



FP-301 Heat Shrink Tubing Kits

Heat Shrink Tubing Kits and Refill Packs

Data Sheet

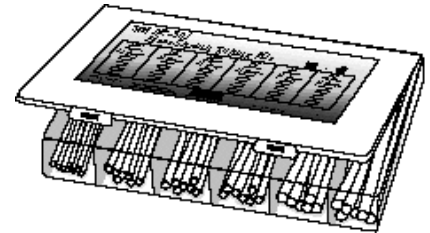
Product Description

The 3M™ FP-301 Heat Shrink Tubing Kits are a versatile assortment of flexible polyolefin heat shrink tubing. The kits are available in two different types: Assorted Colors or Black only. Each box is 7" x 11" x 2 1/2" (177.7 x 279.3 x 63.4 mm) of rugged translucent plastic with product and installation information on the cover. Both heat shrink kits allow an engineer, designer or technician to have a complete selection of popular sizes and colors for small projects and product development programs.

The **Assorted Color Kit** has a total of 133 pieces and contains seven colors: black, red, white, yellow, blue, green and clear. The Assorted Color Kit contents, by expanded diameter, are listed in the chart below.

The **Black Kit** contains 102 pieces, all of 6 inch (152.4 mm) lengths. The Black Kit contents, by expanded diameter, are listed in the chart below.

Each diameter has a corresponding refill pack that allows the customer to repurchase a single package of a specific diameter to replenish the kit. FP-301 is a 2:1 shrink ratio polyolefin-heat shrinkable tubing that is widely used in a variety of electronic and electrical applications.



Assorted Colors Kit

Description	Size	Pieces
FP-301	3/32" (2,36 mm)	35
FP-301	1/8" (3,18 mm)	28
FP-301	3/16" (4,75 mm)	21
FP-301	1/4" (6,35 mm)	21
FP-301	3/8" (9,53 mm)	14
FP-301	1/2" (12,70 mm)	14

Assorted Colors*

6" Refill Packs

Ordering Size	Quantity	Packs/Carton
3/32" (2,36 mm)	35 pieces	10
1/8" (3,18 mm)	28 pieces	10
3/16" (4,75 mm)	21 pieces	10
1/4" (6,35 mm)	21 pieces	10
3/8" (9,53 mm)	14 pieces	10
1/2" (12,70 mm)	14 pieces	10

* 7 different colors in each pack

Black Kit

Description	Size	Pieces
FP-301	3/16" (4,8 mm)	30
FP-301	1/4" (6,4 mm)	28
FP-301	3/8" (9,6 mm)	20
FP-301	1/2" (12,7 mm)	14
FP-301	3/4" (19,1 mm)	6
FP-301	1" (25,4 mm)	4

Black

6" Refill Packs:

Ordering Size	Quantity	Packs/Carton
3/16" (4,75 mm)	30 pieces	10
1/4" (6,35 mm)	26 pieces	10
3/8" (9,53 mm)	24 pieces	10
1/2" (12,70 mm)	20 pieces	10
3/4" (19,05 mm)	14 pieces	10
1" (25,40 mm)	10 pieces	10

Limited Warranty – 3M expressly warrants that for a period of ninety days from the date of purchase, 3M static control products will be free of defects in materials (parts) and workmanship (labor). Defects occurring during the warranty period will be repaired or products will be replaced at 3M's option and expense, if 3M receives notice during the warranty period. Defective products must be returned to 3M with proof of purchase date.

Warranty Exclusions – THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALLOTHER PRODUCT WARRANTIES, EXPRESS AND IMPLIED, INCLUDING FITNESS AND MERCHANTABILITY. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean, or repair products.

Limit of Liability – In no event will 3M or Seller be responsible or liable for special, incidental, or consequential losses or damages, whether based in tort or contract. Fulfillment of 3M's warranty obligations will be Customer's exclusive remedy and 3M's and Seller's limit of liability for any breach of warranty or otherwise.

For your nearest distributor or to order, call 1-800-328-1368

3M Electrical Specialties Division

6801 River Place Blvd.
Austin, TX 78726-9000

© 3M March 1997

3M

Heat Shrinkable Products

Heavy-Wall Tubing	pg. 357	Adhesive-Lined Tubing	pg. 367
Medium-Wall Tubing	pg. 360	Bus Bar Tubing	pg. 369
Thin-Wall Tubing	pg. 362		

3M offers a full line of heat shrinkable tubing. If the product, product size or product length you need is not listed in this catalog, contact your 3M Electrical Markets distributor or sales representative for a quote.



3M™ Heat Shrink Tubing Selector Guide

Product	Material/Typical Applications	Application Specifications
Thin-Wall Tubings FP-301	Flexible Polyolefin (2:1 Shrink) tubing for general purpose insulation; identification; UL, CSA and MIL-I-23053/5 applications; cable and component covering (black, white, red, blue, clear, green and yellow). Rated to 135°C.	MIL-I-23053/5, Class 1 and 2; AMS-3636; AMS-3637; File E39100; CSA LR38227
Kynar®	Semi-rigid, thin-wall (2:1 Shrink) heat-resistant transparent insulation and marking for electronic and appliance applications. Rated to 175°C.	MIL-DTL-23053/18, Class 1; MIL-DTL-23053/8; AMS-3632; UL File E-39100, VW-1, E69751; CSA LR38227 OFT
Thin-Wall Adhesive-Lined EPS-300	Flexible, polyolefin tubing (3:1 Shrink) with adhesive; insulation, strain relief and environmental protection for automotive and marine wire bundles and splices. (black). Rated to 110°C.	MIL-I-23053/4, Class 3; File 15227
MW	Semi-rigid, polyolefin tubing (2.5:1 Shrink) with adhesive; insulation strain relief and sealing electrical connections and electrical components. (black). Rated to 110°C.	MIL-I-23053/4, Class 1; AMS-3534 File 15227
Medium-Wall IMCSN	Adhesive lined, medium wall polyolefin (3:1 Shrink). Split resistant tubing for electrical splices, connections; moisture seals and mechanical protection. Rated to 1000V. (black)	
MDT	Adhesive lined, thick wall polyolefin (3:1 Shrink). Flame-retardant, split resistant tubing for electrical splices, connections; mechanical and abrasion resistance. Rated to 1000V. (black, not printed)	MIL-I-23053/15, Class 1
Heavy-Wall ITCSN	Adhesive lined, thick wall polyolefin (3:1 Shrink), split resistant tubing for electrical splices, connections; mechanical and abrasion resistance. Rated to 1000V. (black)	UL 486D, File E102356
HDT	Adhesive lined, medium wall polyolefin (3:1 Shrink). Flame-retardant, split resistant, tubing for electrical splices, connections; moisture seals and mechanical protection. Rated to 1000V. (black, not printed)	MIL-I-23053/15, Class 2
Bus Bar Insulation BBI-A	See page 369	Conforms to requirements of ANSI/IEEE #C37.20

3M™ Heat Shrink Tubing Selector Guide

Typical Properties	FP-301	MW	EPS-300	IMCSN
Operating Temperature Range	-67°F to +275°F (-55°C to +135°C)	-67°F to +230°F (-55°C to +110°C)	-67°F to +230°F (-55°C to +110°C)	-67°F to +230°F (-55°C to +110°C)
Shrink Temperature (Min.)	212°F (100°C)	275°F (135°C)	250°F (121°C)	250°F (121°C)
Shrink Ratio	2:1	2.5:1	3:1	3:1
Standard Sizes Expanded Diameter	3/64" to 4" (1,19 to 101,6 mm)	1/8" to 1" (3,18 to 25,4 mm)	1/8" to 1 1/2" (3,18 to 38,1 mm)	0.400" to 6" (10,16 to 152,4 mm)
Dielectric Strength (V/Mil)	900	900	700	500
Volume Resistivity (ohm-cm)	10 ¹⁵	10 ¹⁵	10 ¹⁴	10 ¹⁴
Tensile Strength (psi)	2400	2200	2100	2400
Elongation (%)	400	400	450	450
Longitudinal Change (± %)	±5%	+1, -10%	+1, -15%	+1, -10%
Specific Gravity	1.3	1.0	1.3	1.28
Flammability	Self-extinguish meets UL 224 flame test except clear	n/a	Outer Jacket Self-extinguish meets UL 224 flame test	N/A
Corrosive Effect	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive
Abrasion Resistance	Good	Good	Good	Good
Fuel & Oil Resistance	Good	Good	Good	Good
Solvent Resistance	Excellent	Excellent	Good	Excellent
Resistance to Acids & Alkalis	Excellent	Excellent	Excellent	Excellent

3M™ Heat Shrink Tubing Selector Guide

Typical Properties	ITCSN	HDT	MDT	Kynar®
Operating Temperature Range	-67°F to +230°F (-55°C to +110°C)	-67°F to +230°F (-55°C to +110°C)	-67°F to +230°F (-55°C to +110°C)	-67°F to +347°F (-55°C to +175°C)
Shrink Temperature (Min.)	250°F (121°C)	250°F (121°C)	250°F (121°C)	347°F (175°C)
Shrink Ratio	3:1	3:1	3:1	2:1
Standard Sizes Expanded Diameter	0.400 to 4.30" (10,16 to 152,4 mm)	0.300 to 7.00" (7,62 to 177,8 mm)	0.400 to 4.30" (10,16 to 152,4 mm)	3/64 to 2" (1,19 to 50,8 mm)
Dielectric Strength (V/Mil)	500	500	500	900
Volume Resistivity (ohm-cm)	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Tensile Strength (psi)	2400	2400	2400	5500
Elongation (%)	475	475	475	350
Longitudinal Change (± %)	+1, -10%	+1, -10%	+1, -10%	+1, -10%
Specific Gravity	1.28	1.28	1.28	1.7
Flammability	N/A	Flame-retardant	Flame-retardant	Self-extinguish meets UL 224 VW-1 Test
Corrosive Effect	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive
Abrasion Resistance	Good	Good	Good	Excellent
Fuel & Oil Resistance	Good	Good	Good	Excellent
Solvent Resistance	Good	Good	Good	Excellent
Resistance to Acids & Alkalis	Excellent	Excellent	Excellent	Excellent

Heavy-Wall Tubing

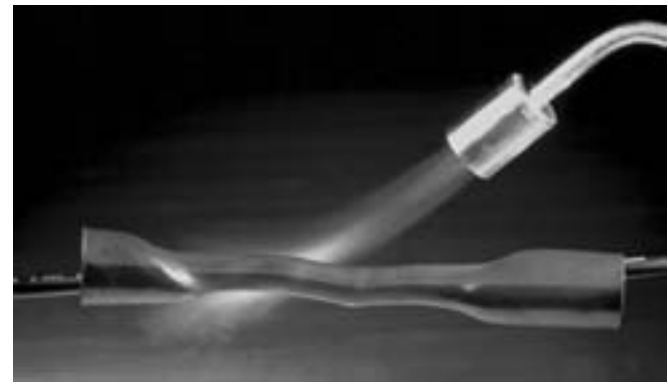
3M™ ITCSN Heavy-Wall Cable Sleeves for 1 kV

Shrink Ratio 3:1

3M ITCSN heat shrinkable cable sleeves are designed to provide reliable performance for electrical splices, connections and terminations, as well as mechanical and environmental protection.



ITCSN heavy-wall cable sleeves are cross-linked polyolefin. They are highly split resistant and fast shrinking to provide rapid installation. The cut-to-length sleeves come standard with a factory-applied adhesive/sealant. Order any of several



packaging choices or look for the counter merchandiser assortment at a 3M authorized distributor. Rated to 1 kV, UL Listed 486 D for 600V. File Number E102356. CSA rating.

When ordering, please specify boxed, bulk, tamper evident bag or merchandising display to assure proper pricing.

