3 Cable Supports 11
 - 5.4 Cable Bending Radius 11
 - 5.5 Transitions 11
 - 5.6 Cable Pulling Lubricants 12
 - 5.7 Pulling Cables 12
 - 5.8 Manholes 13
 - 5.9 Direct Burial 13
 - 5.10 Training Cables 15
- 6. Splices and Terminations 16**
 - 6.1 General 16
 - 6.2 Preparing the Work Area 17
 - 6.3 Nonmetallic Underground Conduit with Conductors (NUCC) 17
 - 6.4 Preparing Cables 17
 - 6.5 Installing Connectors 18
 - 6.6 Insulating Connectors and Terminations 18
 - 6.7 Shielding and Grounding 19
 - 6.8 Cable Jacketing 19

7. Completing Installation.....	20
7.1 Grounding and Bonding	20
7.2 Cable Identification	20
7.3 Fireproofing Cables	20
7.4 Preliminary Testing	21
8. Testing and Commissioning.....	22
8.1 Visual Inspections	22
8.2 Electrical Testing	22
8.3 Energizing Cables	23
8.4 Phasing	23
8.5 Infrared Testing	23
9. Maintenance	24
9.1 General	24
9.2 Routine Inspections and Maintenance	24
9.3 Major Inspections and Maintenance	24
9.4 Maintenance Testing.....	25
9.5 Energizing Cables	26
10. Testing Procedures	27
10.1 General	27
10.2 Insulation Resistance Testing	27
10.3 High-Potential Acceptance Testing (DC High Potential and Very Low Frequency (VLF) AC High Potential Testing).....	27
10.4 Tan-Delta (Dissipation Factor) Testing Using Very Low Frequency (VLF) Test Set	31
10.5 Partial Discharge Testing	31
10.6 Infrared Testing	32
11. Unusual Operating Conditions	33
11.1 Short Circuit or Ground Fault	33
11.2 Cable Faults	33
Annex A: Cable Splicer Certification Programs	35
Annex B: Reference Standards	36

(This foreword is not a part of the standard)

Foreword

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:

Install and maintain medium-voltage cable in accordance with NECA 600-2020, *Standard for Installing and Maintaining Medium-Voltage Cable* (ANSI).

Use of *NEIS* is voluntary, and the National Electrical Contractors Association (NECA) and the Mid-Atlantic Cable Splicing Certification Board (NCSCB) assumes no obligation or liability to users of this publication. Existence of a standard shall not preclude any member or non-member of NECA or NCSCB 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 when installing electrical products and systems.

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

NECA Standards & Safety
1201 Pennsylvania Ave. NW, Suite 1200
Washington, D.C. 20004
(202) 991-6300 telephone
(202) 217-4171 fax
www.neca-neis.org
www.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 format at www.neca-neis.org/standards.

Copyright© 2020, National Electrical Contractors Association. All rights reserved. Unauthorized reproduction prohibited.

Jointly developed with the National Cable Splicing Certification Board (NCSCB).

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 procedures for shielded and non-shielded solid-dielectric medium-voltage cables rated from 2001 Volts to 35,000 Volts AC and installed in conduits or ducts, or direct-buried. This publication applies to single- and multi-conductor cables used for distributing power for commercial, institutional, and industrial loads in nonhazardous locations both indoors and outdoors.

This Standard also covers periodic routine maintenance and troubleshooting procedures for medium-voltage cable, and special procedures used after adverse operating conditions such as a short circuit or ground-fault.

1.2 Products and Applications Excluded

This publication does not apply to the following:

1. Paper Insulated Lead Cable (PILC).
2. Fluid- or gas-filled cable.
3. Overhead cable.
4. Messenger supported cable.
5. Exposed cable.
6. Cable installed in cable trays.
7. Cable installed in hazardous locations.

1.3 Regulatory and Other Requirements

All information in this publication is intended to conform to the National Electrical Code® (ANSI/NFPA Standard 70). Installers shall always follow the NEC®, applicable State and local codes, and manufacturer's instruction when installing electrical equipment and systems.

Only qualified persons as defined in the NEC familiar with the construction and installation of electrical power distribution and control systems and equipment shall perform the technical work described in this publication. Administrative functions and other tasks can 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 1-2010, Standard Practices for Good Workmanship in Electrical Construction (ANSI). Other National Electrical Installation Standards provide additional guidance for installing particular types of electrical products and systems. A complete list of NEIS is provided in Annex B.