

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series 5, 8, 15, 25/28 and 35 kV

Data Sheet

August 2012

Product Description

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series, are designed for applications requiring a high-ampacity ground. Each kit contains one-piece, skirted, silicone rubber termination with high-ampacity ground assembly and is qualified as IEEE Standard 48 Class 1 for outdoor and weather-exposed applications. The termination assemblies consist of a skirted insulator, high-dielectric constant (Hi-K) stress control tube, conformable Hi-K stress controlling compound and built-in environmental top sealing compound. The insulator is made of a dark gray silicone rubber with excellent tracking resistance and hydrophobic properties.

The complete assembly is prestretched and loaded onto a removable core. The disposable core can be recycled. The kits are designed for terminating solid dielectric shielded power cable rated 5 through 35 kV, with tape shield, wire-over-tape shield and longitudinally corrugated (LC) shield constructions.

Kit Contents

Each kit contains sufficient quantities of the following materials to make one termination (compression lug is not included in the kit).

- 1 - Hi-K, Tracking Resistant, Silicone Rubber Termination
- 1 - Constant Force Spring
- 1 - Pre-formed High-ampacity Ground Braid
- 2 - Strips Scotch® Mastic Strip 2230
- 1 - Instruction Sheet

Features

- Conforms to IEEE Standard 48 Class 1 requirements for 5, 8, 15, 25/28 and 35 kV terminations
- One-piece versatile design, allowing quick installation and accommodating a wide range of cable sizes
- Cold Shrink delivery system for easy installation: Simply place termination over prepared cable and unwind core to shrink into place (no force fit required)
- Hi-K stress control: Specially formulated high dielectric constant material minimizes surface stress by more uniformly distributing the electrical field over the entire surface of the insulator
- Compact design provides for easier installation in restricted spaces
- Silicone rubber insulators, EPDM stress control tubes, stress controlling compound and environmental sealing compound are compatible with all common solid dielectric insulations, such as polyethylene (PE), cross-linked polyethylene (XLPE) and ethylene propylene rubber (EPR)

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Applications

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series is designed for/to:

- 5, 8, 15, 25/28 and 35 kV classes
- Tape shielded, wire-over-tape shielded and longitudinally corrugated (LC) cables
- Solid dielectric insulations, such as polyethylene, XLPE and EPR
- Free-hanging or bracket-mounting arrangements
- Protected and weather-exposed contaminated areas
- These terminations can be field tested using normal cable testing procedures (reference: ANSI/IEEE Standard 400 "Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems". Refer to most recent version.)

The amount of airborne contamination determines the operating environment. Operating environments are described as having varying degrees of airborne contaminant or pollution severity that may, or may not, affect the long term performance of terminations. These operating environments are defined as light, medium, heavy and extremely heavy variations according to pollution severity. The appropriate termination selection depends on the system voltage and operating environment. (See tables below)

Stress Control

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series controls the electric field stress distribution with special Hi-K materials, which are an integral part of the termination. The Hi-K material, with a dielectric constant (K) of greater than 15, capacitively distributes the field that surrounds the termination.

The stress concentrations in a continuous length of shielded cable are typically 50 V/mil adjacent to the shield to about 70 V/mil at the conductor. The 3M™ QT-III termination reduces the cable stresses at the termination to less than those in the continuous shielded portion of the cable.

Electrical flux is refracted to distribute the voltage stress in a controlled manner along the entire termination length extending beyond the cable shield cutoff. By controlling the electric field, the stress concentrations on the termination insulator surface are kept below 15 V/mil at rated voltage. This stress distribution permits high power frequency performance and impulse performance with a compact termination design.

Figure 1 below illustrates an actual computerized stress plot of the 3M™ QT-III termination.

