



Silicone Rubber

Cold Shrink Termination Kits

QTIII (X) Series

PRODUCTION DESCRIPTION

The 3M Cold Shrink QT-III Silicone Rubber Skirted Termination Kits, 7620-S, 7680-S and 7690-S Series, contain one-piece, skirted, silicone rubber terminations, and two-piece, Inverted Skirted, silicone rubber terminations, qualified as IEEE Standard 48 Class 1 for outdoor weather-exposed applications. The one-piece termination assemblies consist of a skirted insulator, high-dielectric constant (High-K) stress control tube*, conformable High-K stress controlling compound and built-in environmental top sealing compound. The two-piece inverted skirted termination assemblies consist of a non-skirted (tubular) insulator, high-dielectric constant (High-K) stress control tube, conformable High-K stress controlling compound, built-in environmental top sealing compound and a separate skirted assembly. The insulators and separate skirted assemblies are made of a dark gray silicone rubber with excellent tracking resistance and hydrophobic properties. *7620-S is designed and assembled with stress controlling compound only. The complete assembly is pre-stretched and loaded onto a removable core. The disposable core can be recycled. The kits are designed for terminating solid dielectric shielded power cables rated 5 through 35kV, with Tape Shield, Wire Shield and UniShield® constructions.

PRODUCTION APPLICATION

3M Cold Shrink QT-III Silicone Rubber Skirted and Inverted Skirted Termination Kits, 7620-S, 7680-S and 7690-S Series are designed for:

- ▶ 5, 8, 15, 25/28 and 35kV classes.
- ▶ Tape Shield, Wire Shield and UniShield® cables.
- ▶ Solid dielectric insulations, such as polyethylene, XLPE and EPR.
- ▶ Protected and weather-exposed contaminated locations.
- ▶ Free-hanging or bracket-mounting arrangements.
- ▶ Upright or inverted installation arrangements available.
- ▶ Inverted termination kits are available in limited versions, but cover 5kV to 35kV classes.
- ▶ 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 areas 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 following tables)

KEY FEATURES

Conforms to the IEEE Standard 48 Class 1 requirements for 5, 8, 15, 25/28 and 35kV terminations. One-piece, and two-piece inverted skirted, versatile designs, 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) High-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).



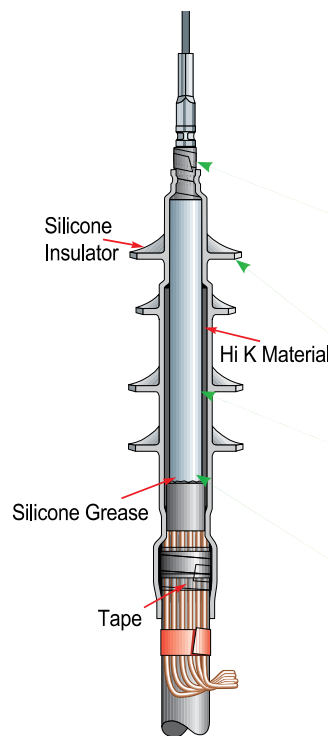
QTIII (X) Series

DETAILED COMPOSITION OF THE QTIII (X)

QT-III improves QT-II design with more integration features:

- ▶ Integrated mastic seal on the cable lug.
- ▶ Integrated stress control mastic at the end of the semi-conductive shield and improved stress control behavior.

QT-III also is made of new silicone rubber with 4 times better track resistance, which make it having faster hydrophobic recovery.



QT-III
Moisture Blocking Silicon Tape
Integrated into termination
Outer Insulator
Very good track resistance
Stress Control Tube
Integrated into termination
Silicone Grease - Stress Relief
Integrated into termination

STRESS CONTROL

3M Cold Shrink QT-III Silicone Rubber Skirted and Inverted Skirted Termination Kits, 7620-S, 7680-S and 7690-S Series, control the electric field stress distribution with special High- K materials, which are an integral part of the termination. The High-K materials with a dielectric constant (K) of greater than 15, capacitively distribute 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 Cold Shrink QT-III.

Silicone Rubber 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 Cold Shrink QT-III Silicone Rubber Termination.

