

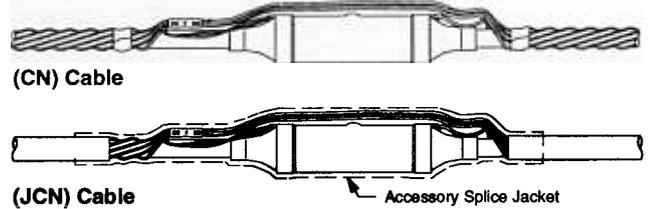
3M

Quick Splice II

5451A

25/28 kV Molded Rubber Inline Splicing Kit

Data Sheet



1. Product Description

The 3M™ 5451A Quick Splice II is a 25/28 kV class inline splice designed for joining concentric neutral (CN) and jacketed concentric neutral (JCN) distribution class power cables. The splice is a one-piece molded design made of specially formulated, peroxide cured EPDM rubbers. Each splice is production tested on CN cable to ensure reliability. The splice is designed for use with special CI-series Inline Compression Connectors, for connecting either aluminum or copper conductors. The 5451A Quick Splice II splice meets the 25 kV voltage rating requirements of ANSI/IEEE Std. 404-1986.

Kit Contents:

- 1 Molded Rubber Splice Body
- 2 Packets of Silicone Grease
- 1 Template
- 1 Instruction Sheet

Splice Features:

- One-piece design, for simple installation
- Production tested, partial discharge and alternating current withstand, for long term reliability
- Peroxide cured EPDM rubber construction, for long term elastic memory (sealing) and easy installation
- Computer designed, for compact size and optimal distribution of the electrical field
- Direct contact between insulation shields, for complete shield continuity between splice and cables
- Visual reference of splice positioning, for accurate inspection of installation

2. Applications

To splice 25 kV and 28 kV class distribution cables:

- For inline splicing
- For concentric neutral (CN) cables
- For jacketed concentric neutral (JCN) cables, when used with an accessory splice jacket (e.g., 3M SJ-2A or HSJ-2 Jacket Kit)
- For insulation diameter sizes of 0.905" to 1.055" (23,0 to 26,8 mm)
- For use with 3M CI-A and CI-840 Series Connectors (Al/Cu)
- For direct burial installations
- For aerial installations
- For submerged locations

3. Data: Physical and Electrical Properties

The 3M 5451A Quick Splice II can be used on distribution class cables with a rated operating temperature of 90°C, and an emergency overload rating of 130°C. Splices made with this kit are rated for 25 kV and 28 kV and meet the 25 kV rating requirements of ANSI/IEEE Std. 404-1986, "IEEE Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5000 V through 46,000 V." The current rating of the splice meets or exceeds the current rating for the cables on which it is installed. BIL rating of splice is 200 kV.

Special 3M CI-A and CI-840 Series connectors are used with the splice. They are crimped with a standard 5/8 die or 840 die, respectively. The connectors meet the requirements of ANSI C119.4-1986, "Connectors for Use Between Aluminum or Aluminum-Copper Overhead Conductors."

A. Selection Table

SPLICE AND CONNECTOR SELECTION TABLE

NOTE: Final determining factor is cable insulation diameter.

Kit Number	Cable Insulation (O.D. Range)	Conductor Size (AWG)	Cable Insulation Thickness (mils)	3M Connector Number *
5451A	0.905 – 1.055 in. (23,0 – 26,8 mm)	2 Stranded	295	CI-2A or CI-21-840
		1 Solid	295	CI-2A or CI-21-840
		1 Stranded	280 295	CI-1A or CI-21-840
		1/0 Solid	280 295	CI-1A or CI-21-840
		1/0 Stranded	260 280 295	CI-1/0A or CI-1/0-840
		2/0 Stranded	260 280	CI-2/0

Table 1

SPLICE KIT(WITH CONNECTOR INCLUDED) SELECTION TABLE

NOTE: Final determining factor is cable insulation diameter.