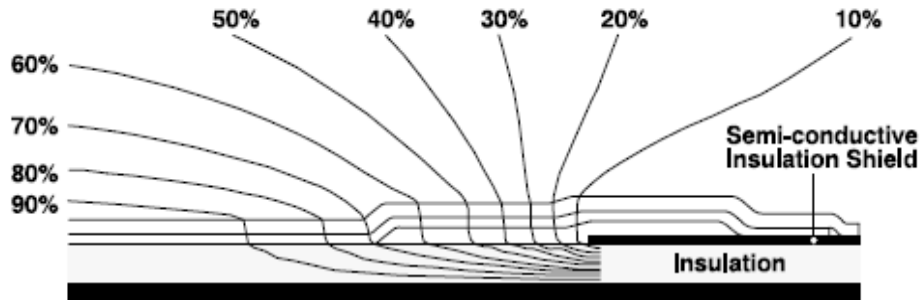


Figure 1

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Pollution Severity Level Guide

Light	Heavy
<ul style="list-style-type: none"> ▪ Areas without industry and with low-density housing ▪ areas subjected to frequent winds and/or rainfall with low-density industry and housing ▪ Agricultural areas * ▪ Mountainous areas <p>All of these regions should be situated at least 7 miles from the coast and should not be exposed to coastal winds.**</p>	<ul style="list-style-type: none"> ▪ High-density industrial areas and some urban areas with high-density housing, especially those with infrequent rainfall ▪ Areas subjected to a moderate concentration of conductive dust, particularly deposits from industrial smoke ▪ Areas generally close to the coast and exposed to coastal spray or to strong winds carrying sand and salt, and subjected to regular condensation
Medium	Extremely Heavy
<ul style="list-style-type: none"> ▪ Non-polluting industrial areas subject to infrequent rainfall and with average-density housing ▪ Areas subject to frequent winds and/or rainfall with high-density industry and housing ▪ Areas exposed to wind from the coast, but generally over two miles from the coast 	<ul style="list-style-type: none"> ▪ Usually very limited areas having extremely heavy pollutants from industrial sites, especially those located near oceans and subjected to prevailing winds from the sea ▪ Very small isolated areas where terminations are located immediately adjacent to a pollutant source, especially downwind (cement plants, paper mills, etc.)

* Use of fertilizers by spraying, or the burning of crop residues, can lead to a higher pollution level due to dispersal by wind.

**Distances from coast depend on the topography of the coastal area and on the extreme wind conditions.

Recommended Application Table

Termination Kit	System Voltage	Operating Environment			
		Light	Medium	Heavy	Extremely Heavy
(4 skirt) 7652-S-HSG-4 – 7656-S-HSG-4	15 kV	✓	✓	✓	✓
(8 Skirt) 7663-S-HSG-8 – 7666-S-HSG-8	15 kV	✓	✓	✓	✓
(4 Skirt) 7652-S-HSG-4 – 7656-S-HSG-4	25/28 kV	✓	✓	✓	
(8 Skirt) 7663-S-HSG-8 – 7666-S-HSG-8	25/28 kV	✓	✓	✓	✓
(8 Skirt) 7663-S-HSG-8 – 7666-S-HSG-8	35 kV	✓	✓	✓	*

Recommended operation environments are marked with a check (✓)

*Consult 3M sales representative

**Environmental
Performance**

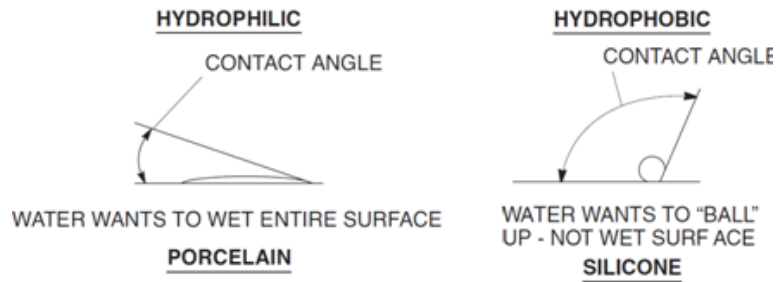
Material Characteristics

Hydrophobicity

When airborne contaminants are deposited on a termination surface, destructive leakage currents can initiate when the surface becomes wet. Fog and drizzle are normally considered to be worse than rain as these two forms of precipitation can combine with accumulated surface contaminants to reduce surface resistivity making the surface conductive to varying degrees, promoting leakage current formation. Rain tends to wash the pollutants off the termination surface.

The inherent hydrophobic nature of the silicone rubber compound used to make 3M™ Cold Shrink QT-III Silicone Rubber Termination Kit 7650-S-HSG and 7660-S-HSG Series components tends to reject moisture accumulation, and thereby, reduces the probability for discharge-initiated material erosion and tracking.

