

3M™ Cold Shrink 1/C Transition Splice Kit QS-III, 5510A-1T-PILC Series

Data Sheet

March 2011

Description 3M™ Cold Shrink 1/C Transition Splice Kits QS-III, 5510A-1T-PILC Series (which includes 5513A-1T-PILC, 5514A-1T-PILC, 5515A-1T-PILC, and 5516A-1T-PILC) are 15 kV-class inline splices designed to transition single-conductor PILC to Poly/EPR cable and meet the 15 kV voltage class rating requirements of IEEE Std. 404.

The splice kits include an oil barrier system based on a cold shrink tube design of specially formulated, oil-resistant polymer, and laboratory tested to nominal internal pressures of 40 psi with no oil leakage. The splice body itself is a one-piece molded QS-III design made of specially formulated silicone rubber. An EPDM rubber foldback cold shrink jacket is included for physical protection and environmental sealing.

Kit Contents Each kit contains the following materials as appropriate to make one splice:

- QS-III Cold Shrink Splice Body
- Cold Shrink Foldback Jacket Tube
- Cold Shrink Connector Adapters (if required within the kit size range)
- 3M™ Copper Foil Shielding Tape 1181
- 3M™ Cable Cleaning Pads CC-3
- P55/R Compound (red)
- Scotch® Rubber Mastic Tape 2228
- Shielding Sleeve
- Constant Force Spring Shield Connectors
- Ground Braid
- Scotch® Mastic Sealing Strips 2230
- Instruction Booklet
- Cold Shrink Oil Barrier Tube
- Cold Shrink Oil Barrier Adapter Tubes (if required within the kit size range)
- Cold Shrink Semi-Conductive Tube
- Scotch® Electrical Stress Control Tape 2220
- White Restricting Tape

Connector is not provided with the kits due to customer specific application requirements. To ensure a positive oil stop, a non-tapered, sealed connector (with a solid center barrier) should be used with the QS-III 5510A-1T-PILC series splice kits.



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Features

- **Cold Shrink Design** – for quick and easy installation; excellent for cable size transitions
- **Complete Kit** – includes everything required to make one splice (connector not included; see Note on page 1)
- **Silicone Rubber Construction** – for good high and low temperature performance
- **High Ampacity Shield** – fault current rated for 25,000 Amps for 10 cycles, neutral current rated for 350 Amps
- **Production Tested** – partial discharge and A.C. withstand tests to provide reliability
- **Computer Aided Design** – for compact size and optimal distribution of electrical field
- **Special Electrode Design** – minimizes electrical stress at critical cable/splice interface

Applications

3M™ Cold Shrink 1/C Transition Splice Kits QS-III, 5510A-1T-PILC Series may be used on cables with an operating temperature of 90°C and an emergency overload rating of 110°C. A splice constructed from this kit is rated for 15 kV and meets the requirements of IEEE Std. 404.

Collectively, the QS-III 5510A-1T-PILC series splice kits accommodate 15 kV PILC and Poly/EPR conductor sizes ranging from 2 AWG to 1000 kcmil (22 to 500 mm²), as well as 4 AWG conductor PILC cable.

- PILC (paper insulated lead covered) to Tape Shielded Cable
- PILC to Wire Shielded Cable
- PILC to EP-Lead or XLP-Lead Cable
- PILC to Concentric Neutral (CN) Cable
- PILC to Jacketed Concentric Neutral (JCN) Cable
- PILC to Longitudinally Corrugated (LC) Shielded Cable
- PILC to UniShield® Cable
- For Copper or Aluminum conductors
- For use with non-tapered Copper (Cu) or Aluminum (Cu/Al) oil stop type inline crimp connectors with solid center barrier.
- For size transition splicing (within the listed cable and connector ranges)
- For direct bury installations
- For submerged locations

User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a 3M product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

