



# Industrial Quick Splice Inline Splicing Kits

## 5500 Series

### Data Sheet

---



### 1. Product Description

3M™ Industrial Quick Splice 5500 Series are premolded 15 kV class splices for splicing solid dielectric insulated, shielded cables. They will accommodate ribbon, wire shielded and UniShield® cables. The kits will handle 15 kV rated cable with 175 or 220 mils of insulation, copper or aluminum, stranded or solid conductors, from 2 AWG through 750 kcmil. Special CI Series compression connectors must be used.

#### Kit Contents:

Each kit contains sufficient quantity of the following materials to make one splice.

- 1 Molded Rubber Splice Body
- 2 Molded Rubber End Caps  
(for 5503, 5504 and 5505 only)
- 1 Shield continuity Assembly
- 1 Shield Clamp
- 2 Cold Shrink™ End Seals
- 1 Mastic Sealing Strip
- 2 Strips Scotch™ 24 Shielding Tape
- 1 Roll Scotch™ 13 Semi-Con Tape
- 1 Roll Scotch™ 35 Vinyl Tape
- 2 Tubes Silicone Grease in 5501 and 5502  
(three in 5503, 5504 and 5505)
- 1 Solvent Saturated Cleaning Pad
- 1 Plastic Glove
- 1 Instruction Sheet

**NOTE: A 3M CI Series connector is required with each splice. It is not included in the kit and must be ordered separately.**

#### Features:

Complete kit available on distributor's shelf.

No soldering required.

Minimum amount of taping.

No special tools required to install.

Factory tested splices.

Peroxide cured EPDM rubber, assures splice life equal to the cable.

Immediately energizable.

Fits 15 kV class cable from 2 AWG – 750 kcmil.

Computer generated stress plots shows outstanding electrical properties of complete splice (*see section on Stress Control*).

100% factory tested.

Shield Continuity Assembly results in fast, easy, effective continuation of shield across splice body.

#### Stress Control

Splicing of a high voltage cable is primarily rebuilding the portions of the cable which were removed or cut. These portions consist of three major areas:

- a) Conductor
- b) Insulation
- c) Shielding System

A function of utmost importance of all splices is that of controlling the electrical stresses within the splice's insulation.

The figures following show the stresses existing around two energized cables. *Figure 1* and *Figure 2* on *page 2* show, respectively, the stress concentrations near the shield ends of two cables prepared for splicing, and stress concentrations in the insulating rubber of the splice. The closer the equipotential lines are together in the drawings, the greater the stress concentration in that area.

By geometrically controlling the electrical field in the 5500 Series splice, the stress concentrations are reduced from several hundred volts per mil (as shown in *Figure 1* at the end of the Cable's shields on *page 2*) to values found in continuous cable – usually less than 50 volts per mil at rated cable voltage.

These mappings of such fields in cable splices and in the region around them can be accomplished readily, and with good accuracy, by the use of an electrolytic tank with digital computer computations.

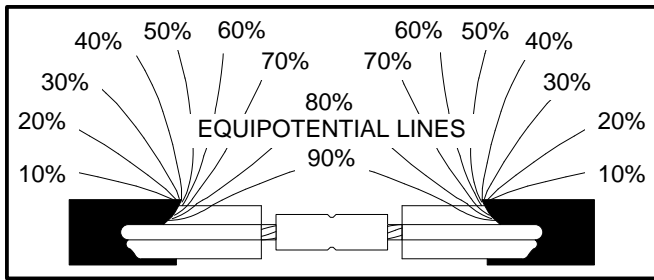


Figure 1

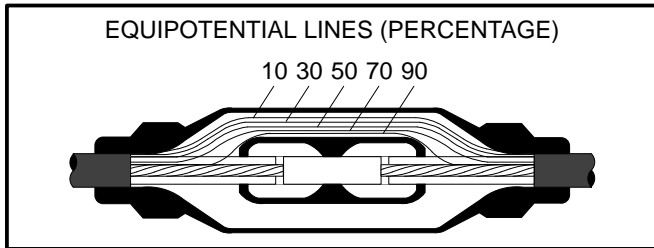


Figure 2

## 2. Applications

To splice 15 kV class ribbon shielded, wire shielded or UniShield® cable from 2 AWG to 750 kcmil, copper or aluminum conductors. Kit meets requirements of a 15 kV class splice in IEEE standard 404–1993 for Power Cable Joints.

For use with solid dielectric cables; polyethylene (high and low density) cross-linked polyethylene (XLP) and ethylene propylene rubber (EPR).

For use in direct buried applications (fully submerged).

For use in indoor and outdoor applications.