Kit Number (With Connector) *	Cable Insulation (O.D. Range)	Conductor Size (AWG)	Cable Insulation Thickness (mils)
5451A-CI-21-840	0.905 – 1.055 in. (23,0 – 26,8 mm)	2 or 1 Stranded 1 or 1/0 Solid	295
5451A-CI-1A	0.905 – 1.055 in. (23,0 – 26,8 mm)	1 Stranded 1/0 Solid	280 295
5451A-CI-1/0A	0.905 – 1.055 in. (23,0 – 26,8 mm)	1/0 Stranded	260 280 295
5451A-CI-1/0-840	0.905 – 1.055 in. (23,0 – 26,8 mm)	1/0 Stranded	260 280 295
5451A-CI-2/0	0.905 – 1.055 in. (23,0 – 26,8 mm)	2/0 Stranded	260 280

*Note: CI-A Series Connectors are sized for 5/8 crimping die;
CI-2/0 and CI-840 Series Connectors are sized for 840 crimping die.

Table 2

B. Typical Dimensions

Dimension		
A	B	C
12.43 in. (316 mm)	2.47 in. (63 mm)	0.78 in. (20 mm)

Table 3

C. Typical Physical and Electrical Properties

Insulating EPDM Rubber

Physical Properties

<u>Test Method</u>	<u>Typical Value*</u>
• Color	White
• Ultimate Elongation ASTM D 412	570% min.
• Ultimate Tensile Strength ASTM D 412	900 psi min. (6.21 MPa min.)
• Shore A Hardness ASTM D 2240	55
• Permanent Set (3M Test Method: 100% strain with 5 min. recovery)	25%
• Compression Set ASTM D 395, Method B	19%
• 100% Modulus ASTM D 412	185 psi (1.28 MPa)
• 300% Modulus ASTM D 412	650 psi (4.49 MPa)

Electrical Properties

<u>Test Method</u>	<u>Typical Value*</u>
• Dielectric Constant ASTM D 150 73°F (23°C) 194°F (90°C) 266°F (130°C)	2.71 2.58 2.56
• Dissipation Factor ASTM D 150 73°F (23°C) 194°F (90°C) 266°F (130°C)	0.4% 1.3% 4.7%
• Dielectric Strength ASTM D 149 25 mil thick slab 100 mil thick slab	1177 Volts/mil (46.4 MV/m) 518 Volts/mil (20.4 MV/m)
• 20 Days @ 96% RH and 194°F (90°C) 25 mil thick slab 100 mil thick slab	1066 Volts/mil (42.0 MV/m) 790 Volts/mil (31.1 MV/m)

Splice Jacket Semi-Conductive Rubber

Physical Properties

<u>Test Method</u>	<u>Typical Value*</u>
• Color	Black
• Ultimate Elongation ASTM D 412	300% min.
• Ultimate Tensile Strength ASTM D 412	1700 psi min. (11.7 MPa min.)
• Shore A Hardness ASTM D 2240	70
• Die C Tear ASTM D 624	225 lbs/in min. (39.4 KN/m min.)
• Permanent Set (3M Test Method TM 86A)	20% max.
• 100% Modulus ASTM D 412	400 psi (2.8 MPa)
• 300% Modulus ASTM D 412	1800 psi (12.4 MPa)
• Ozone Resistance (70 hrs., 150 ppm @ 20% strain)	No Cracking
• UV Resistance (70 hrs. @ 20% strain)	No Cracking

Electrical Properties

<u>Test Method</u>	<u>Typical Value*</u>
• Volume Resistivity (3M Test Method TM 80)	15.4 Ohm–inch max. (40 Ohm–cm max.)

* This data is not to be used for specification. Values listed are for typical properties and should not be considered minimum or maximum.

4. Specification

Product

(Open Specification)

The concentric neutral (CN) and jacketed concentric neutral (JCN) cable splice must meet the requirements of ANSI/ IEEE Std. 404–1986 for a 25 kV rating, and must be rated by the manufacturer for use on 25 kV and 28 kV distribution systems. It must be rated for continuous operation at 90°C, with an emergency overload temperature rating of 130°C. The splice shall be a one-piece, slip-on design made of molded peroxide cured EPDM rubber. It shall be rated for indoor, outdoor and direct burial applications.