On occasion, severe environmental conditions that are sustained for long time periods can cause any polymeric surface to lose its hydrophobicity. Because of this, EPD polymers and others tend to lose their hydrophobic nature over time. Porcelain surfaces become increasingly hydrophilic with time, which can result in premature failure or flashover. Silicone surfaces can regenerate their hydrophobic character. The silicone insulator surface will re-establish its hydrophobic surface within 24 hours. This unique ability is a major factor for ensuring a long service life.



Ozone, Heat and UV Resistance

One of the most outstanding physical characteristics of silicone rubber is its retention of desirable properties over the very wide temperature range of -150°F (-100°C) to 600°F (315°C). While there are applications that take advantage of these temperature extremes, a more attractive feature might be that of its extremely long life expectancy at moderate operating temperatures.

The silicone polymer molecular backbone, silicone-oxygen linkage, provides the same strong -Si-O-Si- type bond occurring in quartz, sand and glass, which accounts for the outstanding temperature properties of silicones and their resistance to oxidation by ozone, corona and weathering. Polymer chains from organic rubber materials often have double carbon bond molecular backbones, which are quickly cleaved by ozone, ultraviolet light, heat or other influences found in the operating environment.

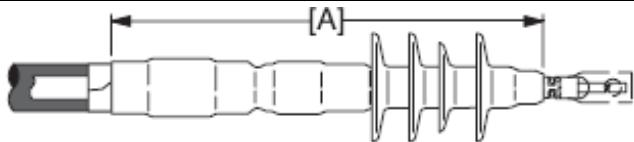
3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Typical Properties

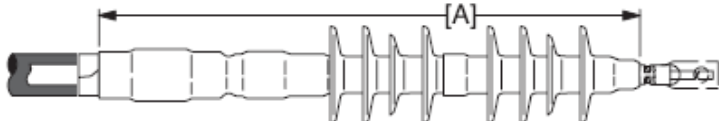
Not for specifications. Values are typical, not to be considered minimum or maximum. Properties measured at room temperature 73°F (23°C) unless otherwise noted.

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series can be used on cables with a rated maximum operating temperature of 221°F (105°C) and an overload rating of 284°F (140°C). Terminations constructed from these kits meet the requirements of IEEE Standard 48, "IEEE Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations", and are designated Class 1 for outdoor weather-exposed locations. The current rating of these terminations meets or exceeds the current rating of the cables on which they are installed.

Typical Dimensions



Kit Number	Dimension [A] (Max.)	Wet Creepage Distance (Max.)	Arcing Distance (Max.)
7652-S-HSG-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7653-S-HSG-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7654-S-HSG-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7655-S-HSG-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7656-S-HSG-4	13.25" (337 mm)	19.5" (495 mm)	13.25" (337 mm)



Kit Number	Dimension [A] (Max.)	Wet Creepage Distance (Max.)	Arcing Distance (Max.)
7663-S-HSG-8	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7664-S-HSG-8	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7665-S-HSG-8	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7666-S-HSG-8	21.50" (546 mm)	34.00" (864 mm)	21.50" (546 mm)

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits,
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Typical Properties
(continued)

Hi-K Stress Control Tube

Physical Properties (Test Method)	Typical Value English units (metric)
Tensile Strength (ASTM D412 Test Method) Modulus @ 100% Elongation Modulus @ 300% Elongation	1500 psi (10,34N/mm ²) 160 psi (1,10N/mm ²) 500 psi (3,45N/mm ²)
Electrical Properties (Test Method) (ASTM D150 unless noted)	Value
Dielectric Constant (K) (ASTM D150) 60 Hz @ 1000 V; 73°F (23°C), 50% RH	22
Dissipation Factor (ASTM D150) 60 Hz @ 1000 V; 73°F (23°C), 50% RH	0.10

Hi-K Stress Controlling Compound

Electrical Properties (Test Method)	Typical Value English units (metric)
Dielectric Constant (ASTM D150) 60 Hz @ 1000 V; 73°F (23°C), 50% RH 100 mil (2,54 mm) thickness	25
Dissipation Factor 60 Hz @ 1000 V; 73°F (23°C), 50% RH 100 mil (2,54 mm) thickness	0.90

