



QTII (X) Series

Silicone Rubber Cold Shrink Termination Kits

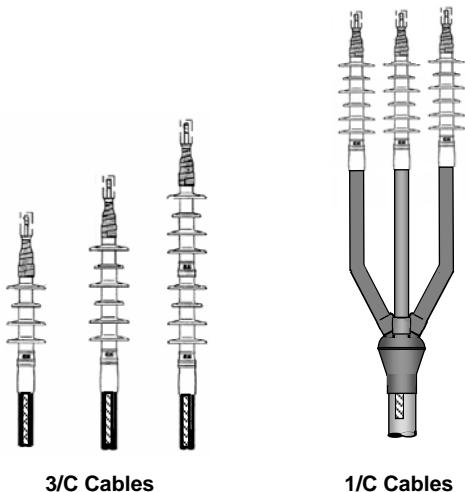
For MV Armored/Non-Armored Cables up to 36kV

DATA SHEET

Update: August 2006

1. Product Description

The 3M QTII (X) Series are Silicone Rubber Cold Shrink Quick Terminating System that designed to accommodate medium voltage metallic- shielded armored non-armored, copper or aluminum conductor power cables configurations.



3/C Cables

1/C Cables

2. Hydrophobicity: When water comes in contact with the silicone it beads up and runs off the skirts rather than completely wetting these surface. Thus a less conductive path is formed on the silicone and leakage currents are lowered

3. Non-organic/ nonconductive: degrade leakage current and arcing occurs on the surface of termination.

4. High temperature withstand: An outstanding physical characteristic of silicone rubber is its retention of desirable properties over the wide temperature range of 100°C to 180°C.

Configurations: ID: In door OD: Outdoor

	6/10(12)kV		12/20(24)kV		18/30(36)kV	
	ID	OD	ID	OD	ID	OD
4-Skirt	✓	✓	✓			
6-Skirt				✓	✓	
8-Skirt						✓

The main components of QTII (X) :

▪ QTII Termination Assembly:

The cold shrink delivery system has repeatedly proven itself to be unsurpassed as a positive and reliable electrical insulating and moisture-sealing system for cable primary insulation interface surface.

One piece cold shrink termination assembly is created when silicon rubber skirted insulator is mounted over a High Dielectric Constant (High-K) stress relief on a common support core.

▪ Silicone Breakout Boot Assembly (for 3C cable):

- A molded silicone rubber open-ended three-finger boot. The installed breakout boot provides a sealed enclosure between the cable phase leg breakout boot area and the operating environment

▪ Silicone Phase Re-jacketing Sleeve Assembly (for 3C cable):

It is designed to reduce sliding friction when positioning the assembly over cable phase metallic shield surfaces. Re-jacketing sleeves are track-resistant insulating tubes that also protect cable phase legs from exposure to moisture, corrosion, ozone, ultraviolet radiation, physical contact and other hazards associated with termination operating environments.

Silicone Rubber-Material Characteristics

1. Smooth surface: minimum amount of contamination adhere to the termination.

2. Product Applications

- For power cables up to 36 kV
- For polymeric cables: polyethylene, XLPE, EPR.
- For 1C/ 3C copper tape, wire shield, armored/ non-armored power cables.
- For copper or aluminum conductors.
- For contaminated, pollution area, operating environment.
- For switchgear, transformer, motor lead (terminal type) bus, overhead etc. connections.

3. Features and Benefits

- Versatile- Install quickly and accommodates a wide range of cable sizes: from 25sqmm to 630sqmm.
- Simple hand application, no need for special installation tools.
- No torches or heat required
- Excellent resistance to ozone and UV radiation.
- Good solvent resistant;
- Excellent thermal stability.
- High dry and wet insulation resistance.
- High flexible- accommodates all cable company bend radius recommendations.
- Reliable Seals - Termination assemblies retain resiliency and cable interface pressure after prolonged years of aging and exposure.