Specification and Ordering Information for 3M ITCSN Cut Lengths (Black Only)

Product Number	UPC (054007-)		Typical Cable Range	Expanded/Recovered I.D.	Length	Case Qty		Certifications and Listings
	Boxed	Bulk				Boxed	Bulk	
ITCSN-0400-6	08887	08963	12-6 AWG (4-10 mm ²)	0.40/0.15" (10,2/3,8 mm)	6" (15,2 cm)	25 pieces	100	UL E102356 SF
ITCSN-0400-48	08902	08964	12-6 AWG (4-10 mm ²)	0.40/0.15" (10,2/3,8 mm)	48" (121,9 cm)	5 pieces	20	UL E102356 SF
ITCSN-0800-6	40067	50474	8-1/0 AWG (10-50 mm ²)	0.80/0.20" (20,3/5,1 mm)	6" (15,2 cm)	25 pieces	100	UL E102356 SF
ITCSN-0800-9	08890	08966	8-1/0 AWG (10-50 mm ²)	0.80/0.20" (20,3/5,1 mm)	9" (22,9 cm)	25 pieces	100	UL E102356 SF
ITCSN-0800-12	08889	08967	8-1/0 AWG (10-50 mm ²)	0.80/0.20" (20,3/5,1 mm)	12" (30,5 cm)	25 pieces	100	UL E102356 SF
ITCSN-0800-48	08903	08968	8-1/0 AWG (10-50 mm ²)	0.80/0.20" (20,3/5,1 mm)	48" (121,9 cm)	5 pieces	20	UL E102356 SF
ITCSN-1100-6	08894	08969	2-4/0 AWG (35-95 mm ²)	1.10/0.37" (27,9/9,4 mm)	6" (15,2 cm)	25 pieces	100	UL E102356 SF
ITCSN-1100-9	08893	08970	2-4/0 AWG (35-95 mm ²)	1.10/0.37" (27,9/9,4 mm)	9" (22,9 cm)	25 pieces	100	UL E102356 SF
ITCSN-1100-12	08892	08971	2-4/0 AWG (35-95 mm ²)	1.10/0.37" (27,9/9,4 mm)	12" (30,5 cm)	10 pieces	100	UL E102356 SF
ITCSN-1100-48	08904	08972	2-4/0 AWG (35-95 mm ²)	1.10/0.37" (27,9/9,4 mm)	48" (121,9 cm)	5 pieces	20	UL E102356 SF
ITCSN-1500-9	08897	08973	3/0 AWG-400 kcmil (95-185 mm ²)	1.50/0.50" (38,1/12,7 mm)	9" (22,9 cm)	10 pieces	50	UL E102356 SF
ITCSN-1500-12	08896	08974	3/0 AWG-400 kcmil (95-185 mm ²)	1.50/0.50" (38,1/12,7 mm)	12" (30,5 cm)	10 pieces	50	UL E102356 SF
ITCSN-1500-48	08905	08975	3/0 AWG-400 kcmil (95-185 mm ²)	1.50/0.50" (38,1/12,7 mm)	48" (121,9 cm)	5 pieces	20	UL E102356 SF
ITCSN-2000-9	08900	08976	250-750 kcmil (150-300 mm ²)	2.00/0.65" (50,8/16,5 mm)	9" (22,9 cm)	10 pieces	50	UL E102356 SF
ITCSN-2000-12	08899	08977	250-750 kcmil (150-300 mm ²)	2.00/0.65" (50,8/16,5 mm)	12" (30,5 cm)	10 pieces	50	UL E102356 SF
ITCSN-2000-48	08906	08978	250-750 kcmil (150-300 mm ²)	2.00/0.65" (50,8/16,5 mm)	48" (121,9 cm)	5 pieces	20	UL E102356 SF
ITCSN-3000-12	08901	08979	600-1250 kcmil (400-625 mm ²)	3.00/1.00" (76,2/25,4 mm)	12" (30,5 cm)	10 pieces		SF
ITCSN-3000-48	08907	08980	600-1250 kcmil (400-625 mm ²)	3.00/1.00" (76,2/25,4 mm)	48" (121,9 cm)	5 pieces		SF
ITCSN-4500-48	37979	08981	1500-2500 kcmil (800-1000 mm ²)	4.50/1.50" (114,3/38,1 mm)	48" (121,9 cm)	5 pieces		SF
ITCSN-6000-48	37980	08982	2.1-4.8" (53-122 mm ²)	6.00/1.80" (152,4/45,7 mm)	48" (121,9 cm)	5 pieces		SF

Note: Flame-retarded ITCSF and other sizes and lengths are available subject to quote. Uncoated product is available on special order—order part number with the suffix "U".

Specification and Ordering Information for 3M™ ITCSN Tamper Evident Bags

Product Number	UPC (054007-)	Description	Expanded/Recovered I.D.	Case Qty.	Certifications and Listings
ITCSN-0400-6 (black)	50475	6" (15,2 cm) pieces, 6 per bag	0.40/0.15" (10,2/3,8 mm)	12 packs	UL E102356 SF
ITCSN-0400-6 (red)	38153*	6" (15,2 cm) pieces, 6 per bag	0.40/0.15" (10,2/3,8 mm)	12 packs	UL E102356
ITCSN-0800-6 (black)	50474	6" (15,2 cm) pieces, 6 per bag	0.80/0.20" (20,3/5,1 mm)	12 packs	UL E102356 SF
ITCSN-0800-6 (red)	38154*	6" (15,2 cm) pieces, 6 per bag	0.80/0.20" (20,3/5,1 mm)	12 packs	UL E102356
ITCSN-1100-9 (black)	50473	9" (22,9 cm) pieces, 6 per bag	1.10/0.37" (27,9/9,4 mm)	12 packs	UL E102356 SF
ITCSN-1100-9 (red)	38155*	9" (22,9 cm) pieces, 6 per bag	1.10/0.37" (27,9/9,4 mm)	12 packs	UL E102356
ITCSN-1500-9 (black)	50472	9" (22,9 cm) pieces, 3 per bag	1.50/0.50" (38,1/12,7 mm)	12 packs	UL E102356 SF
ITCSN-2000-12 (black)	50471	12" (30,5 cm) pieces, 3 per bag	2.00/0.65" (50,8/16,5 mm)	12 packs	UL E102356 SF

* UPC (051135-)

Specification and Ordering Information for 3M™ ITCSN 25-Foot Reels

Reeled sleeves come without the factory-applied adhesive/sealant.

Product Number	UPC (054007-)	Cable Range	Expanded/Recovered I.D.	Length	Case Qty.	Certifications and Listings
ITCSN-0400-25-U	08886	12-6 AWG (4-10 mm ²)	0.40/0.15" (10,2/3,8 mm)	25' reel (762 cm)	1 reel	SF
ITCSN-0800-25-U	08888	8-1/0 AWG (10-50 mm ²)	0.80/0.20" (20,3/5,1 mm)	25' reel (762 cm)	1 reel	SF
ITCSN-1100-25-U	08891	2-4/0 AWG (35-95 mm ²)	1.10/0.37" (27,9/9,4 mm)	25' reel (762 cm)	1 reel	SF
ITCSN-1500-25-U	08895	3/0 AWG-400 kcmil (95-185 mm ²)	1.50/0.50" (38,1/12,7 mm)	25' reel (762 cm)	1 reel	SF
ITCSN-2000-25-U	08898	250-750 kcmil (150-300 mm ²)	2.00/0.65" (50,8/16,5 mm)	25' reel (762 cm)	1 reel	SF

Note: Reels are not supplied with factory-applied adhesive/sealant.

Specification and Ordering Information for 3M™ ITCSN Counter Merchandiser Assortment

UPC 054007-50500, black only, case quantity 1, contents include:

Product Number	Product Length	Product Quantity	Cable Range	Expanded/Recovered I.D.	Certifications and Listings
ITCSN-0400	6" (15,2 cm)	52	12-6 AWG (4-10 mm ²)	0.40/0.15" (10,2/3,8 mm)	UL E102356 SF
ITCSN-0800	9" (22,9 cm)	35	8-1/0 AWG (10-50 mm ²)	0.80/0.20" (20,3/5,1 mm)	UL E102356 SF
ITCSN-1100	9" (22,9 cm)	25	2-4/0 AWG (35-95 mm ²)	1.10/0.37" (27,9/9,4 mm)	UL E102356 SF
ITCSN-1500	9" (22,9 cm)	12	3/0 AWG-400 kcmil (95-185 mm ²)	1.50/0.50" (38,1/12,7 mm)	UL E102356 SF



Product Referral Generator

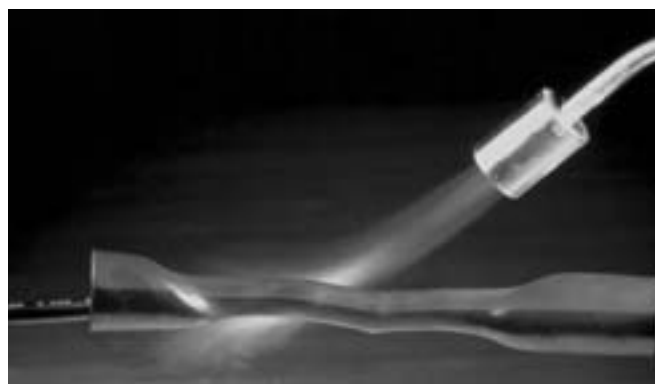
- Tubing
 - Cold Shrinkpg. 272
- Taping
 - Vinyl Electrical Tapepg. 3
- Sealing
 - Resin Kitpg. 265

3M™ HDT Heavy-Wall Flame-Retardant Cable Sleeves for 1 kV

Shrink Ratio 3:1

3M HDT heat shrinkable cable sleeves are designed to provide reliable performance for electrical splices, connections and terminations, as well as mechanical and environmental protection. 3M HDT heavy-wall cable sleeves are cross-linked polyolefin. They are flame-retardant, highly split resistant and fast shrinking to provide rapid installation. The 48 in. (121,9 cm) sleeves come standard with a factory-applied adhesive/sealant. Order any of several packaging choices or look for the counter merchandiser assortment at a 3M authorized distributor and are not printed. MIL-DTL-23053/15, Class 1.

Order in the size equivalent to expanded inside diameter required.



Specification and Ordering Information for 3M HDT Cable Sleeves 4-Foot Lengths (Black Only)

Product Number	UPC (054007-)	Cable Range	Expanded/Recovered I.D.	4' Lengths Per Case
HDT-0400-48A	40649	#12 – #6 AWG	0.40/0.15" (10,2/3,8 mm)	20
HDT-0800-48A	40650	#8 – 1/0 AWG	0.80/0.20" (20,3/5,1 mm)	20
HDT-1100-48A	40651	#2 – 4/0 AWG	1.10/0.37" (27,9/9,4 mm)	20
HDT-1500-48A	40652	3/0 – 400 MCM	1.50/0.50" (38,1/12,7 mm)	20
HDT-2000-48A	40654	250 – 750 MCM	2.00/0.65" (50,8/16,5 mm)	10
HDT-3000-48A	40655	600 – 1250 MCM	3.00/1.00" (76,2/25,4 mm)	10
HDT-4500-48A	40656	1000 – 2500 MCM	4.50/1.50" (114,3/38,1 mm)	5
HDT-6000-48A	59022	2.1" – 4.8" O.D.	6.00/1.80" (152,4/45,7 mm)	5
HDT-7000-48A	37774*	2.5" – 5.6" O.D.	7.00/2.00" (177,8/50,8 mm)	5

*UPC prefix 051135-

Medium-Wall Tubing

3M™ IMCSN Medium-Wall Cable Sleeves for 1kV

3M IMCSN heat shrinkable medium-wall cable sleeves are reliable, tough performers made of split-resistant cross-linked polyolefin. Use for 1 kV splices, connections, terminations and re-jacketing. They are designed to protect against mechanical and environmental dangers providing excellent abrasion, corrosion and chemical resistance. 3M IMCSN sleeves have



greater flexibility than the ITCSN, our heavy-wall version. Installation of these fast-shrinking sleeves is easy with little training necessary.

The 48" (121,9 cm) lengths come standard with a factory-applied adhesive/sealant, a thermoplastic material that remains flexible over long periods under adverse environmental conditions. During heating the sealant softens, bonds to underlying surfaces and fills small voids that might be present.

The 25' (7,62 m) reel version is uncoated. Applications include bus bar insulations and phase re-jacketing.