Environmental Sealing Compound

Electrical Properties	Typical Value English units (metric)
Dielectric Strength (ASTM D149) 75 mil (1,90 mm) thickness	300 V/mil (11,8kV/mm)

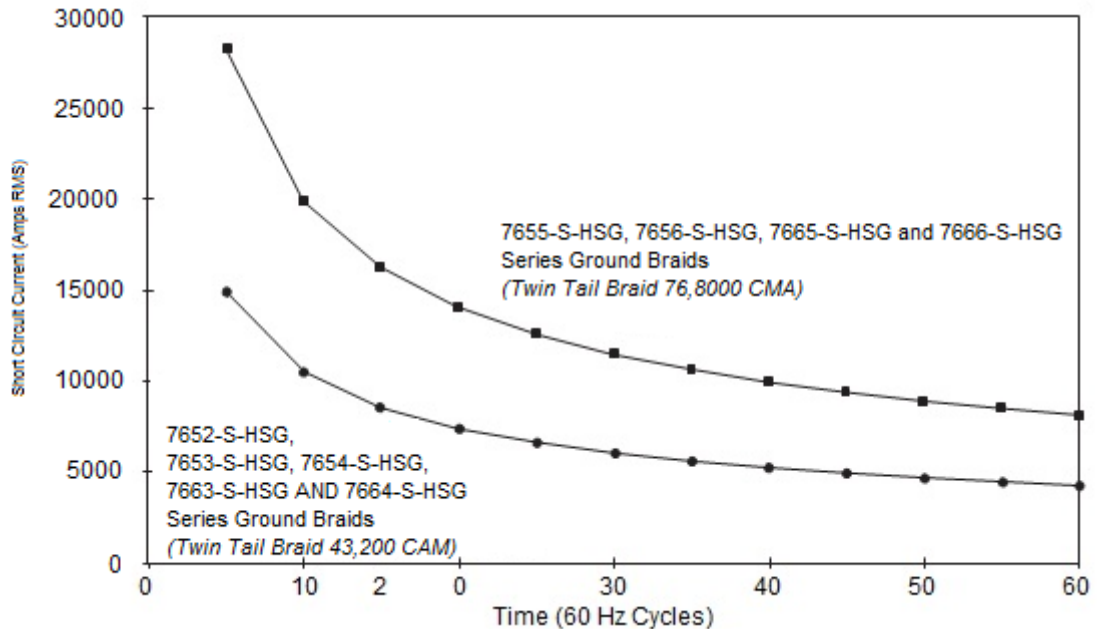
3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Typical Properties (Continued)

Silicone Rubber Insulator	
Physical Properties (Test Method)	Typical Value English units (metric)
Color	Dark Gray
Tensile Strength (ASTM D412) Modulus @ 100% Elongation Modulus @ 300% Elongation	850 psi (5,86N/mm ²) 130 psi (0,90N/mm ²) 400 psi (2,26N/mm ²)
Hydrophobic Recovery (3M Test Method No. 406) >90° Contact Angle	5.0 hrs
Electrical Properties (Test Method)	Typical Value English units (metric)
Dielectric Constant (S.I.C.) (ASTM D150) 60 Hz @ 1000 V; 73°F (23°C), 50% RH	3.6
Dissipation Factor (ASTM D150) 60 Hz @ 1000 V; 73°F (23°C), 50% RH	0.003
Dielectric Strength (ASTM D149) 75 mil (1,90 mm) thickness	500 V/mil (19,68 kV/mm)
Track Resistance (ASTM 2303) 3.5 kV	5.0 hrs.

