



FP-301 Heat Shrink Tubing Kits

Heat Shrink Tubing Kits and Refill Packs

Data Sheet

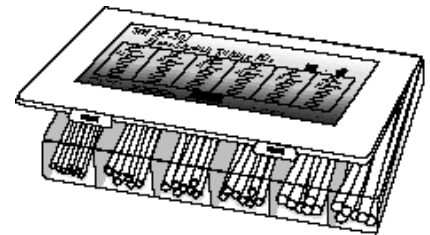
Product Description

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

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3M

Heat Shrinkable Products

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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 |

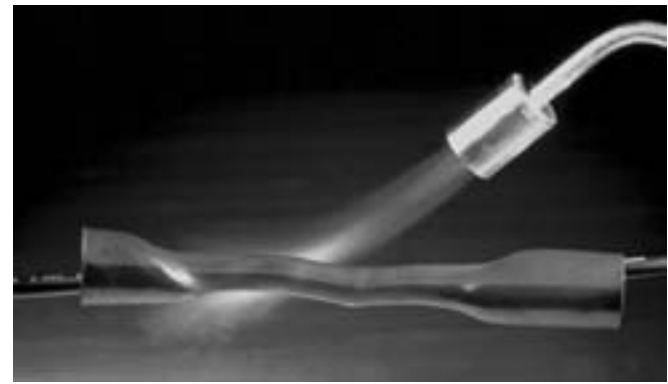
Heavy-Wall Tubing

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

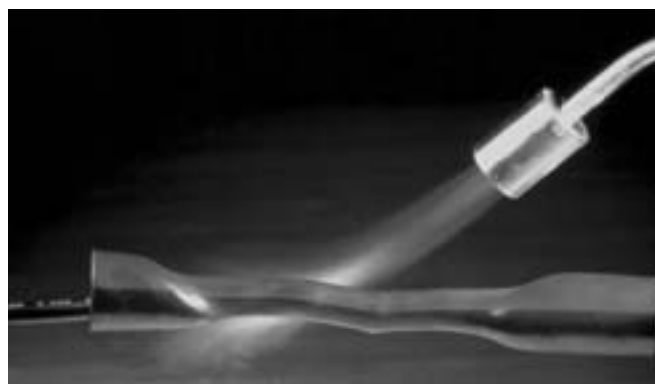
- Tubing
 - Cold Shrinkpg. 272
- Taping
 - Vinyl Electrical Tapepg. 3
- Sealing
 - Resin Kitpg. 265

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 | | | |

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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 | | | Round (Diameter) | | Case Qty. |
|---|----------------|---|---|--|------------------------------|------------------|--|-----------|
| | | | Rectangular | Square | Round (Diameter) | Round (Diameter) | | |
| | | | | | | | | |
| 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