Specification and Ordering Information for 3M IMCSN 4-Foot Lengths

Product Number	UPC (054007-)	Cable Range	Expanded/Recovered I.D.	Cable O.D.	Case Qty.
IMCSN-0400-48A	58810	12-6 AWG (4-10 mm ²)	0.40/0.15" (10,2/3,8 mm)	0.35-0.15" (9-3,3 mm)	20
IMCSN-0800-48A	58811	8-3 AWG (10-25 mm ²)	0.80/0.22" (20,3/5,6 mm)	0.70-0.22" (18-5,6 mm)	20
IMCSN-1100-48A	58812	2-2/0 AWG (35-60 mm ²)	1.10/0.37" (27,9/9,4 mm)	0.95-0.37" (24-9,4 mm)	20
IMCSN-1300-48A	03448*	1-4/0 AWG (50-100 mm ²)	1.30/0.43" (33/10,9 mm)	1.10-0.43" (28-10,8 mm)	20
IMCSN-1500-48A	58813	1/0-250 kcmil (60-120 mm ²)	1.50/0.50" (38,1/12,7 mm)	1.30-0.50" (33-12,1 mm)	20
IMCSN-1700-48A	03317*	4/0-400 kcmil (120-200 mm ²)	1.70/0.60" (43,2/15,2 mm)	1.45-0.60" (37-15,2 mm)	20
IMCSN-2000-48A	58814	300-500 kcmil (185-250 mm ²)	2.00/0.75" (50,8/19,1 mm)	1.75-0.75" (44,5-19,0 mm)	15
IMCSN-3000-48A	58815	600-1250 kcmil (325-625 mm ²)	3.00/1.00" (76,2/25,4 mm)	2.50-1.00" (63,5-25,4 mm)	15
IMCSN-4300-48A	58809	1000-2500 kcmil (625-1000 mm ²)	4.30/1.50" (109,2/38,1 mm)	3.60-1.50" (91,5-29,5 mm)	10

*UPC prefix 051135-.

Note: Flame retardant IMCSF and other sizes and lengths are available subject to quote. Uncoated product is available on special order. Order part number with suffix "u".

Specification and Ordering Information for 3M IMCSN 25-Foot Reels

Product Number	UPC (051135-)	Cable Range	Expanded/Recovered I.D.	Cable O.D.	Case Qty.
IMCSN-0400-25U	03481	12-6 AWG (4-10 mm ²)	0.40/0.15" (10,2/3,8 mm)	0.35-0.15" (9-3,3 mm)	1 reel
IMCSN-0800-25U	03482	8-3 AWG (10-25 mm ²)	0.80/0.22" (20,3/5,6 mm)	0.70-0.22" (18-5,6 mm)	1 reel
IMCSN-1100-25U	03483	2-2/0 AWG (35-60 mm ²)	1.10/0.37" (27,9/9,4 mm)	0.95-0.37" (24-9,4 mm)	1 reel
IMCSN-1300-25U	03484	1-4/0 AWG (50-100 mm ²)	1.30/0.43" (33/10,9 mm)	1.10-0.43" (28-10,8 mm)	1 reel
IMCSN-1500-25U	03485	1/0-250 kcmil (60-120 mm ²)	1.50/0.50" (38,1/12,7 mm)	1.30-0.50" (33-12,1 mm)	1 reel
IMCSN-1700-25U	03486	4/0-400 kcmil (120-200 mm ²)	1.70/0.60" (43,2/15,2 mm)	1.45-0.60" (37-15,2 mm)	1 reel
IMCSN-2000-25U	03487	300-500 kcmil (185-250 mm ²)	2.00/0.75" (50,8/19,1 mm)	1.75-0.75" (44,5-19,0 mm)	1 reel
IMCSN-3000-25U	03530	600-1250 kcmil (325-625 mm ²)	3.00/1.00" (76,2/25,4 mm)	2.50-1.00" (63,5-25,4 mm)	1 reel
IMCSN-4300-25U	03531	1000-2500 kcmil (625-1000 mm ²)	4.30/1.50" (109,2/38,1 mm)	3.60-1.50" (91,5-29,5 mm)	1 reel

Note: Reels are not supplied with factory-applied adhesive/sealant.

3M™ MDT Medium-Wall, Flame-Retardant Cable Sleeves for 1kV

3M MDT heat shrinkable medium-wall cable sleeves are reliable, tough performers made of split-resistant cross-linked polyolefin. Use for 1 kV splices, connections, terminations and re-jacketing. They are flame-retardant and are designed to protect against mechanical and environmental dangers, providing excellent abrasion, corrosion and chemical resistance. MDT sleeves have greater flexibility than the HDT, our heavy-wall version. Installation of these fast-shrinking sleeves is easy with little training necessary.

The 48" (121,9 cm) lengths are unprinted and come standard with a factory-applied adhesive/sealant, a thermoplastic material that



remains flexible over long periods under adverse environmental conditions. During heating the sealant softens, bonds to underlying surfaces and fills small voids that might be present.

Order in the size equivalent to expanded inside diameter required.

Specification and Ordering Information for 3M MDT Cable Sleeves 4-Foot Lengths (Black Only)

Product Number	UPC (054007-)	Cable Range	Expanded/Recovered I.D.	4' Lengths Per Case
MDT-0400-48A	40672	#12 – #6 AWG	0.40/0.15" (10,2/3,8 mm)	20
MDT-0800-48A	40673	#8 – #3 AWG	0.80/0.22" (20,3/5,6 mm)	20
MDT-1100-48A	40674	#2 – 2/0 AWG	1.10/0.37" (27,9/9,4 mm)	20
MDT-1300-48A	40675	#1 – 4/0 AWG	1.30/0.43" (33,0/10,9 mm)	20
MDT-1500-48A	40676	1/0 – 250 MCM	1.50/0.50" (38,1/12,7 mm)	20
MDT-1700-48A	40677	4/0 – 400 MCM	1.70/0.60" (43,2/15,2 mm)	20
MDT-2000-48A	40678	300 – 500 MCM	2.00/0.75" (50,8/19,1 mm)	15
MDT-3000-48A	40679	600 – 1250 MCM	3.00/1.00" (76,2/25,4 mm)	15
MDT-4300-48A	40680	1000 – 2500 MCM	4.30/1.50" (109,2/38,1 mm)	10

Thin-Wall Tubing

3M™ Thin-Wall Tubing FP-301

Shrink Ratio 2:1



3M Thin-Wall Tubing FP-301 is a heat shrinkable flexible polyolefin tubing that offers an outstanding balance of electrical, physical and chemical properties for a wide variety of industrial and military applications. Rated for 275°F(135°C) continuous operation.

3M tubing FP-301 is typically used as a shrink-fit electrical insulation over cable splices and terminations. It is also used for lightweight wire harness covering, wire marking, wire bundling, component packaging and fire resistant covering.

3M clear tubing FP-301 provides excellent visibility for component packing. All 3M tubing FP-301 is split resistant, mechanically tough, easily marked and resists cold flow.

FP-301 is available in black, white, red, blue, yellow and clear in the standard lengths of 6-inch (15,2 cm) cut pieces, 48-inch (1,21 m) and small (8.5-inch core diameter) spools of 50 (15,24 m) and 100 (30,48 m) feet. Four-foot lengths of green tubing are available in sizes 1/16 inch to 1/2 inch. The Assorted Color Kit has a total of 133 pieces and contains seven colors: black, red, white, yellow, blue, green and clear (see chart below.) The Black Kit contains 102 pieces, all 6" (512,4 mm) lengths (see chart below.) Additional sizes, colors and put-ups are available — please contact your 3M Electrical Products Sales Representative.

Application Specifications: UL Recognized and CSA Certified at 600 volts at 257°F(125°C); UL File No. E-39100 and CSA No. 38227. MIL-I-23053/5, Class 1,2. AMS 3636 (Type I) and AMS 3637 (Type II).

To Order: Reference specific product size, color and description on the following pages. Example: FP-301-1/4, white 6" (15,2 cm) pieces.

Specification and Ordering Information for 3M Thin-Wall Tubing FP-301 Assortment Kits

Description	UPC (051135-)	Case Quantity
Assorted Colors Kit	37677	5 kits
Kit Contents:	Kit Quantity:	
3/32" (2,35 mm)	35	—
1/8" (3,18 mm)	28	—
3/16" (4,75 mm)	21	—
1/4" (6,35 mm)	21	—
3/8" (9,53 mm)	14	—
1/2" (12,70 mm)	14	—
Assorted Black Kit	38139	5 kits
Kit Contents:	Kit Quantity:	
3/16" (4,8 mm)	30	—
1/4" (6,5 mm)	28	—
3/8" (9,6 mm)	20	—
1/2" (12,7 mm)	14	—
3/4" (19,1 mm)	6	—
1" (25,4 mm)	4	—

Specification and Ordering Information for 3M Thin-Wall Tubing FP-301 Six-Inch Pieces—Tamper Evident Bags (Refills for Kits)

Product No.	Size	Color	UPC (051135-)		Expanded/ Recvd. I.D.	Case Qty
			Descrpt.			
FP-301	3/64" (1,19 mm)	Black Clear	36484 36485	40 pcs/bag	0.046/0.023" (1,17/0,58 mm)	10
FP-301	1/16" (1,59 mm)	Black Clear	36486 36487	38 pcs/bag	0.063/0.031" (1,6/0,79 mm)	10
FP-301	3/32" (2,4 mm)	Black Clear	36488 36489	36 pcs/bag	0.093/0.046" (2,36/1,17 mm)	10
FP-301	1/8" (3,18 mm)	Black Clear	36490 36491	34 pcs/bag	0.125/0.062" (3,18/1,57 mm)	10
FP-301	3/16" (4,77 mm)	Black Clear	36492 36493	30 pcs/bag	0.187/0.093" (4,75/2,36 mm)	10
FP-301	1/4" (6,4 mm)	Black Clear	36494 36495	26 pcs/bag	0.250/0.125" (6,35/3,18 mm)	10
FP-301	3/8" (9,55 mm)	Black Clear	36496 36497	24 pcs/bag	0.375/0.187" (9,53/4,75 mm)	10
FP-301	1/2" (12,7 mm)	Black Clear	36498 36499	20 pcs/bag	0.500/0.250" (12,7/6,35 mm)	10
FP-301	3/4" (19,0 mm)	Black Clear	36500 36501	14 pcs/bag	0.750/0.375" (19,05/9,52 mm)	10
FP-301	1" (25,4 mm)	Black Clear	36502 36503	10 pcs/bag	1.000/0.500" (25,4/12,7 mm)	10
FP-301	1-1/2" (38,1 mm)	Black Clear	36504 36505	6 pcs/bag	1.500/0.750" (38,1/19,05 mm)	10
FP-301	2" (50,8 mm)	Black Clear	36506 36507	4 pcs/bag	2.000/1.000" (50,8/25,4 mm)	10
FP-301	3" (76,0 mm)	Black Clear	36508 36509	3 pcs/bag	3.000/1.500" (76,2/38,1 mm)	10
FP-301	4" (102,0 mm)	Black Clear	36510 36511	2 pcs/bag	4.000/2.000" (101,6/50,8 mm)	10

Specification and Ordering Information for 3M FP-301 Assortment Packs of Six-Inch Lengths—Tamper Evident Bags (Refills for Kits)

Product	Size	Color	UPC (051135-)		Case Qty.
			Description		
FP-301	3/64–3/16" (1,19–4,77 mm)	Black	36612	6 each of 5 sizes	10
FP-301	1/4–3/4" (6,4–19,0 mm)	Black	36613	4 each of 4 sizes	10
FP-301	1-4" (25,4–102 mm)	Black	36614	2 each of 5 sizes	10
FP-301	3/32" (2,4 mm)	Assort.	36618	5 each of 7 colors	10
FP-301	1/8" (3,18 mm)	Assort.	36619	4 each of 7 colors	10
FP-301	3/16" (4,77 mm)	Assort.	36620	3 each of 7 colors	10
FP-301	1/4" (6,4 mm)	Assort.	36621	3 each of 7 colors	10
FP-301	3/8" (9,55 mm)	Assort.	36622	2 each of 7 colors	10
FP-301	1/2" (12,7 mm)	Assort.	36623	2 each of 7 colors	10

Specification and Ordering Information for
3M™ Thin-Wall Tubing FP-301 Four-Foot
Sticks (small box)