Rated Ground Fault Current Limit

Typical Properties Ground Braid



3M™ Cold Shrink QT-III Silicone Rubber Termination Kits,
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**Common Conductor
Size Chart**

Cross Sectional Area		
Size	CMA	MM ²
10 AWG	10,380	
	11,844	6
9 AWG	13,090	
	15,792	8
8 AWG	16,510	
	19,740	10
7 AWG	20,820	
6 AWG	26,240	
	27,627	14
	31,580	15
5 AWG	33,090	
4 AWG	41,740	
	43,413	22
	49,430	25
3 AWG	52,620	
	59,200	30
2 AWG	66,360	
	69,070	35
	74,987	38
1 AWG	83,690	

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits,
7650-S-HSG and 7660-S-HSG Series

Termination Selection Table

Kit Number	Cable Insulation O.D. Range	Conductor Size Range (AWG and kcmil)				
		5 kV 100 % and 133 %	8 kV 100% and 133%	15 kV 100% and 133%	25/28 kV 100% and 133%	35 kV 100% and 133%
7652-S-HSG-4	.064 – 1.08 (16,3 – 27,4 mm)	4/0 – 400	3/0 – 300	2 – 4/0 (35 – 120 mm ²)	2 – 1/0 (35 – 50 mm ²)	–
7653-S-HSG-4	0.72 – 1.29” (18,3 – 32,8 mm)	300 – 500	250 – 500	2/0 – 300 (70 – 150 mm ²)	2 – 4/0 (35 – 120 mm ²)	–
7654-S-HSG-4	0.83 – 1.53” (21,1 – 38,9 mm)	500 – 750	350 – 700	4/0 – 500 (120 – 240 mm ²)	2/0 – 250 (70 – 150 mm ²)	–
7655-S-HSG-4	1.05 – 1.80” (26,7 – 45,7 mm)	700 – 1500	600 – 1250	500 – 1000 (240 – 500 mm ²)	250 – 800 (150 – 400 mm ²)	–
7656-S-HSG-4	1.53 – 2.32” (38,9 – 58,9 mm)	1750 – 2000	1500 – 2000	1250 – 2000 (625 – 1000 mm ²)	900 – 1750 (500 – 800 mm ²)	–
7663-S-HSG-8	0.72 – 1.29” (18,3 – 32,8 mm)	300 – 500	250 – 500	2/0 – 300 (70 – 150 mm ²)	2 – 4/0 (35 – 120 mm ²)	2 – 2/0 (35 – 70 mm ²)
7664-S-HSG-8	0.83 – 1.53” (21,1 – 38,9 mm)	500 – 750	350 – 700	4/0 – 500 (120 – 240 mm ²)	2/0 – 250 (70 – 150 mm ²)	2 – 4/0 (35 – 120 mm ²)
7665-S-HSG-8	1.05 – 1.80” (26,7 – 45,7 mm)	700 – 1500	600 – 1250	500 – 1000 (240 – 500 mm ²)	250 – 800 (125 – 400 mm ²)	3/0 – 600 (95 - 325 mm ²)
7666-S-HSG-8	1.53 – 2.32” (38,9 – 58,9 mm)	1750 – 2000	1500 – 2000	1250 – 2000 (625 – 1000 mm ²)	900 – 1750 (500 – 800 mm ²)	700 – 1500 (400 – 725 mm ²)

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Product Specifications

The 3M™ Cold Shrink QT-III Silicone Rubber Termination Kit, 7650-S-HSG and 7660-S-HSG Series cable terminations must have a voltage class rating equal to or greater than the cable being terminated. The rating shall be 5, 8, 15, 25/28 or 35 kV as an IEEE Standard 48 Class 1 termination. It must have a maximum continuous operating temperature rating of 221°F (105°C), with an emergency overload rating of 284°F (140°C). The termination stress control shall be capacitive and constructed of a Hi-K EPDM rubber tube. The installation procedure shall not require using silicone grease.

The termination insulator shall be of a skirted design, constructed of tracking resistant silicone rubber, dark gray in color. The termination must be of a pre-stretched Cold Shrink design, installed without the application of a heat source. The termination kit shall include all materials required (except lug and vinyl tape) and shall accommodate tape, wire-over-tape and longitudinally corrugated (LC) shielded cables. The Class 1 termination kits shall be used with listed copper or aluminum compression lugs.

Engineering/Architectural Specifications

Terminating of all 5, 8, 15, 25/28 and 35 kV shielded power cables, indoors and in weather-protected equipment shall be performed in accordance with instructions included in the 3M™ Cold Shrink QT-III Silicone Rubber Termination Kit 7650-S-HSG and 7660-S-HSG Series. This shall include all outdoor weather-exposed areas for tape, wire-over-tape and longitudinally corrugated (LC) shielded cables. The termination kits shall be used in conjunction with 3M™ Scotchlok™ Copper Compression Lugs, 30000 and 31000 Series, 3M™ Scotchlok™ Copper/Aluminum Compression Lugs, 40000 Series, or 3M™ Stem Connectors SC Series.