- Vault
- Cable tray
- Junction boxes
- Ducts

For cable rupture and dig-ins.

For cable reel ends.

## A. Typical Physical and Electrical Properties

### Insulating Rubber

#### Physical Properties

Test Method	Typical Value*
• Color	Black
• Ultimate Elongation (ASTM-D-412)	570%
• Ultimate Tensile Strength (ASTM-D-412)	900 psi (6,2 MPa)
• Shore A Hardness (ASTM-D-2240)	55
• Permanent Set 70 hrs. @ 90°C 100% Elongation 5 Minute Recovery (3M Test Method)	25%

PERMANENT SET is defined as: That portion of the original stretched deformation not recovered in a given period of time after the deforming force has been removed. This is usually recorded as a percentage of deformation.

- Compression Set  
70 hrs. @ 100°C  
(ASTM-D-395) Method B 18.7%
- 100% Modulus (ASTM-D-412) 185 psi (1,3 MPa)
- 300 % Modulus (ASTM-D-412) 650 psi (4,5 MPa)

## Electrical Properties

Test Method	Typical Value*
• Dielectric Constant (SIC) (ASTM-D-150) @23°C @90°C @130°C	2.71 2.58 2.56
• Dissipation Factor (ASTM-D-10) @23°C @90°C @130°C	0.4% 1.3% 4.7%
• Dielectric Strength (ASTM-D-149) @25 mil gap  @100 mil gap  20 Days @96% R.H. @90°C @25 mil gap  @100 mil gap	1177 volts/mil (46 kV/mm) 518 volts/mil (20,4 kV/mm) 1066 volts/mil (41,9 kV/mm) 790 volts/mil (31,1 kV/mm)

### Semi-Conducting Rubber

#### Physical Properties

Test Method	Typical Value*
• Color	Black
• Ultimate Elongation (ASTM-D-412)	450%
• Ultimate Tensile Strength (ASTM-D-412)	1000 psi (6,9 MPa)
• Shore A Hardness (ASTM-D-2240)	75
• Die C Tear (ASTM-D-624)	200 lbs/in. (173,5 kg/cm)
• Permanent Set (3M Test Method TM 86A)	60%
• Compression Set (ASTM-D-395-B)	20%
• 100% Modulus (ASTM-D-412)	300 psi (2,1 MPa)
• 300% Modulus (ASTM-D-412)	900 psi (6,2 MPa)

## Electrical Properties

### Test Method

- Volume Resistivity (3M Test Method TM 80)

### Typical Value\*

6 ohm-cm

- Ultimate Elongation (ASTM-D-412-75) Original

750%

- Die C Tear (ASTM-D-624C-73)

150 pli  
(26,3 kN/m)

## Cold Shrink™ End Seals EPDM Rubber

## Physical Properties

### Test Method

- Color
- 300% Modulus (ASTM-D-412-75)
- Ultimate Tensile (ASTM-D-412-75) Original

### Typical Value\*

Black  
480 psi  
(3,3 MPa)  
1400 psi  
(9,6 MPa)

## Electrical Properties

### Test Method

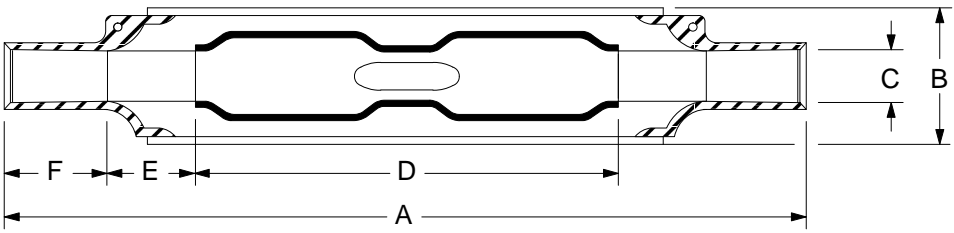
- Dielectric Strength (ASTM-D-149-75) Original @ 1.78 mm (365 V/mil)
- 7 Days in H<sub>2</sub>O 90°C (194°F)

### Typical Value\*

365 v/mil  
(14,3 kV/mm)  
282 V/mil  
(11,1 kV/mm)

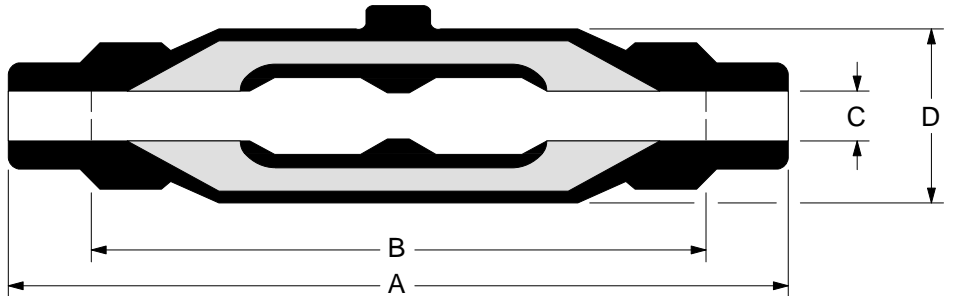
\* All values are averages and are not intended for specification purposes.