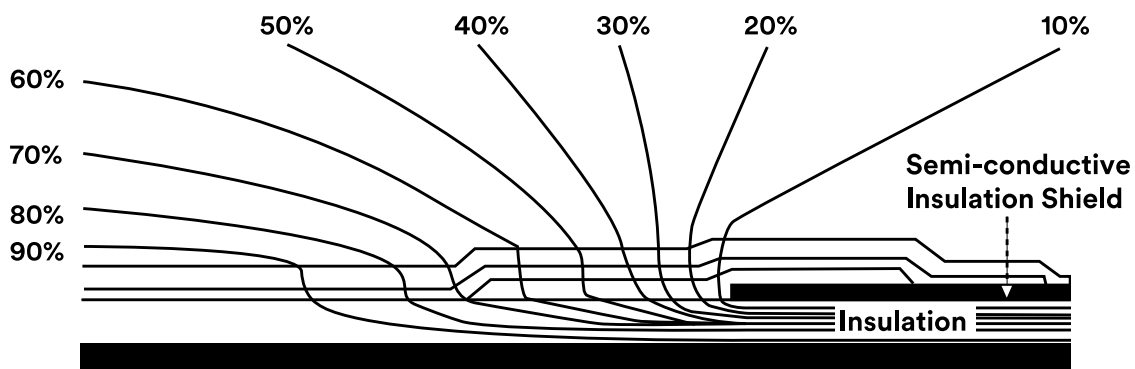


Figure 1

3M Cold Shrink QT-III Silicone Rubber Skirted and Inverted Skirted Termination Kit		System Voltage	Operating Environment			
			Light	Medium	Heavy	Extremely Heavy
2 Skirt	7620-S-2, 7621-S-2	5 & 8kV	✓	✓	✓	
2 Skirt	7622-S-2, 7622-S-2 (L)**, 7622-S-INV-2, 7622-S-INV-2 (L)**	15kV	✓	✓	✓	
4 Skirt	7692-S-4 - 7696-S-4, 7692-S-4 (L)**, 7695-S-4 (L)**, 7693-S-INV-4, 7695-S-INV-4, 7696-S- INV-4, 7695-S-INV-4 (L)**	15kV	✓	✓	✓	✓
8 Skirt	7683-S-8 - 7686-S-8, 7685-S-8 (L)**	15kV	✓	✓	✓	✓
4 Skirt	7692-S-4 - 7696-S-4, 7695-S-4 (L)**, 7693-S-INV-4, 7695-S-INV-4, 7695-S-INV-4 (L)**, 7696-S-INV-4	25/28kV	✓	✓	✓	
8 Skirt	7683-S-8 - 7686-S-8, 7685-S-8 (L)**	25/28kV	✓	✓	✓	✓
4 Skirt	7693-S-INV-4, 7695-S-INV-4, 7696-S-INV-4	35kV	✓	✓	✓	
8 Skirt	7683-S-8 - 7686-S-8	40.5kV	✓	✓	✓	*

Recommended operation environments are marked with a check (✓)

* Consult 3M sales representative

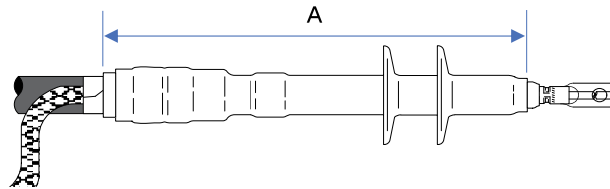
** The designated (L) version terminations are the same as the non-(L) versions of the above specified termination kits, except that they are on a larger core to accommodate and properly fit specific 3M Mechanical Shearbolt Lugs QL2 Series: Two-Hole and the Insulation O.D. range is slightly different than the non-(L) versions (See Termination Selection Table on Pages 9 and 10).

TYPICAL PROPERTIES

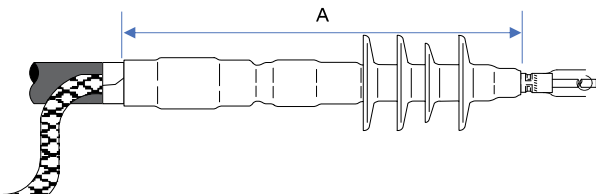
Not for specifications. Values are typical, not to be considered minimum or maximum. Properties measured at room temperature 73°F (23°C) unless otherwise stated.

3M Cold Shrink QT-III Silicone Rubber Skirted and Inverted Skirted Termination Kits, 7620-S, 7680-S and 7690-S 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.

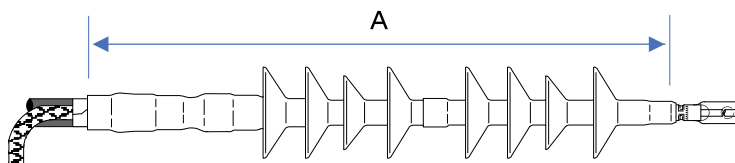
TYPICAL DIMENSIONS



Kit Number	Dimension [A] (Max.)	Wet Creepage Distance (Max.)	Arcing Distance (Max.)
7620-S-2	10.5" (267 mm)	14.0" (356 mm)	10.5" (267 mm)
7621-S-2	10.5" (267 mm)	14.0" (356 mm)	10.5" (267 mm)
7622-S-2	9.8" (249 mm)	13.3" (338 mm)	9.8" (249 mm)
7622-S-2 (L)	9.8" (249 mm)	13.3" (338 mm)	9.8" (249 mm)



Kit Number	Dimension [A] (Max.)	Wet Creepage Distance (Max.)	Arcing Distance (Max.)
7692-S-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7692-S-4 (L)	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7693-S-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7694-S-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7695-S-4	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7695-S-4 (L)	12.25" (311 mm)	18.5" (470 mm)	12.25" (311 mm)
7696-S-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.)
7683-S-8	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7684-S-8	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7685-S-8	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7685-S-8 (L)	20.50" (521 mm)	33.00" (838 mm)	20.50" (521 mm)
7686-S-8	21.50" (546 mm)	34.00" (864 mm)	21.50" (546 mm)