4. Specification

3M QTII (X) Series Termination are approved for use on electrical power cables that have continuous operating temperature rating of 90°C and an emergency overload rating of 130°C.

The current rating of the QTII (X) Series Termination meets or exceeds the current rating of the cable onto which it is applied.

3M QTII (X) pre-build a special high dielectric constant (High-K) controls the electric field surrounding the terminated cable insulation shield end. The stress in the cable underneath this unit is less than it is in the shield portion of the cable.

Standards application:

The QTII (X) Series Termination meet or exceed the specification requirements of Standards

- IEEE Standard 48-1990, for Class 1 termination
- CENELEC Standards HD 628-S1 and HD 629.1.S1.
- VDE Standard 0278-628 and VDE 0278-629-1
- British Standard BS C-89
- Spanish Standard UNE 21-115-75
- Brazilian Standard A*B*N*T* 9314
- French EdF Standards HN 33-E-01, HN 41-E-01

Operating Temperature

Cable Standard Reference	Max. Continuous OT	Emergency OT
AEIC CS5 (XLPE)/ AEIC CS6 (EPR)	90°C	130°C
IEC 60502-2 (XLPE)	90°C	250°C (conductor I _{sc})

5. Product Series Number

	6/10(12)kV	12/20(24)kV		18/30(36)kV	
	Indoor/ Outdoor	Indoor	Outdoor	Indoor	Outdoor
1-phase	QTII (X)4S-11	QTII (X)4S-12	QTII (X)6S-12	QTII (X)6S-13	QTII (X)8S-13
3-phase	QTII (X)4S-31	QTII (X)4S-32	QTII (X)6S-32	QTII (X)6S-33	QTII (X)8S-33