Product No.	Size	Color	UPC (051135-)	Descript.	Expanded/ Recvd. I.D.	Case Qty
FP-301	3/64" (1,17 mm)	Black	36644	25 48" Sticks (1,22 m)	0.046/0.023" (1,17/0,58 mm)	1
		Clear	36645			
		White	36646			
		Red	36647			
		Blue	36649			
		Yellow	36648			
FP-301	1/16" (1,58 mm)	Black	36650	25 48" Sticks (1,22 m)	0.063/0.031" (1,6/0,79 mm)	1
		Clear	36651			
		White	36652			
		Red	36653			
		Blue	36655			
		Yellow Green	36654 36672			
FP-301	3/32" (2,38 mm)	Black	36673	25 48" Sticks (1,22 m)	0.093/0.046" 2,36/1,17 mm)	1
		Clear	36674			
		White	36675			
		Red	36676			
		Blue	36678			
		Yellow Green	36677 36679			
FP-301	1/8" (3,18 mm)	Black	36680	25 48" Sticks (1,22 m)	0.125/0.062" (3,18/1,57 mm)	1
		Clear	36681			
		White	36682			
		Red	36683			
		Blue	36685			
		Yellow Green	36684 36686			
FP-301	3/16" (4,75 mm)	Black	36687	25 48" Sticks (1,22 m)	0.187/0.093" (4,75/2,36 mm)	1
		Clear	36688			
		White	36689			
		Red	36690			
		Blue	36692			
		Yellow Green	36691 36693			
FP-301	1/4" (6,35 mm)	Black	36694	12 48" Sticks (1,22 m)	0.250/0.125" (6,35/3,18 mm)	1
		Clear	36695			
		White	36696			
		Red	36697			
		Blue	36699			
		Yellow Green	36698 36700			
FP-301	3/8" (9,5 mm)	Black	36701	12 48" Sticks (1,22 m)	0.375/0.187" (9,53/4,75 mm)	1
		Clear	36702			
		White	36703			
		Red	36704			
		Blue	36706			
		Yellow Green	36705 36707			
FP-301	1/2" (12,7 mm)	Black	36709	12 48" Sticks (1,22 m)	0.500/0.250" (12,7/6,35 mm)	1
		Clear	36710			
		White	36711			
		Red	36712			
		Blue	36714			
		Yellow Green	36713 36715			
FP-301	3/4" (19,05 mm)	Black	36716	12 48" Sticks (1,22 m)	0.750/0.375" (19,01/9,53 mm)	1
		Clear	36720			
		White	36721			
		Red	36722			
		Blue	36724			
		Yellow Green	36723 37764			
FP-301	1" (25,4 mm)	Black	36725	5 48" Sticks (1,22 m)	1.000/0.500" (25,4/12,7 mm)	1
		Clear	36726			
		White	36727			
		Red	36728			
		Blue	36730			
		Yellow Green	36729 37767			

Continued on next column

Specification and Ordering Information for
3M Thin-Wall Tubing FP-301 Four-Foot
Sticks (small box)

Product No.	Size	Color	UPC (051135-)	Descript.	Expanded/ Recvd. I.D.	Case Qty
FP-301	1-1/2" (38,1 mm)	Black	36731	5 48" Sticks (1,22 m)	1.500/0.750" (38,1/19,05 mm)	1
		Clear	36732			
		White	36733			
		Red	36734			
		Blue	36736			
		Yellow	36735			
FP-301	2" (50,8 mm)	Black	36737	5 48" Sticks (1,22 m)	2.000/1.000" (50,8/25,4 mm)	1
		Clear	36738			
		White	36739			
		Red	36740			
		Blue	36742			
		Yellow	36741			
FP-301	3" (76,2 mm)	Black	36743	2 48" Sticks (1,22 m)	3.000/1.500" (76,2/38,1 mm)	1
		Clear	36744			
FP-301	4" (101,6 mm)	Black	36745	2 48" Sticks (1,22 m)	4.000/2.000" (101,6/50,8 mm)	1
		Clear	36746			

Specification and Ordering Information for 3M™ Thin-Wall Tubing FP-301 Small Spools

Product No.	Size	Color	UPC (051135-)		Expanded/ Recvd. I.D.	Case Qty
			Descrpt.	UPC (051135-)		
FP-301	3/64" (1,19 mm)	Black Clear	36027** 36028**	100' Spool (30,5 m)	0.046/0.023" (1,17/0,58 mm)	300'
FP-301	1/16" (1,6 mm)	Black	35550	100' Spool (30,5 m)	0.063/0.031" (1,6/0,79 mm)	300'
		Clear	35555			
		White	35551			
		Red	35552			
		Blue	35553			
FP-301	3/32" (2,4 mm)	Black	35556	100' Spool (30,5 m)	0.093/0.046" (2,36/1,17 mm)	300'
		Clear	35548			
		White	35557			
		Red	35558			
		Blue	35559			
FP-301	1/8" (3,2 mm)	Black	35562	100' Spool (30,5 m)	0.125/0.062" (3,18/1,57 mm)	300'
		Clear	35567			
		White	35563			
		Red	35564			
		Blue	35565			
FP-301	3/16" (4,77 mm)	Black	35568	100' Spool (30,5 m)	0.187/0.093" (4,75/2,36 mm)	300'
		Clear	35573			
		White	35569			
		Red	35570			
		Blue	35571			
FP-301	1/4" (6,4 mm)	Black	35574	100' Spool (30,5 m)	0.250/0.125" (6,35/3,18 mm)	300'
		Clear	35579			
		White	35575			
		Red	35576			
		Blue	35577			
FP-301	3/8" (9,6 mm)	Black	35580	100' Spool (30,5 m)	0.375/0.187" (9,53/4,75 mm)	300'
		Clear	35585			
		White	35581			
		Red	35582			
		Blue	35583			
FP-301	1/2" (12,7 mm)	Black	35586	100' Spool (30,5 m)	0.500/0.250" (12,7/6,35 mm)	300'
		Clear	35591			
		White	35587			
		Red	35588			
		Blue	35589			
FP-301	3/4" (19,1 mm)	Black	35592	50' Spool (15,2 m)	0.750/0.375" (19,05/9,52 mm)	150'
		Clear	35597			
		White	35593			
		Red	35594			
		Blue	35595			
FP-301	1" (25,4 mm)	Black	35598	50' Spool (15,2 m)	1.000/0.500" (25,4/12,7 mm)	150'
		Clear	35603			
		White	35599			
		Red	35600			
		Blue	35601			
		Yellow	35602			
		Green	37768			

* UPC prefix 054007-

** UPC prefix 051138-

Continued on next column

Specification and Ordering Information for 3M Thin-Wall Tubing FP-301 Small Spools

Product No.	Size	Color	UPC (054007-)		Expanded/ Recvd. I.D.	Case Qty
			Descrpt.	UPC (054007-)		
FP-301	1-1/2" (38,1 mm)	Black	36026*	50' Spool (15,2 m)	1.500/0.750" (38,1/19,05 mm)	100'
		Clear	36025*			
		White	08515			
		Red	38860			
		Blue	38857			
FP-301	2" (50,8 mm)	Black	36024*	50' Spool (15,2 m)	2.000/1.000" (50,8/25,4 mm)	100'
		Clear	36023*			
		White	08519			
		Red	08518			
		Blue	38870			
FP-301	3" (76,2 mm)	Black	08521	50' Spool (15,2 m)	3.000/1.500" (76,2/38,1 mm)	50'
		Clear	38982			
		White	08522			
		Red	38881			
		Blue	38880			
FP-301	4" (101,6 mm)	Black	38884	50' Spool (15,2 m)	4.000/2.000" (101,6/50,8 mm)	50'
		Clear	38986			
		White	38894			
		Red	38893			
		Blue	58973			
		Yellow	38895			

* UPC prefix 051138-

Specification and Ordering Information for 3M Thin-Wall Tubing FP 25-Foot Reels Thin-Wall, Flexible Polyolefin

Product Number	UPC (054007-)	Expanded/ Recovered I.D.	Case Qty.
FP-063-BK-25	40058	0.063/0.031" (1,6/0,8 mm)	1
FP-093-BK-25	40059	0.093/0.046" (2,4/1,2 mm)	1
FP-125-BK-25	40060	0.125/0.062" (3,2/1,6 mm)	1
FP-187-BK-25	40061	0.187/0.093" (4,7/2,4 mm)	1
FP-250-BK-25	40062	0.250/0.125" (6,4/3,2 mm)	1
FP-375-BK-25	40063	0.375/0.187" (9,5/4,2 mm)	1
FP-500-BK-25	40064	0.500/0.250" (12,7/6,4 mm)	1
FP-750-BK-25	40065	0.750/0.375" (19,1/9,5 mm)	1
FP-1000-BK-25	40066	1.000/0.500" (25,4/12,7 mm)	1

Note: Bulk spools and 4-foot lengths are available subject to quotation. Special cut lengths are also available subject to quotation.

Specification and Ordering Information for 3M™ Thin-Wall Tubing FP-301 Four-Foot Lengths with Header Cards



Product No.	Size	Color	UPC (051135-)	Descript.	Expanded/ Recvd. I.D.	Case Qty
FP-301H	1/16" (1,58 mm)	Black	36748	25 48" Sticks (1,22 m)	0.063/0.031" (1,6/0,79 mm)	1
		Clear	36749			
		White	36750			
		Red	36751			
		Blue	36753			
		Yellow	36752			
		Green	36754			
FP-301H	3/32" (2,38 mm)	Black	36770	25 48" Sticks (1,22 m)	0.093/0.046" 2,36/1,17 mm)	1
		Clear	36771			
		White	36772			
		Red	36773			
		Blue	36775			
		Yellow	36774			
		Green	36776			
FP-301H	1/8" (3,18 mm)	Black	36777	25 48" Sticks (1,22 m)	0.125/0.062" (3,18/1,57 mm)	1
		Clear	36778			
		White	36779			
		Red	36780			
		Blue	36782			
		Yellow	36781			
		Green	36783			
FP-301H	3/16" (4,75 mm)	Black	36784	25 48" Sticks (1,22 m)	0.187/0.093" (4,75/2,36 mm)	1
		Clear	36785			
		White	36786			
		Red	36787			
		Blue	36789			
		Yellow	36788			
		Green	36790			
FP-301H	1/4" (6,35 mm)	Black	36791	12 48" Sticks (1,22 m)	0.250/0.125" (6,35/3,18 mm)	1
		Clear	36792			
		White	36793			
		Red	36794			
		Blue	36796			
		Yellow	36795			
		Green	36797			
FP-301H	3/8" (9,5 mm)	Black	36798	12 48" Sticks (1,22 m)	0.375/0.187" (9,53/4,75 mm)	1
		Clear	36799			
		White	36800			
		Red	36801			
		Blue	36803			
		Yellow	36802			
		Green	36804			
FP-301H	1/2" (12,7 mm)	Black	36805	12 48" Sticks (1,22 m)	0.500/0.250" (12,7/6,35 mm)	1
		Clear	36806			
		White	36807			
		Red	36808			
		Blue	36810			
		Yellow	36809			
		Green	36811			
FP-301H	3/4" (19,05 mm)	Black	36812	12 48" Sticks (1,22 m)	0.750/0.375" (19,01/9,53 mm)	1
		Clear	36813			
		White	36814			
		Red	36815			
		Blue	36817			
		Yellow	36816			
		Green	37763			
FP-301H	1" (25,4 mm)	Black	36818	5 48" Sticks (1,22 m)	1.000/0.500" (25,4/12,7 mm)	1
		Clear	36819			
		White	36820			
		Red	36821			
		Blue	36823			
		Yellow	36822			
		Green	37766			

3M™ Kynar® Heat Shrink, Cross-linked, Thin-walled, Modified Polyvinylidene Fluoride Tubing

3M Kynar tubing is a cross-linked, thin-walled, heat-shrinkable tubing offering a high degree of mechanical strength and high-temperature resistance. Fabricated from polyvinylidene fluoride, the tubing has outstanding abrasion resistance and cut-through properties in combination with high dielectric strength. It is inherently flame retardant, semi-rigid and highly resistant to most industrial fuels, chemicals and solvents. When heated in excess of 347°F (175°C), Kynar tubing rapidly shrinks to a skintight fit. Kynar tubing is rated for continuous operation from -67°F (-55°C) to 347°F (175°C).

Kynar tubing is recommended for shrink-fit protection and strain relief of wires, solder joints, terminals and connections. Kynar tubing has a 2:1 shrink ratio. Standard color is clear. Standard packaging is 4-foot lengths. Order Kynar tubing by product name, size equivalent to the expanded inside diameter, package type and color.

Applicable Specifications: MIL-DTL-23053/8, MIL-DTL-23053/18, Class 1; AMS-3632; UL File E-39100, VW-1; CSA LR 38227, OFT.

Kynar® is a registered trademark of Elf Atochem North America, Inc.