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Sizing

A. Splice Selection Table

Kit Number	Maximum O.D. over Lead sheath Inches (mm)	Cable Insulation O.D. Range Inches (mm)		Conductor Size Range AWG or kcmil (mm ²)		
		PILC Cable	Poly/EPR Cable	PILC Cable		Poly/EPR Cable
				100% Insulation	133% Insulation	
5513A-1T-PILC	1.01 (26)	0.59 - 0.83 (15 - 21)	0.64 - 1.01 (17 - 25)	*4 - 4/0 (22 - 95)	*4 - 1/0 (22 - 50)	2 - 4/0 (35 - 95)
5514A-1T-PILC	1.23 (31)	0.79 - 1.07 (20 - 27)	0.84 - 1.38 (22 - 35)	4/0 - 500 (120 - 240)	**2/0 - 250 (70 - 120)	4/0 - 500 (95 - 240)
5515A-1T-PILC	1.53 (38)	1.07 - 1.32 (28 - 33)	1.04 - 1.70 (27 - 43)	500 - 750 (300 - 325)	250 - 550 (150 - 250)	300 - 750 (185 - 325)
5516A-1T-PILC	1.85 (47)	1.24 - 1.63 (32 - 41)	1.08 - 1.70 (28 - 43)	750 - 1000 (400 - 500)	500 - 1000 (300 - 500)	500 - 1000 (240 - 500)

*4 AWG requires use of Al connector as #4 Cu connector is below min. O.D. for the 5513A-1T-PILC kit

**2/0 & 3/0 AWG require use of Al connector as Cu connectors are below min. O.D. for the 5514A-1T-PILC kit

B. Connector Dimension Requirements Table

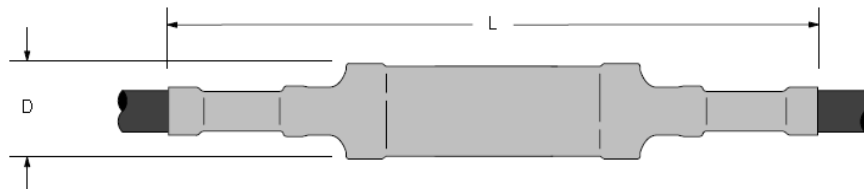
Kit Number	Minimum O.D. Inches (mm)	Maximum O.D. Inches (mm)	Maximum Length Inches (mm)		Connector O.D. Ranges Requiring Adapters Inches (mm)	
			Aluminum (Al/Cu)	Copper (Cu)	Oil Barrier Adapter	Connector Adapter
*5513A-1T-PILC	0.4 (11)	1.06 (27)	4.50 (114)	5.00 (127)	0.4 - 0.75 (11 - 19)	0.4 - 0.69 (10 - 18)
5514A-1T-PILC	0.69 (18)	1.33 (33)	5.00 (127)	5.75 (146)	0.69 - 0.92 (18 - 24)	0.69 - 0.95 (18 - 24)
5515A-1T-PILC	0.8 (21)	1.63 (41)	6.75 (171)	7.50 (191)	0.8 - 1.13 (21 - 29)	0.8 - 1.3 (21 - 33)
5516A-1T-PILC	1.05 (27)	1.85 (46)	6.75 (171)	7.50 (191)	1.05 - 1.30 (27 - 33)	1.05 - 1.35 (27 - 34)

NOTE: Maximum length of solid oil stop center barrier center is 0.5 in. (12 mm) for all connectors. Non-tapered connector is required.

*5513A-1T-PILC kit also carries minimum connector length requirement of 3.0 in. (76mm)

C. Typical Dimensions (Installed Splice)

Kit Number	Typical Length (L) inches (mm)	Typical Diameter (D) inches (mm)
5513A-1T-PILC	28 (711)	2.25 (57)
5514A-1T-PILC	29 (736)	2.5 (64)
5515A-1T-PILC	32 (813)	3.0 (76)
5516A-1T-PILC	32 (813)	3.0 (76)



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Installation

Connectors for 3M™ Cold Shrink 1/C Transition Splice Kits QS-III, 5510A-1T-PILC Series


The QS-III 5510A-1T-PILC series kits are designed to be used with 3M™ Scotchlok™ Copper/Aluminum Connectors 20000 Series, 3M™ Connectors CI Series, or other non-tapered, inline copper/aluminum compression connectors with a solid center barrier that meet ANSI C119.4 and fit within the dimension limits listed in Connector Dimensional Requirements Table B. In addition, the following transition connectors may be used:

Kit Number	Conductor Sizes AWG or kcmil (Stranded)			Homac Connectors	Burndy® Connectors	3M™ Connectors
		to				
5513A-1T-PILC	2	to	4	SAC2R4		
	1/0	to	2	SAC1/0R2		
	2/0	to	2	SAC2/0R2		
	3/0	to	1/0	SAC3/0R1/0	YRB27U25	
	3/0	to	2/0		YRB27U26	
	4/0	to	2	SAC4/0R2		
	4/0	to	1/0	SAC4/0R1/0		
	4/0	to	2/0	SACR4/0R2/0	YRB28U26	
5514A-1T-PILC	4/0	to	2/0	SACR4/0R2/0	YRB28U26	
	4/0	To	3/0			CI-T7
	250	to	2/0	SAC250R2/0		
	250	to	3/0	SAC250R3/0		
	250	to	4/0	SAC250R4/0	YRB29U28	
	300	to	3/0	SAC300R3/0		
	300	to	250	SAC300R250		
	350	to	4/0	SAC350R4/0	YRB31U28	
5515A-1T-PILC	350	to	250	SAC350R250	YRB31U29	
	500	to	350	SAC500R350	YRB34U31	
	600	to	350		YRB36U31	
	600	to	500		YRB36U34	
	750	to	350	SAC750R350		
5516A-1T-PILC	750	to	500	SAC750R500	YRB39U34	
	750	to	600		YRB39U36	

Oil-stop copper connectors, including Homac 'PC' Series and Richards 'OCC' Series, may also be used when splicing two copper conductors, provided the connector satisfies the Connector Dimensional Requirements Table B for the kit with which it is used.

Caution

Working around energized electrical systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling electrical equipment. De-energize and ground all electrical systems before installing product.

- 3M cold shrink removable core is mixed polymer and recyclable with other waste. 
- Refer to Material Safety Data Sheet for additional precautionary information.

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Performance Tests IEEE Std. 404 Testing

Design Test and Sequence	Test Requirement	Result
AC withstand voltage, 1 minute	35 kV-RMS	Pass
DC withstand voltage, 15 minute	55 kV-DC	Pass
Impulse withstand (BIL) at 77° F (25° C)	±110 kV-crest	Pass
Impulse withstand (BIL) at 230° F (110° C)	±110 kV-crest	Pass
Ionization factor	0.60% maximum	Pass
30 Day Cyclic aging (in-air and water), 230° F (110° C) connector temp	17.4 kV	Pass
High voltage time, 6 hour AC withstand	35 kV-RMS	Pass
Connector thermal and mechanical	ANSI C119.4	Pass

Shielding Short Circuit Testing

The 3M™ Cold Shrink 1/C Transition Splice Kits QS-III, 5510A-1T-PILC Series shielding system is rated for 25 kA for 10 cycles. The shielding system was submitted to an independent test laboratory for short circuit testing. High ampacity performance was verified by applying the following series: 20 kA-RMS for 10 cycles and 25 kA-RMS for 10 cycles. The shielding system is rated for 350 Amps of neutral current and was tested in a loop similar to that which is used in the ANSI C119.4 Connector Test Method, by measuring temperature and resistance. Ampacity performance was verified by applying current in 3-hour on/3-hour off cycles at levels up to and exceeding the 350-Amp-rated current. The shielding system consists of a tin-plated, braided copper sleeve, which serves as the splice metallic shield and ground jumper connected to the cable metallic shields with solderless constant force springs.

Product Specifications

The splice shall be capable of transition splicing PILC to Poly/EPR cable and meet requirements of IEEE Std. 404 for a 15 kV rating, and must be rated by the manufacturer for use on 15 kV class cable systems. It must be rated for continuous operation at 90°C (194°F), with an emergency overload temperature rating of 110°C (230°F). The splice must provide an effective oil barrier of a cold shrink design which does not require any additional heat source for installation. The splice body must be of a cold shrink design. The cold shrink splice body must be of a molded design made of silicone rubber with geometric stress control, an inner electrode and an outer semi-conductive shield. The splice jacketing shall be of a cold shrink tubing made of EPDM rubber. The color of the splice body and outer jacket shall be black.

Engineering/ Architectural Specifications

Splicing and re-jacketing of all 15 kV rated PILC cables sized from 4 AWG to 1000 kcmil (22 to 500 mm²) to Poly/EPR cables sized from 2 AWG to 1000 kcmil (35 to 500 mm²) shall be performed in accordance with the instructions provided with the splice kits: 5513A-1T-PILC, 5514A-1T-PILC, 5515A-1T-PILC and 5516A-1T-PILC.

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Shelf Life & Storage As provided, in the expanded state, 3M™ Cold Shrink 1/C Transition Splice Kits QS-III, 5510A-1T-PILC Series have an on-shelf storage life of three years from the date of manufacture under humidity controlled storage (10°C/50°F to 27°C/80°F and <75% relative humidity) .

Availability Please contact your local distributor; available from 3M.com/electrical (click on Where to Buy), or call 1.800.245.3573.

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