## B. Typical Dimension



Kit Number	Dimensions inches (mm)					
	A	B	C	D	E	F
5501	9.00 (22,9)	1.760 (4,5)	0.600 (1,5)	4.40 (11,2)	1.05 (2,7)	1.25 (3,2)
5502	9.60 (24,4)	1.760 (4,5)	0.780 (2,0)	5.00 (12,7)	1.05 (2,7)	1.25 (3,2)

Table 1



Kit Number	Dimensions inches (mm)			
	A	B	C	D
5503	12.70 (32,3)	10.30 (26,2)	1.00 (25)	2.50 (64)
5504	15.00 (38,1)	11.50 (29,2)	1.06 (27)	3.40 (86)
5505	15.00 (38,1)	11.50 (29,2)	1.26 (32)	3.40 (86)

Table 2

### C. Splice Selection Table

Kit Number	Cable Rated Voltage	Cable Insulation O.D. Range inches (mm)	Conductor Size (AWG/kcmil)
5501	15 kV	0.637 – 0.900 (16 – 23)	2 – 2/0 (0.175" insulation only)
5502	15 kV	0.840 – 1.05 (21 – 27)	2/0 (0.22" insulation only)
5503	15 kV	1.060 – 1.210 (27 – 31)	250 – 350
5504	15 kV	1.120 – 1.320 (28 – 34)	500
5505	15 kV	1.320 – 1.520 (34 – 39)	750

Table 3

### D. Connector Dimensions

Special “CI” Series compression connectors used in the 5500 Series Splices meet all the requirements set forth in the EEI–NEMA Standards for Overhead Distribution Connectors, EEI Publication No. TDJ–162. The “CI”

connectors MUST be ordered separately, but will be packaged in each kit. The table below lists the “CI” connector sizes needed for solid and stranded, aluminum and copper conductors.


Kit Number	CI Connector Number	Connector Length inches (mm)	Connector O.D. inches (mm)
5501	CI–22	2.00 (51)	0.640 (16)
	CI–21	2.00 (51)	0.640 (16)
	CI–1/0	2.00 (51)	0.640 (16)
	20006	2.31 (59)	0.687 (17)
5502	CI–2/0	3.00 (76)	0.910 (23)
	CI–3/0	3.00 (76)	0.910 (23)
	CI–4/0	3.00 (76)	0.910 (23)
5503	CI–250	3.75 (95)	1.125 (29)
	CI–350	3.70 (94)	1.125 (29)
5504	CI–500	4.25 (108)	1.312 (33)
5505	CI–750	4.66 (118)	1.590 (40)

Table 4

### 3. Maintenance

The components within this kit are stable under normal storage conditions for a period of 5 years. Normal storage and stock rotation are recommended.

The rubber splice and Cold Shrink™ are not impaired by

freezing nor by overheated storage up to the point of flow. After a 5500 Series splice has been installed, it can be checked periodically by visual inspection or by normal Hypotting procedures. 3M Cold Shrink™ removable core material is polypropylene and recyclable with other  waste.

UniShield® is a registered trademark of BICC Cables.  
'3M', 'Cold Shrink' and 'Scotch' are trademarks of 3M.

**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.

Any statements or recommendations of the Seller which are not contained in the Seller's current publications shall have no force or effect unless contained in an agreement signed by an authorized officer of the Seller. The statements contained herein are made in

lieu of all warranties expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose which warranties are hereby expressly disclaimed.

SELLER SHALL NOT BE LIABLE TO THE USER OR ANY OTHER PERSON UNDER ANY LEGAL THEORY, INCLUDING BUT NOT LIMITED TO NEGLIGENCE OR STRICT LIABILITY, FOR ANY INJURY OR FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES SUSTAINED OR INCURRED BY REASON OF THE USE OF ANY OF THE SELLER'S PRODUCTS.



**Electrical Products Division**

6801 River Place Blvd.  
Austin, TX 78726-9000  
800-245-3573



*Recycled paper*  
*40% pre-consumer*  
*10% post-consumer*

Litho in USA  
© 1996 3M  
80-6108-5270-1