Specification and Ordering Information for Kynar Tubing with Header Cards

Product Number	Size	UPC (051135-)	Description	Expanded/Recovered I.D.	Broken Case Qty.	Case Qty.
Kynar-H	1/16"	38759	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.063/0.031" (1,60/0,79 mm)	—	1 box
Kynar-H	3/32"	38760	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.093/0.046" (2,36/1,17 mm)	—	1 box
Kynar-H	1/8"	38761	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.125/0.062" (3,18/1,57 mm)	—	1 box
Kynar-H	3/16"	38762	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.187/0.093" (4,75/2,36 mm)	—	1 box
Kynar-H	1/4"	38763	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.250/0.125" (6,35/3,18 mm)	—	1 box
Kynar-H	3/8"	38764	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.375/0.187" (9,53/4,75 mm)	—	1 box
Kynar-H	1/2"	38765	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.500/0.250" (12,70/6,35 mm)	—	1 box
Kynar-H	3/4"	38766	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	0.750/0.375" (19,05/9,53 mm)	—	1 box
Kynar-H	1"	38767	Modified Polyvinylidene Fluoride 48" Sticks w/Header Small Box	1.000/0.500" (25,40/12,70 mm)	—	1 box

*See your 3M sales representative for bulk 4' stick packages.

Adhesive-Lined Tubing

3M™ Thin-Wall, Flexible Polyolefin Adhesive-Lined Tubing EPS-300

Shrink Ratio 3:1



3M tubing EPS 300 is a thin-wall tubing offering the advantages of integral, dual wall construction. The tubing is made from flame-retardant, flexible polyolefin-lined with an internal layer of special thermoplastic adhesive. The heat shrinkable outer wall is selectively radiation cross-linked, while the adhesive maintains high flow and excellent adhesion characteristics. 3M tubing EPS-300 is an environmental protection sleeve and insulation. It offers environmental protection for electronic components, twisted pigtail and inline wire splices, crimp splices, wire bundles and wire harness breakouts in automotive, truck fleet, marine and industrial applications.

Standard Color: Black and standard packaging is four-foot (1,219 m) lengths and six-inch (15,2 cm) cut pieces. Also available in a kit containing 42 pieces of 6-inch lengths in assorted sizes (see chart below.) Additional sizes, colors and put-ups are available — please contact your 3M Electrical Markets Sales Representative.

Application Specifications: MIL-I-23053/4, Class 3.
To Order: Reference specific product size, color and description. Example: EPS-300-1/4, 48" (1,21 m) sticks, black.

Specification and Ordering Information for 3M Tubing Kit EPS-300

UPC 051135-38444, Case quantity 5 kits

Description	# of 6" Size	Pieces
EPS-300 Red	1/2" (12,70 mm)	12
EPS-300 Black	1/2" (12,70 mm)	12
EPS-300 Red	3/4" (19,05 mm)	6
EPS-300 Black	3/4" (19,05 mm)	6
EPS-300 Red	1" (25,40 mm)	3
EPS-300 Black	1" (25,40 mm)	3

Specification and Ordering Information for 3M Tubing EPS-300

Product Number	Size	UPC (051135-)	Expanded/Recvrd I.D.	Descrpt.	Case Qty.
EPS-300 Black	1/8" (3,2 mm)	37483	0.125/0.040" (3,18/1,02 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	3/16" (4,76 mm)	36875	0.187/0.063" (4,75/1,57 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	3/16" (4,76 mm)	36592	0.187/0.063" (4,75/1,57 mm)	6" Pieces, 24/Bag (15,2 cm)	10 pack
EPS-300 Black	1/4" (6,35 mm)	36876	0.250/0.080" (6,35/2,03 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	1/4" (6,35 mm)	36593	0.250/0.080" (6,35/2,03 mm)	6" Pieces, 20/Bag (15,2 cm)	10 pack
EPS-300 Black	3/8" (9,53 mm)	36877	0.375/0.120" (9,53/3,05 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	3/8" (9,53 mm)	36594	0.375/0.120" (9,53/3,05 mm)	6" Pieces, 16/Bag (15,2 cm)	10 pack
EPS-300 Black	1/2" (12,7 mm)	36878	0.500/0.160" (12,7/4,06 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	1/2" (12,7 mm)	36595	0.500/0.160" (12,7/4,06 mm)	6" Pieces, 14/Bag (15,2 cm)	10 pack
EPS-300 Red	1/2" (12,7 mm)	38441	0.500/0.160" (12,7/4,06 mm)	6" Pieces, 14/Bag (15,2 cm)	10 pack
EPS-300 Black	3/4" (19,05 mm)	36879	0.750/0.250" (19,05/6,35 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	3/4" (19,05 mm)	36596	0.750/0.250" (19,05/6,35 mm)	6" Pieces, 12/Bag (15,2 cm)	10 pack
EPS-300 Red	3/4" (19,05 mm)	38442	0.750/0.250" (19,05/6,35 mm)	6" Pieces, 12/Bag (15,2 cm)	10 pack
EPS-300 Black	1" (25,4 mm)	36880	1.000/0.320" (25,4/8,13 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	1" (25,4 mm)	36597	1.000/0.320" (25,4/8,13 mm)	6" Pieces, 8/Bag (15,2 cm)	10 pack
EPS-300 Red	1" (25,4 mm)	38443	1.000/0.320" (25,4/8,13 mm)	6" Pieces, 8/Bag (15,2 cm)	10 pack
EPS-300 Black	1-1/2" (38,1 mm)	36881	1.500/0.500" (38,1/12,95 mm)	48" Sticks (1,21 m)	1 box
EPS-300 Black	1-1/2" (25,4 mm)	36598	1.500/0.500" (38,1/12,95 mm)	6" Pieces, 4/Bag (15,2 cm)	10 pack

Note: Bulk 48" sticks and special cut lengths are available subject to quotation.

Specification and Ordering Information for 3M™ Tubing EPS-300 with Header Cards

Product Number	Size	UPC (051135-)	Expanded/Recvrd I.D.	Descrpt.	Case Qty.
EPS-300H Black	1/8" (3,2 mm)	38749	0.125/0.040" (3,18/1,02 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Black	3/16" (4,76 mm)	38750	0.187/0.063" (4,75/1,57 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Black	1/4" (6,35 mm)	38751	0.250/0.080" (6,35/2,03 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Black	3/8" (9,53 mm)	38752	0.375/0.120" (9,53/3,05 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Black	1/2" (12,7 mm)	38753	0.500/0.160" (12,7/4,06 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Red	1/2" (12,7 mm)	38754	0.500/0.160" (12,7/4,06 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Black	3/4" (19,05 mm)	38755	0.750/0.250" (19,05/6,35 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Red	3/4" (19,05 mm)	38756	0.750/0.250" (19,05/6,35 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Black	1" (25,4 mm)	38757	1.000/0.320" (25,4/8,13 mm)	48" Sticks (1,21 m)	1 box
EPS-300H Red	1" (25,4 mm)	38758	1.000/0.320" (25,4/8,13 mm)	48" Sticks (1,21 m)	1 box

Note: Bulk 48" sticks and special cut lengths are available subject to quotation.



3M™ Tubing MW Multiple-Wall, Semi-Rigid Polyolefin

Shrink Ratio: 2.5:1

3M Tubing MW is a semi-rigid, heat shrinkable polyolefin tubing that is co-extruded and selectively cross-linked to provide an integral, meltable inner wall. When heated in excess of 275°F (135°C), the inner meltable wall of the tubing is simultaneously softened and forced by the shrink action into intimate contact with all underlying surfaces, interstices and small voids. Upon cooling, the 3M Tubing MW provides a tough protective and insulating barrier, highly resistant to penetration by moisture and the attack of chemicals and solvents. Uses include strain relief for delicate wire terminations, connections, solder joints and harness breakouts — where semi-rigid environmental protective sleeving and insulation is needed.

Standard Color: Black and standard packaging is four-foot (1,219 m) lengths and six-inch (15,2 cm) cut pieces. Additional sizes, colors and put-ups are available — please contact your 3M Electrical Products Sales Representative.

Application Specifications: MIL-I-23053/4, Class 1; AMS-3634. To Order: Reference specific product size, color and description. Example: MW, 1/4, 6" pieces, black.

Specification and Ordering Information for 3M Tubing MW Multiple Wall, Semi-Rigid Polyolefin

Product Number	Size	UPC (051135-)	Expanded/Recvrd I.D.	Descrpt.	Case Qty.
MW	1/8" (3,18 mm)	36859	0.125/0.023" (3,18/0,58 mm)	48" Sticks (1,21 m)	1 box
MW	1/8" (3,18 mm)	36563	0.125/0.023" (3,18/0,58 mm)	6" Pieces, 28/Bag (15,2 cm)	10 pack
MW	3/16" (4,76 mm)	36860	0.187/0.060" (4,75/1,52 mm)	48" Sticks (1,21 m)	1 box
MW	3/16" (4,76 mm)	36564	0.187/0.060" (4,75/1,52 mm)	6" Pieces, 24/Bag (15,2 cm)	10 pack
MW	1/4" (6,35 mm)	36861	0.250/0.080" (6,35/2,03 mm)	48" Sticks (1,21 m)	1 box
MW	1/4" (6,35 mm)	36565	0.250/0.080" (6,35/2,03 mm)	6" Pieces, 20/Bag (15,2 cm)	10 pack
MW	3/8" (9,53 mm)	36862	0.375/0.135" (9,53/3,43 mm)	48" Sticks (1,21 m)	1 box
MW	3/8" (9,53 mm)	36566	0.375/0.135" (9,53/3,43 mm)	6" Pieces, 16/Bag (15,2 cm)	10 pack
MW	1/2" (12,7 mm)	36863	0.500/0.195" (12,7/4,95 mm)	48" Sticks (1,21 m)	1 box
MW	1/2" (12,7 mm)	36567	0.500/0.195" (12,7/4,95 mm)	6" Pieces, 14/Bag (15,2 cm)	10 pack
MW	3/4" (19,05 mm)	36864	0.750/0.313" (19,05/7,95 mm)	48" Sticks (1,21 m)	1 box
MW	3/4" (19,05 mm)	36568	0.750/0.313" (19,05/7,95 mm)	6" Pieces, 12/Bag (15,2 cm)	10 pack
MW	1" (25,4 mm)	36865	1.000/0.400" (25,4/10,16 mm)	48" Sticks (1,21 m)	1 box
MW	1" (25,4 mm)	36569	1.000/0.400" (25,4/10,16 mm)	6" Pieces, 8/Bag (15,2 cm)	10 pack

Note: Bulk 48" sticks and special cut lengths are available subject to quotation.

Bus Bar Tubing

3M™ Bus Bar Tubing BBI-A Series

3M tubing BBI-A is made of specially formulated, cross-linked, flame-retardant, track-resistant polyolefin that will shrink to fit rectangular, square or round bus bars. 3M Bus Bar Tubing BBI-A will handle voltage ranges from 600 V to 35 kV, reducing your inventory requirements and saving you time and money.




The 3M tubing BBI-A material has a high resistance to splitting, while providing the flexibility to conform to bends in certain applications. Superior split resistance can prevent insulation failures and resulting downtimes. 3M tubing BBI-A is unaffected by normal cleaning fluids and is resistant to physical damage. Good thermal endurance (up to 110°C/230°F) contributes to longer life and more stable performance.

Excellent dielectric strength allows the required space between bus bars and metal enclosures to be substantially reduced. Closer spacing reduces both the overall size of the assembly, and the overall cost.

Note: Bus bar is packaged one roll per case, 20 or 50 feet long.



Specification and Ordering Information for 3M™ Bus Bar Tubing BBI-A Series

Product Number	UPC (051135-)	Outside Dimension (Bar Circumference A)	Rectangular	Square	Round (Diameter)	Case Qty.
						