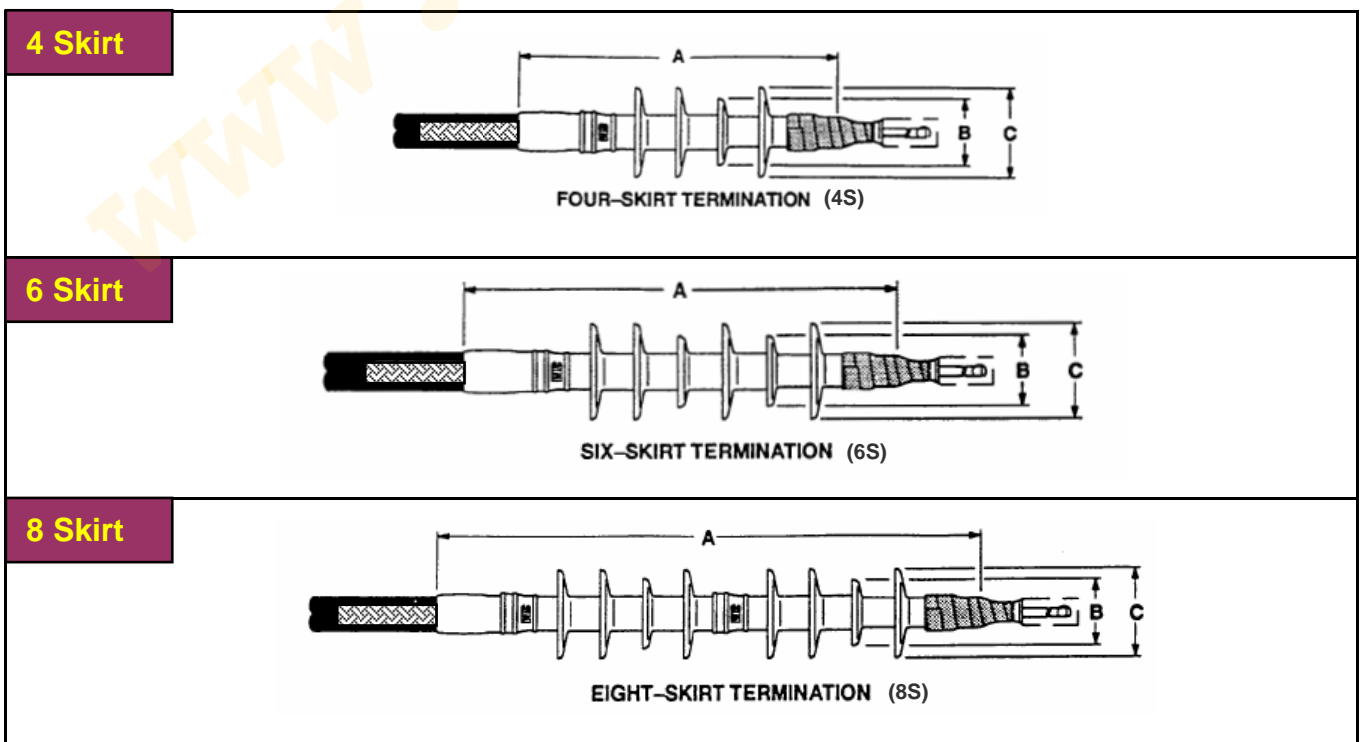
Note: QTII (X)xS-CV

- QTII : Product Name Quick Termination II
- (X)xS : Type of QTII termination/body assembly (i.e. J4S, L6S, M8S ...; _S: Skirt)
- C : Number of Conductor/ Core (1, 3)
- V : Class of Voltage (1: 12kV; 2: 24kV; 3: 36kV)

Ex.: QTII (L)6S-32 is QTII 3/C termination, body type L 6S, outdoor application for 24kV class.

6. Selection Guide

6.1. The QTII Termination

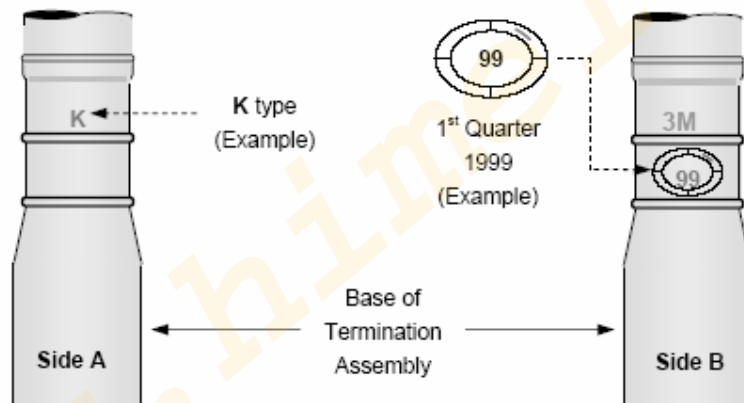


Number of QTII body	Cable Application Range			Dimensions (mm)				
	O.D. insulation (mm)		O.D. Jacket (mm)	Installed length (A)	B	C	Creepage distance	Arcing Distance
	Min.	Max.						
4- SKIRT								
H	8.4	17.5	14.0 - 23.4	--	41.1	66.0	457	349
J	16.3	22.9	20.3 - 30.5	250	42.4	68.1	438	317
K	21.3	33.8	25.4 - 40.6	250	46.2	69.8	438	317
L	27.9	41.9	33.0 - 48.3	275	50.8	82.5	489	356
M	33.0	49.5	38.1 - 61.0	280	50.8	90.2	495	362
6- SKIRT								
J	16.3	22.9	20.3 - 30.5	325	42.4	68.1	584	394
K	21.3	33.8	25.4 - 40.6	325	46.2	69.8	584	394
L	27.9	41.9	33.0 - 48.3	360	50.8	82.5	654	432
M	33.0	49.5	38.1 - 61.0	370	50.8	90.2	660	438
8- SKIRT								
K	21.3	33.8	25.4 - 40.6	415	46.2	69.8	762	508
L	27.9	41.9	33.0 - 48.3	450	50.8	82.5	832	559
M	33.0	49.5	38.1 - 61.0	450	50.8	90.1	854	565