Performance Tests

Typical Results, IEEE Standard 48 Short-Term Test Sequence

Insulation Class Test	15 kV (4 Skirt)		25/28 kV (4 Skirt)		35 kV (8 Skirt)	
	Requirements	Results	Requirements	Results	Requirements	Results
Partial Discharge Extinction Voltage @ 3 pC	13 kV	25 kV	21.5 kV	33 kV	30 kV	45 kV
Power Frequency Voltage 1 min. Dry Withstand	50 kV	95 kV*	65 kV	100 kV*	90 kV	125 kV*
Power Frequency Voltage 10 sec. Wet Withstand	45 kV	70 kV*	60 kV	75 kV*	80 kV	100 kV*
Power Frequency Voltage 6 hour Dry Withstand	35 kV	85 kV*	60 kV	90 kV*	76 kV	115 kV*
Direct Voltage 15 min. Dry Withstand	75 kV	Passed	105 kV	Passed	140 kV	Passed
Lightning Impulse Voltage Withstand (BIL)	110 kV	165 kV*	150 kV	175 kV*	200 kV	240 kV*
Partial Discharge Extinction Voltage @ 3 pC	13 kV	25 kV	21.5 kV	33 kV	30 kV	45 kV

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Performance Tests (Continued)

Typical Results, IEEE Standard 48 Long-Term Test Sequence

Insulation Class Test	15 kV (4 Skirt)		25/28 kV (4 Skirt)		35 kV (8 Skirt)	
	Requirements	Results	Requirements	Results	Requirements	Results
Partial Discharge Extinction Voltage @ 3 pC	13 kV	25 kV	21.5 kV	33 kV	30 kV	45 kV
Cyclic Aging 30 days, 130° C cond. temp.) Power Frequency Voltage Withstand	26 kV	Passed	43 kV	Passed	60 kV	Passed
Partial Discharge Extinction Voltage @ 3 pC	13 kV	25 kV	21.5 kV	33 kV	30 kV	45 kV
Lightning Impulse Voltage Withstand (BIL)	110 kV	165 kV*	150 kV	175 kV*	200 kV	240 kV*

Partial Discharge (Corona) Tests

The purpose of corona testing is to determine whether all properly installed terminations operate corona-free at a minimum of 150% of their operating voltage. For the test, an applied test voltage is gradually increased until discharges appear on the test set oscilloscope display. The voltage at which these discharges reach a magnitude of 3 picocoulombs is recorded as the corona starting voltage (CSV). The applied voltage is then lowered until the discharge level drops below 3 picocoulombs, and this is recorded as the corona extinction voltage (CEV).

Power Frequency (AC) Withstand Tests

All 3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series exceed the IEEE Standard 48 requirements for a Class 1 termination.

Lightning Impulse Tests


For these tests, a 1.2 x 50 microsecond voltage wave is applied to the termination's lug. The testing consists of both positive and negative polarity surges per IEEE Standard 48 BIL requirements. The 3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series terminations kits exceed these BIL requirements.

Sealing Tests

Termination top and bottom seals are tested by applying 7 psi (0,05 MPa) to the cable conductor strands with the termination submerged in water. Both seals withstand this internal air pressure for 6 hours without leaking.

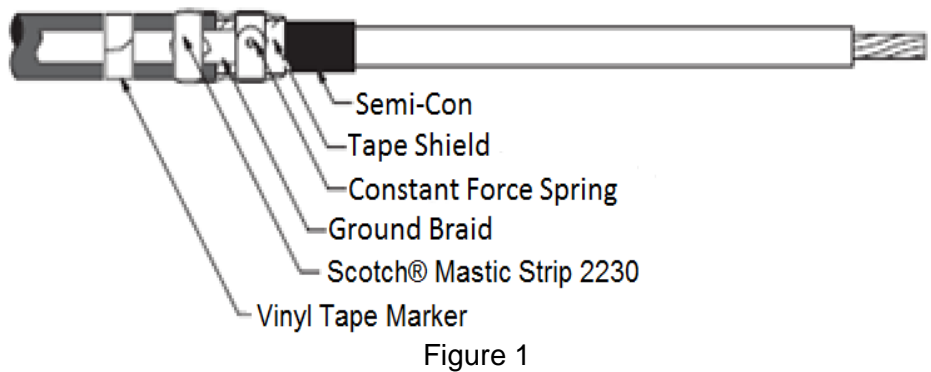
3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Installation Techniques