5, 8 & 15 kV Bus Bar Size Ranges						
BBI-3A	35726 35727	3.28"–5.57" (83–141 mm)	1 1/2" x 1/4"–2 1/2" x 1/2" (38 x 6–64 x 13 mm)	1" x 1"–1 1/2" x 1 1/2" (25 x 25–38 x 38 mm)	1 1/8"–1 3/4" (29–44 mm)	20 50
BBI-4A	35728 35729	5.43"–8.86" (138–225 mm)	2 1/2" x 3/8"–4" x 3/4" (64 x 10–102 x 19 mm)	2" x 2" (51 x 51 mm)	1 3/4"–2 3/4" (44–70 mm)	20 50
BBI-5A	35730 35731	6.67"–10.86" (169–276 mm)	3" x 5/8"–5" x 3/4" (76 x 16–127 x 19 mm)	2" x 2"–2" x 1/2" x 2 1/2" (51 x 51–64 x 64 mm)	2 1/8"–3 3/8" (54–86 mm)	20 50
BBI-6A	35732 35733	7.57"–12.86" (192–327 mm)	3 1/2" x 1/2"–6" x 3/4" (89 x 13–152 x 19 mm)	2 1/2" x 2 1/2"–3" x 3" (64 x 64–76 x 76 mm)	2 1/2"–4" (64–102 mm)	20 50
BBI-7A	35734 35735	8.28"–13.00" (210–330 mm)	4" x 1/4"–6" x 3/4" (102 x 6–152 x 19 mm)	2 1/2" x 2 1/2"–3" x 3" (64 x 64–76 x 76 mm)	2 3/4"–4 1/8" (70–105 mm)	20 50
BBI-8A	35736 35737	10.29"–16.43" (261–417 mm)	5" x 1/4"–8" x 3/8" (127 x 6–203 x 10 mm)	3" x 3"–4 x 4" (76 x 76–102 x 102 mm)	3 3/8"–5 1/8" (86–130 mm)	20 50
BBI-9A	35876 35877	12.29"–19.23" (312–488 mm)	6" x 1/4"–9" x 3/4" (152 x 6–229 x 19 mm)	3 1/2" x 3 1/2"–5" x 5" (89 x 89–127 x 127 mm)	4"–6 1/8" (102–156 mm)	20 50
BBI-10A	35878 35879	15.43"–24.14" (392–612 mm)	8" x 1/4"–10" x 3/4" (203 x 6–254 x 19 mm)	5" x 5"–6" x 6" (127 x 127–152 x 152 mm)	5"–7 5/8" (127–194 mm)	20 50
25 kV Bus Bar Size Ranges						
BBI-3A	35726 35727	3.28"–3.56" (83–90 mm)	1 1/2" x 1/4"–1 1/2" x 3/8" (38 x 6–38 x 10 mm)	Measure circumference	1 1/8" (29 mm)	20 50
BBI-4A	35728 35729	5.43"–5.80" (138–147 mm)	2 1/2" x 3/8"–2 1/2" x 5/8" (64 x 10–64 x 16 mm)	Measure circumference	1 3/4" (44 mm)	20 50
BBI-5A	35730 35731	6.67"–7.18" (169–182 mm)	3" x 5/8"–3" x 3/4" (76 x 16–76 x 19 mm)	Measure circumference	2 1/8"–2 1/4" (54–57 mm)	20 50
BBI-6A	35732 35733	7.57"–8.43" (192–214 mm)	3 1/2" x 1/2"–4" x 1/4" (89 x 13–102 x 6 mm)	Measure circumference	2 1/2"–2 5/8" (64–67 mm)	20 50
BBI-7A	35734 35735	8.28"–10.44" (210–265 mm)	4" x 1/4"–5" x 3/8" (102 x 6–127 x 10 mm)	2 1/2" x 2 1/2" (64 x 64 mm)	2 3/4"–3 1/4" (70–83 mm)	20 50
BBI-8A	35736 35737	10.29"–12.88" (261–327 mm)	5" x 1/4"–6" x 3/4" (127 x 6–152 x 19 mm)	3 x 3" (76 x 76 mm)	3 3/8"–4" (86–102 mm)	20 50
BBI-9A	35876 35877	12.29"–15.31" (312–389 mm)	6" x 1/4"–7" x 3/4" (152 x 6–178 x 19 mm)	3 1/2" x 3 1/2"–4 x 4" (89 x 89–102 x 102 mm)	4"–4 7/8" (102–124 mm)	20 50
BBI-10A	35878 35879	15.43"–19.79" (392–503 mm)	8" x 1/4"–9" x 3/4" (203 x 6–229 x 19 mm)	5 x 5" (127 x 127 mm)	5"–6 1/4" (127–158 mm)	20 50
35 kV Bus Bar Size Ranges						
BBI-7A	35734 35735	8.28"–8.86" (210–225 mm)	4" x 1/4"–4" x 3/4" (102 x 6–102 x 19 mm)	Measure circumference	2 3/4" (70 mm)	20 50
BBI-8A	35736 35737	10.29"–10.94" (261–278 mm)	5" x 1/4"–5" x 3/4" (127 x 6–127 x 19 mm)	Measure circumference	3 3/8" (86 mm)	20 50
BBI-9A	35876 35877	12.29"–13.00" (312–330 mm)	6" x 1/4"–6" x 3/4" (152 x 6–152 x 19 mm)	Measure circumference	4"–4 1/8" (102–105 mm)	20 50
BBI-10A	35878 35879	15.43"–16.86" (392–428 mm)	8" x 1/4"–8" x 3/4" (203 x 6–203 x 19 mm)	Measure circumference	5"–5 1/4" (127–133 mm)	20 50

Note: Rectangular and square bar sizes are based on bars having radiused edges and corners.

BBI-A Heat Shrinkable Tubing For Bus Bar

5 – 35 kV

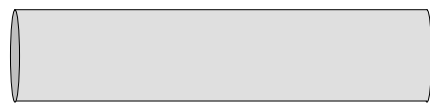
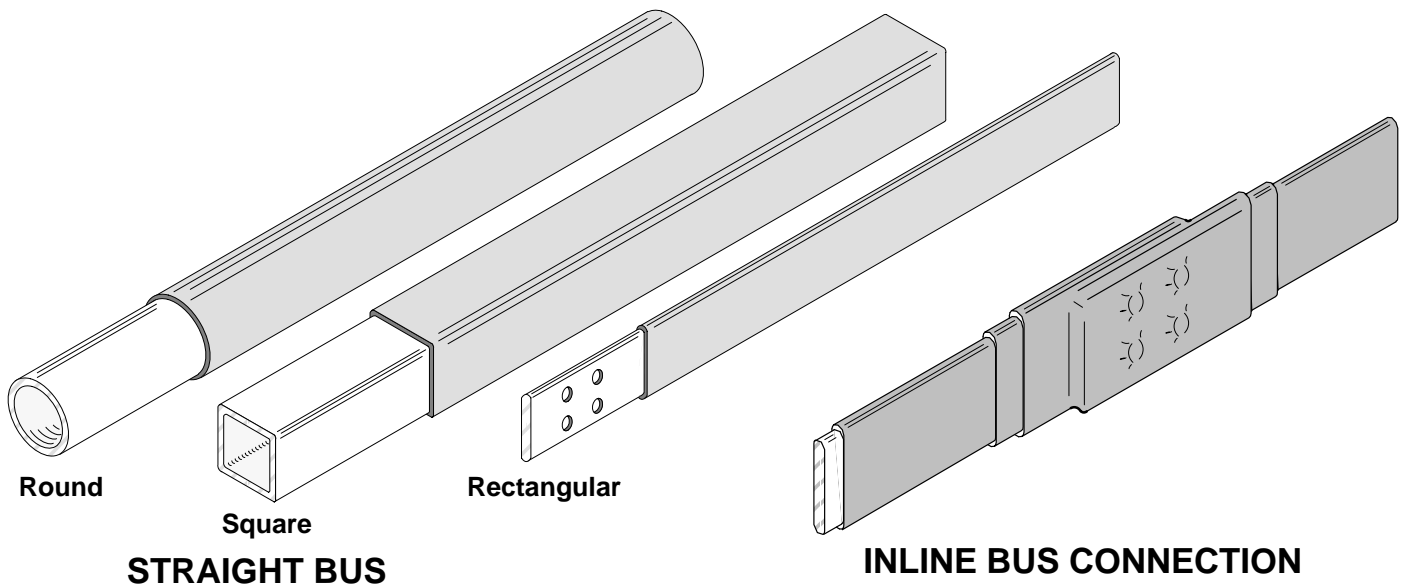
ANSI/IEEE C37.20

5, 8, 15, 25 & 35 kV Classes

Maximum Temperature Rating – 110°C

Material – Polyolefin Based, Heat Shrinkable

Standard Lengths – 20 ft (6,1 m) & 50 ft (15,2 m)



BBI-A Heat Shrinkable Tube

BBI-A Heat Shrinkable Tubing For Bus Bar

BBI-3A	BBI-7A
BBI-4A	BBI-8A
BBI-5A	BBI-9A
BBI-6A	BBI-10A

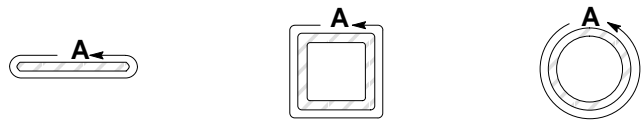
2047SH-52

SCALE: Not to scale

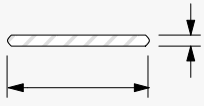
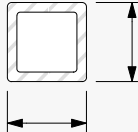

ISSUE DATE: 02/16/93

ISSUE:

A. Selection Charts for Straight Bus Bar
 Standard lengths = 20ft. (6,1m) and 50ft. (15,2m)



5, 8 and 15 kV Bus Bar Size Ranges

Product Number	Bar Circumference (A)			
		Rectangular *	Square *	Round
BBI-3A	3.28 – 5.57 in. (83 – 141 mm)	1 1/2 x 1/4 — 2 1/2 x 1/2 in. (38 x 6 — 64 x 13 mm)	1 x 1 – 1 1/2 x 1 1/2 in. (25 x 25 – 38 x 38 mm)	1 1/8 — 1 3/4 in. (29 — 44 mm)
BBI-4A	5.43 – 8.86 in. (138 – 225 mm)	2 1/2 x 3/8 — 4 x 3/4 in. (64 x 10 — 102 x 19 mm)	2 x 2 in. (51 x 51 mm)	1 3/4 — 2 3/4 in. (44 — 70 mm)
BBI-5A	6.67 – 10.86 in. (169 – 276 mm)	3 x 5/8 — 5 x 3/4 in. (76 x 16 — 127 x 19 mm)	2 x 2 – 2 1/2 x 2 1/2 in. (51 x 51 – 64 x 64 mm)	2 1/8 — 3 3/8 in. (54 — 86 mm)
BBI-6A	7.57 – 12.86 in. (192 – 327 mm)	3 1/2 x 1/2 — 6 x 3/4 in. (89 x 13 — 152 x 19 mm)	2 1/2 x 2 1/2 – 3 x 3 in. (64 x 64 – 76 x 76 mm)	2 1/2 — 4 in. (64 — 102 mm)
BBI-7A	8.28 – 13.00 in. (210 – 330 mm)	4 x 1/4 — 6 x 3/4 in. (102 x 6 — 152 x 19 mm)	2 1/2 x 2 1/2 – 3 x 3 in. (64 x 64 – 76 x 76 mm)	2 3/4 — 4 1/8 in. (70 – 105 mm)
BBI-8A	10.29 – 16.43 in. (261 – 417 mm)	5 x 1/4 — 8 x 3/8 in. (127 x 6 — 203 x 10 mm)	3 x 3 – 4 x 4 in. (76 x 76 – 102 x 102 mm)	3 3/8 — 5 1/8 in. (86 — 130 mm)
BBI-9A	12.29 – 19.23 in. (312 – 488 mm)	6 x 1/4 — 9 x 3/4 in. (152 x 6 — 229 x 19 mm)	3 1/2 x 3 1/2 – 5 x 5 in. (89 x 89 – 127 x 127 mm)	4 — 6 1/8 in. (102 — 156 mm)
BBI-10A	15.43 – 24.14 in. (392 – 613 mm)	8 x 1/4 — 10 x 3/4 in. (203 x 6 — 254 x 19 mm)	5 x 5 – 6 x 6 in. (127 x 127 – 152 x 152 mm)	5 — 7 5/8 in. (127 — 194 mm)

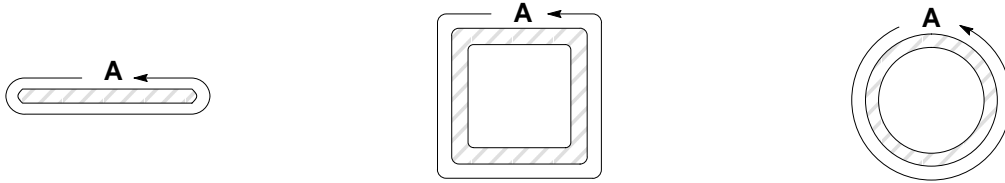
25 kV Bus Bar Size Ranges

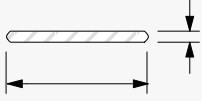
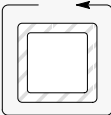