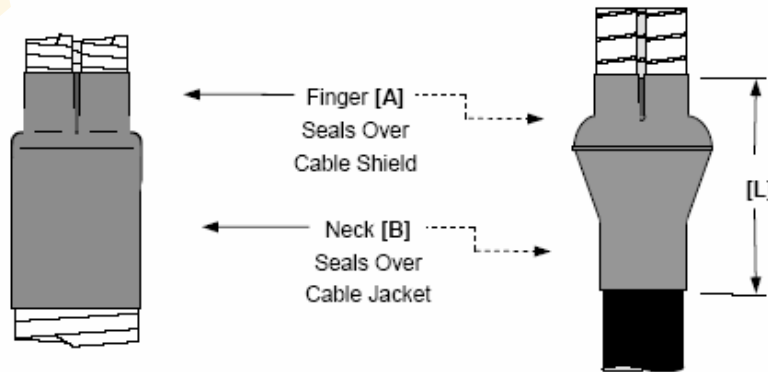
Termination Identification & Marking

Termination Body Size
Available sizes are J, K, L, and M

Production Date Code Indicator
A dash in two quadrants denotes 2nd quarter, etc.



6.2. The Silicone Rubber Breakout Boot Assembly (for 3C cable)



Product size (*)	Finger [A] (mm)	Neck [B] (mm)	Installed Length [L] (Approx. mm)	Application Range (mm ²)	
				24kV	35kV
8563	33.02	83.31	165	35/50/75/95	35/50
8564	45.97	114.30	220	120/150/ 185/240/300	70/95/120/ 150/185/240

6.3. The Silicone Rubber Phase Re-jacketing Sleeve Assembly (for 3C cable)

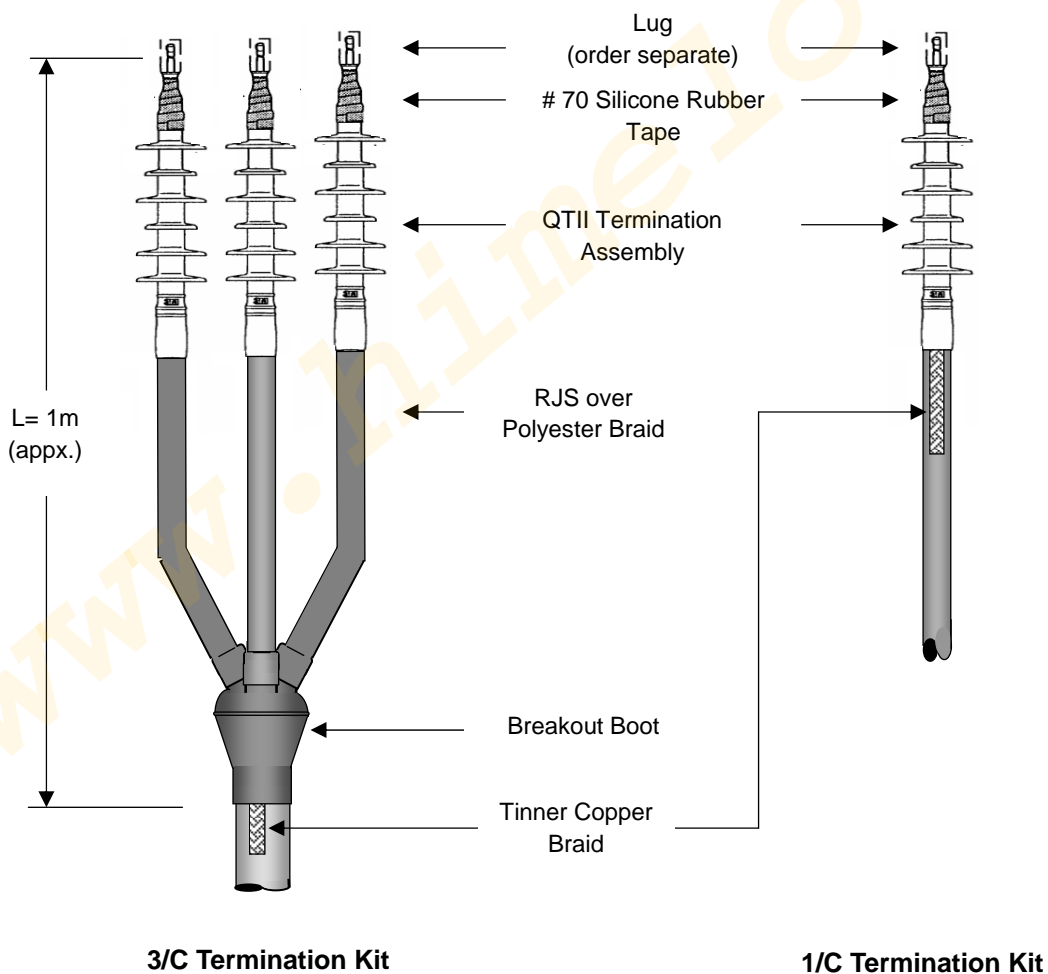
RJS Series Phase Re-jacketing Sleeves (Silicone Rubber Tube over Polyester Braid)