Engineering/Architectural

(Closed Specification)

Splicing of all 25 kV and 28 kV rated concentric neutral (CN) and jacketed concentric neutral (JCN) cables shall be performed in accordance with the instructions provided with the 3M 5451A Quick Splice II Molded Rubber Splicing Kit. For JCN applications, the splice shall be sealed with an additional jacket installed in accordance with the instructions provided with the 3M SJ–2A Cold Shrink™ Jacket Kit.

5. Performance Tests

IEEE Std. 404–1986
25/28 kV Voltage Rating

Design Test and Sequence	Test Requirements	
	25 kV	28 kV*
Minimum Partial Discharge (Corona) Level (kV–rms @ <3 pC)	21.6	24.2
Alternating-Current 1 Minute Withstand (kV–rms)	52	58
Direct -Current 15 Minute Withstand (kV–dc)	100	112
Impulse Withstand (BIL) at 68°F (20°C) (kV–crest)	±150	±168
Impulse Withstand (BIL) at 266F (130C) (kV–crest)	±150	±168
Minimum Partial Discharge (Corona) Level (kV–rms @ <3 pC)	21.6	24.2
Cyclic Aging (kV–rms)	43	48
High Voltage Time		
5 Hour Alternating-Current Withstand (kV–rms)	52	58
1 Hour Alternating-Current Withstand (kV–rms)	78	87
Short-Time Current (sec.) (ICEA P–32–382 and ANSI/IEEE C37.09–1979)	0.17	0.17
Alternating-Current 1 Minute Withstand (kV–rms)	52	58
Shielding	IEEE Std. 592–1990	
Connector Thermal and Mechanical	ANSI/NEMA CC3–1978 and ANSI C119.4–1986	
Production Test	Test Requirements	
Production Units Tested (%)	100	
Minimum Partial Discharge (Corona) Level (kV–rms @ <3 pC)	24.2	
Alternating-Current 1 Minute Withstand (kV–rms)	58	

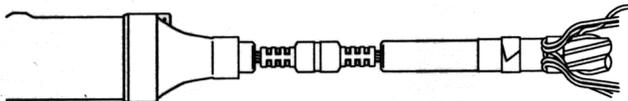
* NOTE: 28 kV test requirement values are extrapolated from standard IEEE 404–1986 values.

Table 4

6. Installation Techniques

Detailed Instructions for installing the 5451A Quick Splice II are included with each kit. The following is a brief summary of the installation steps required:

- a. Prepare cables using standard procedures.
- b. Lubricate cable insulation and semi-con jacket of one cable with silicone grease provided.
- c. Slide splice onto cable until conductor is exposed.
- d. Install CI–Connector.



- e. Slide splice into final position over connector, centering it between the ends of the cable semi-cons.



- f. Connect neutral wire, attaching one wire from each cable to the splice grounding eyes.



- g. JCN Cables Only: Install accessory splice jacket over splice and exposed neutral wires.



CABLE X

CABLE Y

7. Maintenance

Components of the 3M 5451A Quick Splice II Kit are stable under normal storage conditions. Normal stock rotation procedures are recommended. The splice can be field tested using normal field cable testing procedures (reference: ANSI/IEEE Std. 400, "Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field)."

8. Availability

3M 5451A Quick Splice II Kits are available to splice 25/28 kV CN and JCN distribution class cables. They are available in five kits with the special CI-Connector included. It is also available as a kit without a connector, where the special CI-Connector must be ordered separately. These kits are available from your local authorized 3M electrical distributor.

Important Notice to Purchaser:

All statements, technical information and recommendations related to the Seller's products are based on information believed to be reliable, but the accuracy or completeness thereof is not guaranteed. Before utilizing the product, the user should determine the suitability of the product for its intended use. The user assumes all risks and liability whatsoever in connection with such use.

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Electrical Products Division

6801 River Place Blvd.
Austin, TX 78726-9000



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