BBI-3A	3.28 – 3.56 in. (83 – 90 mm)	1 1/2 x 1/4 — 1 1/2 x 3/8 in. (38 x 6 — 38 x 10 mm)	MEASURE CIRCUMFERENCE	1 1/8 in. (29 mm)
BBI-4A	5.43 – 5.80 in. (138 – 147 mm)	2 1/2 x 3/8 — 2 1/2 x 5/8 in. (64 x 10 — 64 x 16 mm)	MEASURE CIRCUMFERENCE	1 3/4 in. (44 mm)
BBI-5A	6.67 – 7.18 in. (169 – 182 mm)	3 x 5/8 — 3 x 3/4 in. (76 x 16 — 76 x 19 mm)	MEASURE CIRCUMFERENCE	2 1/8 – 2 1/4 in. (54 — 57 mm)
BBI-6A	7.57 – 8.43 in. (192 – 214 mm)	3 1/2 x 1/2 — 4 x 1/4 in. (89 x 13 — 102 x 6 mm)	MEASURE CIRCUMFERENCE	2 1/2 – 2 5/8 in. (64 — 67 mm)
BBI-7A	8.28 – 10.44 in. (210 – 265 mm)	4 x 1/4 — 5 x 3/8 in. (102 x 6 — 127 x 10 mm)	2 1/2 x 2 1/2 in. (64 x 64 mm)	2 3/4 — 3 1/4 in. (70 – 83 mm)
BBI-8A	10.29 – 12.88 in. (261 – 327 mm)	5 x 1/4 — 6 x 3/4 in. (127 x 6 — 152 x 19 mm)	3 x 3 in. (76 x 76 mm)	3 3/8 — 4 in. (86 — 102 mm)
BBI-9A	12.29 – 15.31 in. (312 – 389 mm)	6 x 1/4 — 7 x 3/4 in. (152 x 6 — 178 x 19 mm)	3 1/2 x 3 1/2 – 4 x 4 in. (89 x 89 – 102 x 102 mm)	4 — 4 7/8 in. (102 — 124 mm)
BBI-10A	15.43 – 19.79 in. (392 – 503 mm)	8 x 1/4 — 9 x 3/4 in. (203 x 6 — 229 x 19 mm)	5 x 5 in. (127 x 127 mm)	5 — 6 1/4 in. (127 — 159 mm)

NOTE: * Rectangular and square bar sizes are based on bars having radiused edges and corners.
 NOTE: BBI-A sizing is based on straight sections of bar. For bolted connections consult bolted connection chart on page 3.
 NOTE: Contact your 3M Sales Rep for recommendation on the use of BBI-A on 1/8" thick bus bar.

A. Selection Charts for Straight Bus Bar (Cont.)

Standard lengths = 20ft. (6,1m) and 50ft. (15,2m)



35 kV Bus Bar Size Ranges				
Product Number	Bar Circumference (A)			
		Rectangular *	Square *	Round
BBI-7A	8.28 – 8.86 in. (210 – 225 mm)	4 x 1/4 — 4 x 3/4 in. (102 x 6 — 102 x 19 mm)	MEASURE CIRCUMFERENCE	2 3/4 in. (70 mm)
BBI-8A	10.29 – 10.94 in. (261 – 278 mm)	5 x 1/4 — 5 x 3/4 in. (127 x 6 — 127 x 19 mm)	MEASURE CIRCUMFERENCE	3 3/8 in. (86 mm)
BBI-9A	12.29 – 13.00 in. (312 – 330 mm)	6 x 1/4 — 6 x 3/4 in. (152 x 6 — 152 x 19 mm)	MEASURE CIRCUMFERENCE	4 – 4 1/8 in. (102 – 105 mm)
BBI-10A	15.43 – 16.86 in. (392 – 428 mm)	8 x 1/4 — 8 x 3/4 in. (203 x 6 — 203 x 19 mm)	MEASURE CIRCUMFERENCE	5 — 5 1/4 in. (127 — 133 mm)

NOTE: * Rectangular and square bar sizes are based on bars having radiused edges and corners.

NOTE: BBI-A sizing is based on straight sections of bar. For bolted connections consult bolted connection chart on below.

NOTE: Contact your 3M Sales Rep for recommendation on the use of BBI-A on 1/8" thick bus bar.

B. BBI-A Coverage for Inline Bolted Connections (Rectangular Bus Bar)

NOTE: First select BBI-A size from preceding selection charts for Straight Bus Bar.

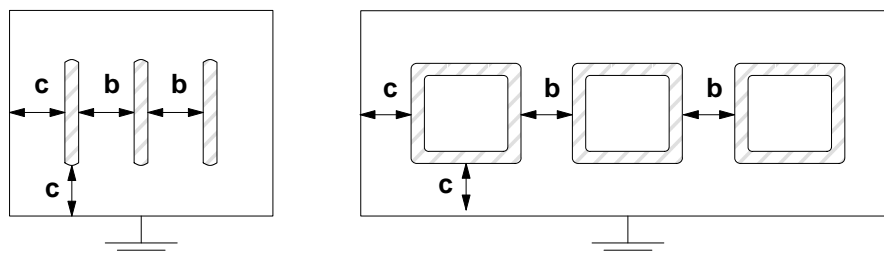
5, 8 & 15 kV: Inline Bolted Connections								
Rectangular Bar Width	BBI-3A	BBI-4A	BBI-5A	BBI-6A	BBI-7A	BBI-8A	BBI-9A	BBI-10A
1.5 in.(38 mm)	1 LAYER							
2.0 in.(51 mm)	2 LAYERS							
2.5 in.(64 mm)		1 LAYER						
3.0 in.(76 mm)		2 LAYERS						
3.5 in.(89 mm)		2 LAYERS	1 LAYER					
4.0 in.(102 mm)		2 LAYERS	2 LAYERS	1 LAYER	1 LAYER			
5.0 in.(127 mm)			2 LAYERS	2 LAYERS	1 LAYER	1 LAYER		
6.0 in.(152 mm)				2 LAYERS	2 LAYERS	1 LAYER	1 LAYER	
7.0 in.(178 mm)						2 LAYERS	1 LAYER	
8.0 in.(203 mm)						2 LAYERS	2 LAYERS	1 LAYER
9.0 in.(229 mm)							2 LAYERS	1 LAYER
10.0 in.(254 mm)								2 LAYERS

25 & 35 kV: Inline Bolted Connections
USE 2 LAYERS OF BBI-A INSULATION FOR ALL 25 & 35 kV INLINE BOLTED CONNECTIONS

C. Typical Dimensions

Product Number	Length	Minimum Expanded Tubing I. D.	Expanded Wall Thickness	Max. Recovered Tubing I. D.	Recovered Wall Thickness
BBI-3A	20 & 50 ft. (6,1 & 15,2 m)	2.38 in. (60 mm)	0.049 in. (1,24 mm)	1.01 in. (26 mm)	0.113 in. (2,87 mm)
BBI-4A	20 & 50 ft. (6,1 & 15,2 m)	4.35 in. (110 mm)	0.043 in. (1,09 mm)	1.67 in. (42 mm)	0.113 in. (2,87 mm)
BBI-5A	20 & 50 ft. (6,1 & 15,2 m)	5.30 in. (135 mm)	0.043 in. (1,09 mm)	2.04 in. (52 mm)	0.114 in. (2,90 mm)
BBI-6A	20 & 50 ft. (6,1 & 15,2 m)	5.90 in. (150 mm)	0.046 in. (1,17 mm)	2.33 in. (59 mm)	0.117 in. (2,97 mm)
BBI-7A	20 & 50 ft. (6,1 & 15,2 m)	6.78 in. (172 mm)	0.048 in. (1,22 mm)	2.55 in. (65 mm)	0.130 in. (3,30 mm)
BBI-8A	20 & 50 ft. (6,1 & 15,2 m)	8.25 in. (210 mm)	0.049 in. (1,24 mm)	3.18 in. (81 mm)	0.128 in. (3,25 mm)
BBI-9A	20 & 50 ft. (6,1 & 15,2 m)	8.83 in. (224 mm)	0.054 in. (1,37 mm)	3.78 in. (96 mm)	0.127 in. (3,23 mm)
BBI-10A	20 & 50 ft. (6,1 & 15,2 m)	10.28 in. (261 mm)	0.059 in. (1,50 mm)	4.53 in. (115 mm)	0.138 in. (3,51 mm)

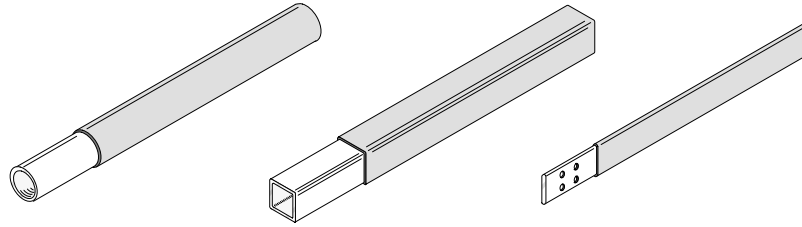
Typical Clearances for Rectangular and Square Bus Bars



Voltage Rating (kV)	BIL (kV)	BBI-A Insulated (Indoor Clearance)		Uninsulated (Indoor Clearance)	
		Dimension b	Dimension c	Dimension b	Dimension c
15 & Below	110	2.7 in. (69 mm)	3.0 in. (76 mm)	7.5 in. (191 mm)	5.0 in. (127 mm)
25	125	3.0 in. (76 mm)	3.5 in. (89 mm)	10.5 in. (267 mm)	7.5 in. (191 mm)
35	150	4.5 in. (114 mm)	5.5 in. (140 mm)	12.5 in. (318 mm)	9.5 in. (241 mm)

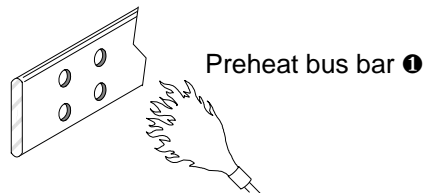
NOTE: b = minimum phase-to-phase dimension
c = minimum phase-to-ground dimension

The table indicates typical minimum clearance dimensions for BBI-A bus bar insulation, as compared to that for uninsulated bus bar. These dimensions are based on 60 Hz withstand, DC withstand (hypot) and BIL tests (Reference: ANSI/IEEE C37.20) and from partial discharge (corona) tests. Testing was performed on 12 ft. (3,7 m) lengths of copper and aluminum bus bar enclosed in a 3 ft. (0,9 m) long duct, with air spacing between the bar and grounded duct.



A. Preparation

1. Clean bus bar using standard practice (e.g. use appropriate cable cleaning solvent).
2. Cut BBI–A Heat Shrinkable Tubing to required length. Use a very sharp knife or a razor knife to ensure a smooth cut with no nicks.
3. Preheating of bus bar is recommended, especially for larger size bars. Preheat to approximately 250 – 300°F (120 – 150°C) ❶. (See figure below)

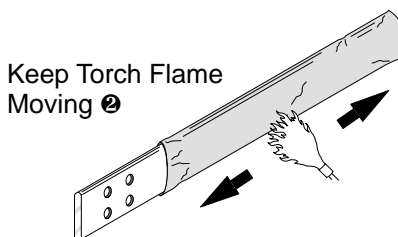


NOTE: Preheating significantly reduces shrink time

4. Slide BBI–A Tubing into position on bus bar.

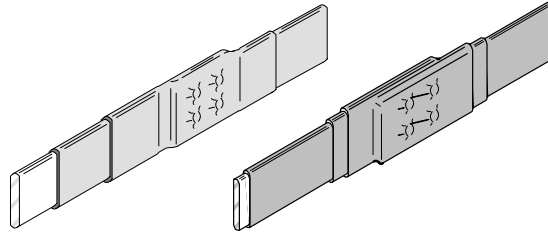
B. Shrink BBI–A Tubing

1. Shrink BBI–A Tubing onto bus bar using standard industry methods (e.g Heat shrink torch, special oven, etc.) ❷. (See figure below)
2. When installing more than one length of BBI–A Tubing on a straight bus bar section, overlap tubing by a minimum of 6 in. (152 mm).