Product size (*)	Tube Ø (ID - mm)	Braid Ø (ID - mm)	Accommodation Range	
			24kV	35kV
RJS-3	24.1	25.4	35/50/70/95	35/50
RJS-4	29.7	25.4/ 31.7	120/150/185	70/95
RJS-5	36.3	25.4/ 31.7	240/300	120/150/185/240

(*): Length of RJS for each phase approximate 500mm. 3M can supply the length of tubes depend on Customer requirements

Typical Installed Quick Termination II Kit



- Length of phases depend on requirements of Customer,
- Installed length of 3-phase 3M QTII termination standard kits are 1m approximate.

7. Typical Results per IEEE STD.48-1990 Tests

4- SKIRT								
IEEE STD.48 Test	5kV Class		8kV Class		15kV Class		25kV Class	
	Requirement	Results	Requirement	Results	Requirement	Results	Requirement	Results
60 sec. w/s ac	25kV	75kV *	35kV	80kV *	50kV	85kV *	65kV	90kV *
10 sec. w/s wet ac	25kV	55kV *	30kV	60kV *	45kV	65kV *	60kV	75kV *
6 hours w/s ac	15kV	70kV *	25kV	75kV *	35kV	80kV *	55kV	85kV *
15 min. w/s dc	50kV	Pass	65kV	Pass	75kV	Pass	105kV	Pass
Impulse w/s	75kV	+ 125kV * - 115kV *	95kV	+ 130kV * - 125kV *	110kV	+ 165kV * - 150kV *	150kV	+ 180kV * - 165kV *
30 day Cyclic Aging @ 130°C w/s ac Corona @ 3pc. CEV> Impulse + 10 - 10	9kV 4.5kV + 75kV - 75kV	Pass Pass Pass Pass	15kV 7.5kV + 95kV - 95kV	Pass Pass Pass Pass	28.5kV 13kV + 110kV - 110kV	Pass Pass Pass Pass	48kV 21.5kV + 150kV - 150kV	Pass Pass Pass Pass