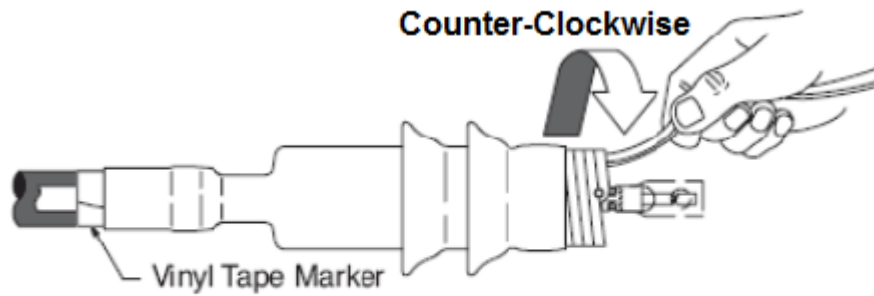
 Caution
Working around energized electrical systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling high-voltage electrical equipment. De-energize and ground all electrical systems before installing product.

Detailed instructions are included in each kit to provide the installer with all information required to properly install the appropriately sized 3M™ Cold Shrink QT-III Silicone Rubber Termination Kits 7650-S-HSG and 7660-S-HSG Series. A brief summary of the installation steps for tape-shielded cable is outlined as follows:

1. Prepare cable according to standard procedure.
2. Apply bottom mastic seal. (*Figure 1*)



3. Install lug using a listed crimping tool and die.
4. Install termination onto cable and unwind core, allowing termination to shrink into place. (*Figure 2*)




NOTE: The material being removed at this step is mixed polymers and can be recycled with  waste.

FIGURE 2 OTHER

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Maintenance

It is good practice to incorporate a general inspection/cleaning of 3M™ Cold Shrink QT-III Silicone Rubber Terminations during normal scheduled or maintenance inspections. Once the area has been de-energized, the terminations can be inspected, and if need be, cleaned. Some recommendations for surface cleaning 3M™ Cold Shrink QT-III Silicone Rubber Terminations are as follows;

Use a can of compressed 'air' in order to blast off dust and miscellaneous airborne contaminants on the surface of the termination body. If needed, wipe the surface of the termination with a cable cleaning solvent, such as 3M™ Cable Cleaning Solvent (CC-2), and allow it to dry before re-energizing the installation.

Mix a mild soap and water solution (deionized water is recommended, if available) in a hand sprayer, or spray bottle, and spray down the surface of the termination. Wipe dry, or allow to air dry, before re-energizing.

If tan discoloration between skirts is observed on the surface of the termination, wipe with a cable cleaning solvent. The discoloration itself does not pose any detrimental effect to the installation, and may not disappear entirely, but it will lighten up to some degree. This discoloration a typical result of the outgassing effect of EPR cable and does not interfere with the performance of the termination in any capacity.

Do not abrade the surface or the termination in any way. Do not use high pressure cleaning (this can tear, or split, the termination), high pressure water with corn cobs, sandpaper or other abrasive products. This will damage the termination surface and reduce tracking and arcing resistance.

3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series

Shelf Life & Storage

As provided, in the expanded state, the 3M™ Cold Shrink QT-III Silicone Rubber Termination Kits, 7650-S-HSG and 7660-S-HSG Series have a 3 year shelf life from date of manufacture when stored in a humidity controlled storage (50°F/10°C to 80°F/27°C and <75% relative humidity).

Availability

Please contact your local distributor; available from 3M.com/electrical [Where to Buy] or call 1.800.245.3573


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NOTE: The core material being removed from the Termination is mixed polymers and can be recycled with other  waste.



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