C. Application Tips

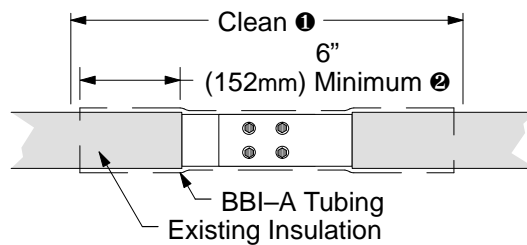
1. **KEEP TORCH FLAME MOVING** to prevent burning of BBI–A Tubing.
2. **For rectangular bars:** Shrink the edges of the BBI–A tubing first. This will achieve a more uniform insulation thickness around the bar.
3. BBI–A Tubing normally shrinks when it reaches approximately 250°F (120°C). **CAUTION:** Burn damage can occur if tubing temperature exceeds approximately 600°F (315°C) for several minutes.
4. **Dimples appearing in BBI–A Tubing during shrinkage are normal,** and are removed with continued even heating.
5. **Heat application should be discontinued immediately after dimples disappear** from BBI–A Tubing, or when tubing has shrunk smoothly onto bus bar.
6. **Use appropriate heat shrink torch which produces a blue and yellow flame.** Application of the yellow portion of flame is recommended for optimum control of the shrink rate.
7. **CAUTION:** Be careful handling insulated bus bar while it is still hot. The heated BBI–A Tubing is soft and susceptible to physical damage.
8. **SAFETY:** Use caution and proper safety procedures when working with open flame and high temperatures. This would include maintaining a well ventilated workplace.



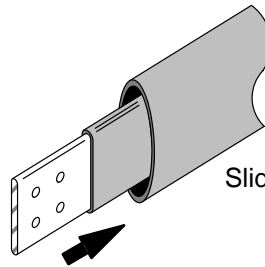
5 – 15 kV (See Additional Instructions on Page 9 for 25 and 35 kV)

A. Preparation for a SINGLE Insulation Layer (15 kV or Less)

1. Consult bolted connection application chart on page 3 to determine if one or two layers of BBI-A are required. If two layers are required go to section B on page 7.
2. Clean bus bar connection, adjacent to exposed bar and existing insulation using standard practice ❶ (e.g. use appropriate cable cleaning solvent).
3. Cut BBI-A tubing to length required to cover bolted connection and at least 6 inches (152 mm) ❷ of existing bus bar insulation. Exercise care to ensure a clean cut. (See figure below)

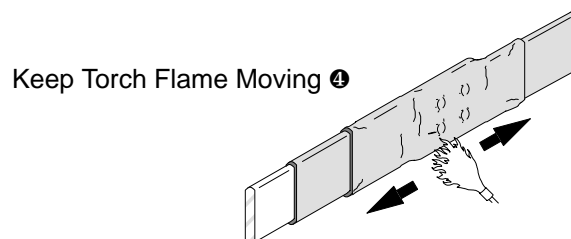


4. Slide BBI-A tubing onto one bus bar. ❸ (See figure below)

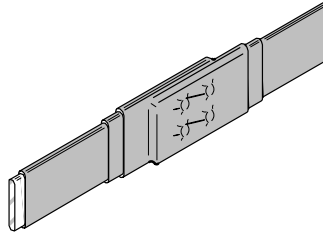


Slide BBI-A Tubing Onto One bus bar ❸.

5. Connect bus bars.
6. Slide BBI-A tubing into required position over bolted connection.
7. Shrink BBI-A Tubing onto bus bar and bolted connection using standard industry methods ❹ (e.g. Heat shrink torch).



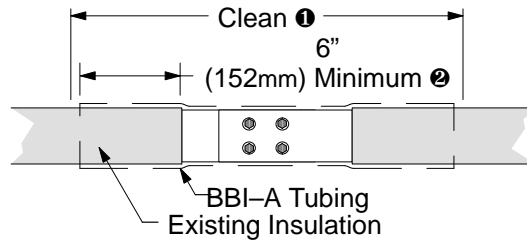
8. Refer to "Application Tips" on page 5.



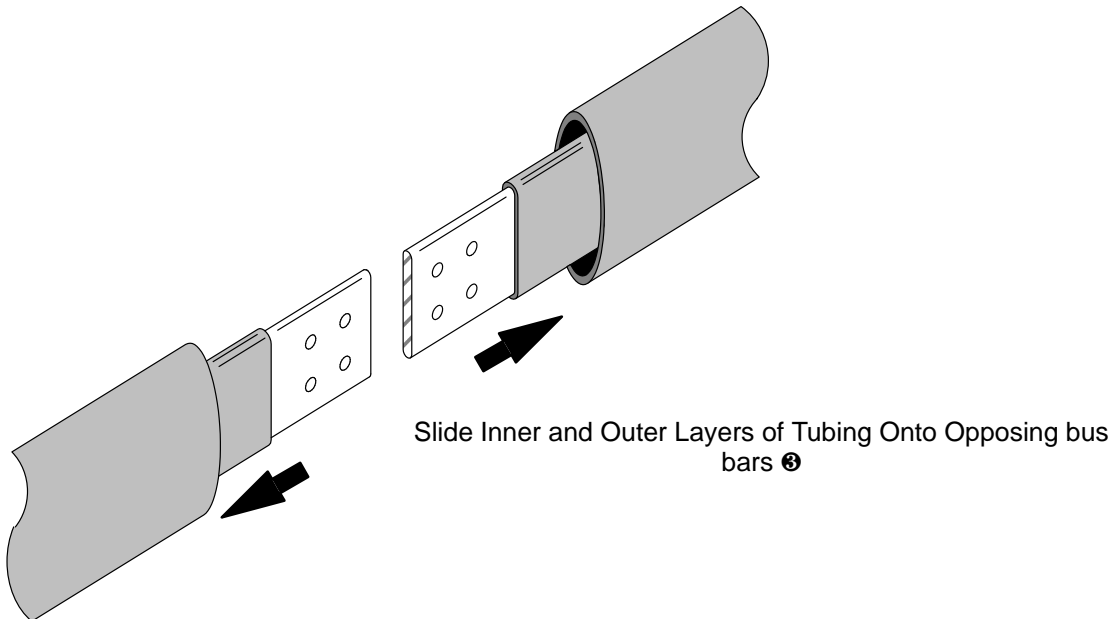
15 – 35 kV

B. Preparation for a DOUBLE Insulation Layer

1. If the application is for 15kV or less, consult the bolted connection application chart on page 3 to determine if one or two layers of BBI-A are required. 25 kV and 35 kV applications will require two layers of BBI-A insulation.
2. See Additional Instructions on Page 9 for 25 and 35 kV.
3. Clean bus bar connection, adjacent to exposed bar and existing insulation using standard practice ❶ (e.g. use appropriate cable cleaning solvent). (See figure below)
4. Cut the inner layer of BBI-A tubing to length required to cover bolted connection and at least 6 inches (152 mm) ❷ of existing bus bar insulation. Exercise care to ensure a clean cut. (See figure below) Cut the outer layer of BBI-A tubing 2 in. (51 mm) shorter than the inner layer.

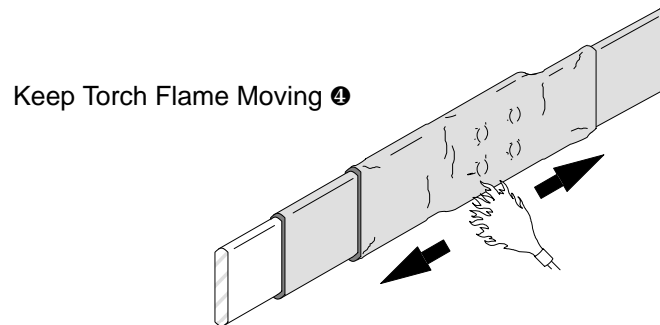


5. Slide inner layer of BBI-A tubing onto one bus bar. Slide the outer layer of BBI-A tubing onto the other bus bar. ❸ (See figure below)



6. Connect bus bars.
7. Slide inner layer of BBI-A tubing into required position over bolted connection.

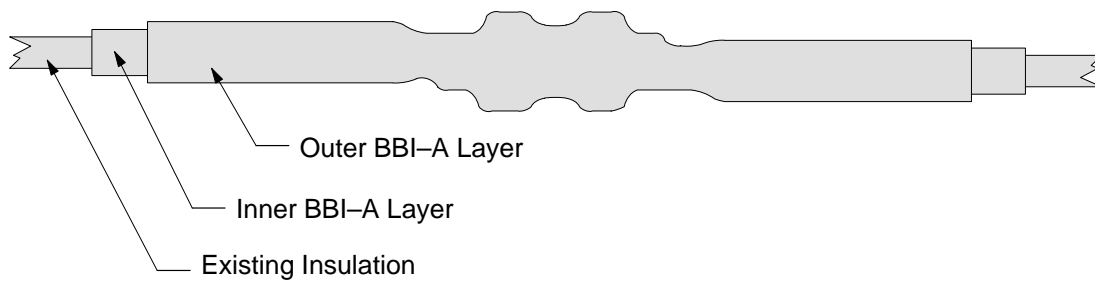
8. Shrink BBI–A Tubing onto bus bar and bolted connection using standard industry methods ④ (e.g Heat shrink torch). (See figure below)



9. Refer to “Application Tips” on page 5.

10. Once the inner layer of BBI–A tubing has completely shrunk, slide the outer layer over the inner layer and center it.

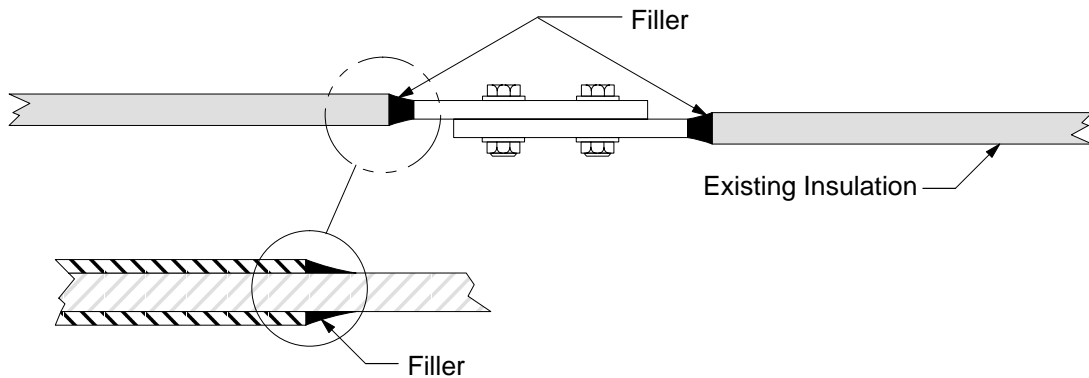
11. Shrink the outer layer of BBI–A tubing. (See figure below)



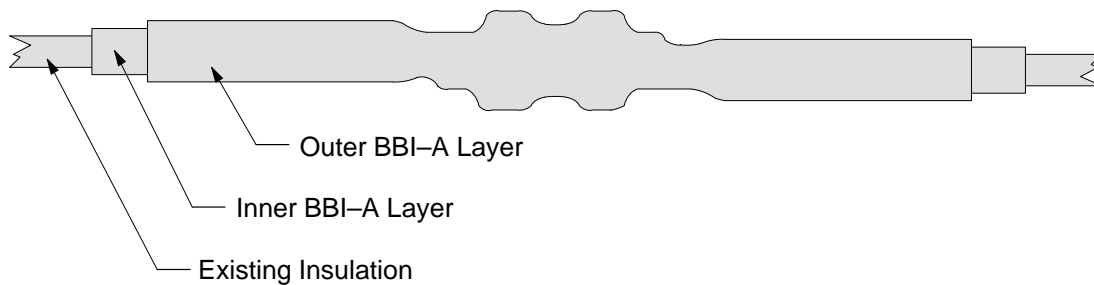
Use Following Instruction Steps in Addition to 5 – 15 kV Instructions

25 & 35 kV:

1. Fill in edges of existing bus bar insulation with an electrical grade mastic, putty or filler (e.g. Scotch™ 2228 Rubber Mastic Tape: cut into strips and fold longitudinally with mastic side facing out. Press filler in against edge of existing insulation to form fillet). (See figure below)



25 & 35 kV Bolted Bus Bar Connection



2. Return to page 7.

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.

All 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.

3M Electrical Products Division

6801 River Place Blvd.
Austin, Texas 78726 – 9000