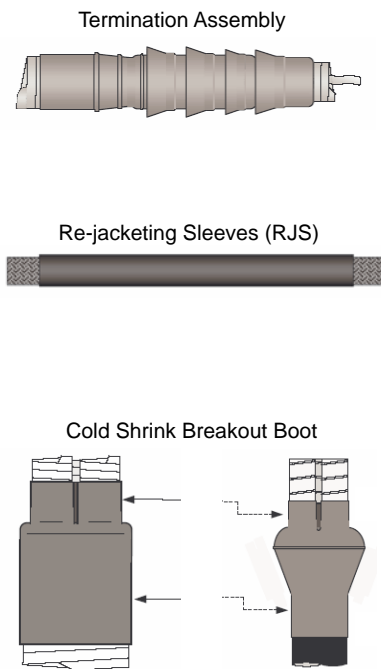
6- SKIRT						
IEEE STD.48 Test	15kV Class		25kV Class (➔)		34.5kV Class	
	Requirement	Results	Requirement	Results	Requirement	Results
60 sec. w/s ac	50kV	100kV *	65kV	110kV *	90kV	115kV *
10 sec. w/s wet ac	45kV	70kV *	60kV	80kV *	80kV	90kV *
6 hours w/s ac	35kV	95kV *	55kV	105kV *	75kV	110kV *
15 min. w/s dc	75kV	Pass	105kV	Pass	140kV	Pass
Impulse w/s	110kV	+ 195kV * - 180kV *	150kV	+ 210kV * - 195kV *	200kV	+ 225kV * - 210kV *
30 day Cyclic Aging @ 130°C w/s ac Corona @ 3pc. CEV> Impulse + 10 - 10	28.5kV 13kV + 110kV - 110kV	Pass Pass Pass Pass	48kV 21.5kV + 150kV - 150kV	Pass Pass Pass Pass	66kV 30kV + 200kV - 200kV	Pass Pass Pass Pass

8- SKIRT						
IEEE STD.48 Test	15kV Class		25kV Class		34.5kV Class	
	Requirement	Results	Requirement	Results	Requirement	Results
60 sec. w/s ac	50kV	115kV *	65kV	125kV *	90kV	135kV *
10 sec. w/s wet ac	45kV	75kV *	60kV	85kV *	80kV	95kV *
6 hours w/s ac	35kV	100kV *	55kV	110kV *	75kV	120kV *
15 min. w/s dc	75kV	Pass	105kV	Pass	140kV	Pass
Impulse w/s	110kV	+ 215kV * - 200kV *	150kV	+ 235kV * - 220kV *	200kV	+ 255kV * - 240kV *
30 day Cyclic Aging @ 130°C w/s ac Corona @ 3pc. CEV> Impulse + 10 - 10	28.5kV 13kV + 110kV - 110kV	Pass Pass Pass Pass	48kV 21.5kV + 150kV - 150kV	Pass Pass Pass Pass	66kV 30kV + 200kV - 200kV	Pass Pass Pass Pass

➔ 25kV class Quick Term II terminations 6S series will also meet prorated values for 28kV rated systems.

* At higher voltage flashover occur

8. Installation Technique



9. Maintenance

Surface Cleaning:

3M QTII (X) Series Terminations are not harmed by field surface cleaning. Established techniques for cleaning insulators and terminations, such as high pressure water or pulverized corn cob blasting, are acceptable. It should be noted, however, that only extreme areas of environmental contamination should require this kind of attention.

10. Availability

3M QTII (X) Series Terminations are available to terminate MV power cables.

8.1. For 1/C cables:

1. Prepare cable according to standard procedure.
2. Install grounding system of cable termination.
3. Slide termination assembly onto cable.
4. Install termination lug.
5. Place termination over cable and unwind the core allowing termination to shrink into place.
6. Apply 70-tape top seal.

8.2. For 3/C cables:

1. Prepare cable according to standard procedure.
 2. Install grounding system for 3 phases of cable.
 3. Place breakout boot and unwind the inner plastic support cores.
 4. Install RJS (re-jacketing Sleeves) for 3 phases. Prepare each phase cable for install termination.
 5. Install termination lug.
 6. Place and install termination assembly by unwind the inner plastic support core.
 7. Apply 70-tape top seal.
- Make the same for remaining phases.

11. Shelf Life

Components of 3M QTII (X) Series Terminations are stable under normal storage conditions.

Maximum recommended storage temperature is 43°C. The termination assemblies are not affected by freezing storage temperatures. Normal stock rotation procedures are recommended.

As provide, in the expanded state, QTII (X) Series have an on-shelf storage life of three years from the date of manufacture.

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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