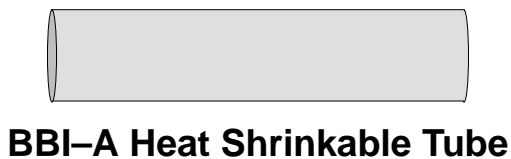
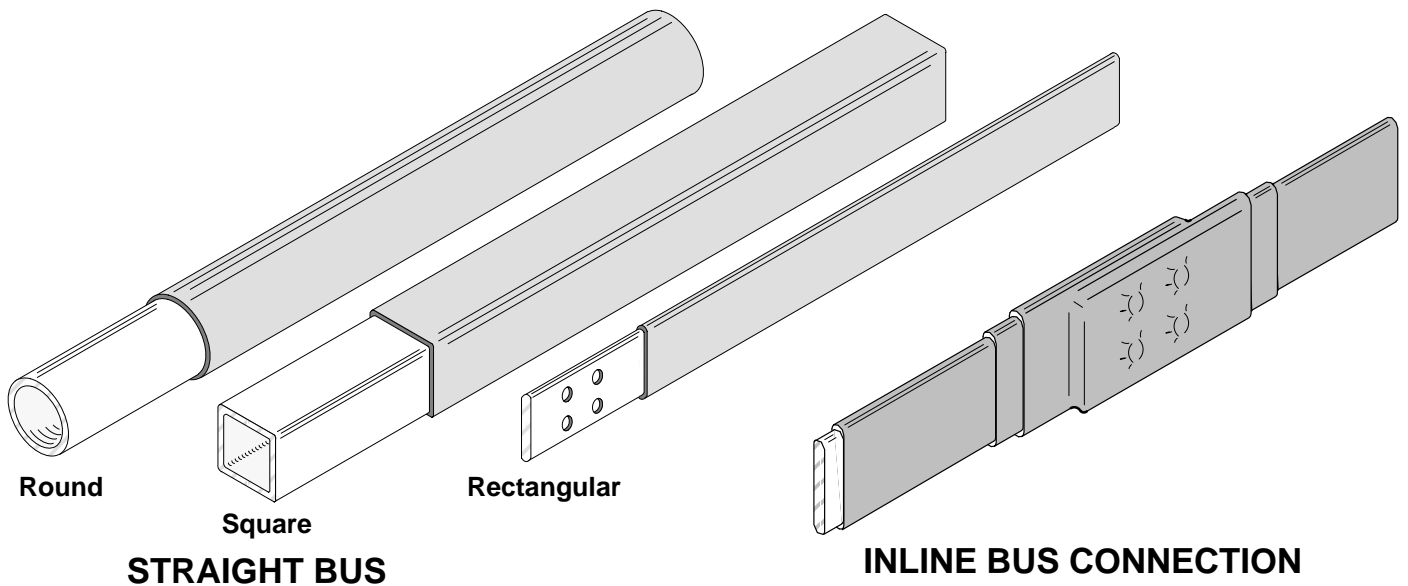
ANSI/IEEE C37.20

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)

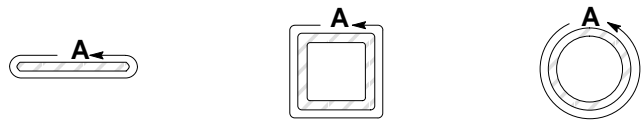


BBI-A Heat Shrinkable Tubing For Bus Bar

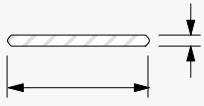
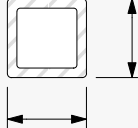

- | | |
|--------|---------|
| BBI-3A | BBI-7A |
| BBI-4A | BBI-8A |
| BBI-5A | BBI-9A |
| BBI-6A | BBI-10A |

2047SH-52

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) |

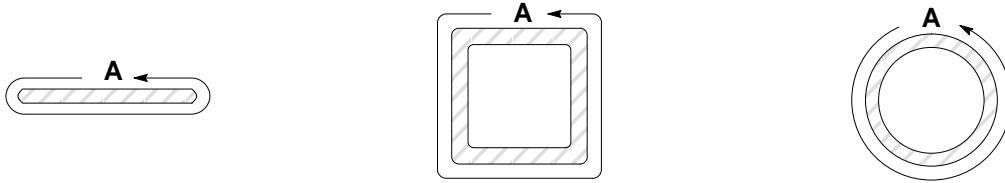
25 kV Bus Bar Size Ranges

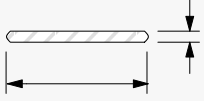
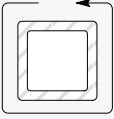

| | | | | |
|---------|-------------------------------------|---|---|-----------------------------------|
| BBI-3A | 3.28 – 3.56 in. (83 – 90 mm) | 1 1/2 x 1/4 — 1 1/2 x 3/8 in. (38 x 6 — 38 x 10 mm) | MEASURE CIRCUMFERENCE | 1 1/8 in. (29 mm) |
| BBI-4A | 5.43 – 5.80 in. (138 – 147 mm) | 2 1/2 x 3/8 — 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.

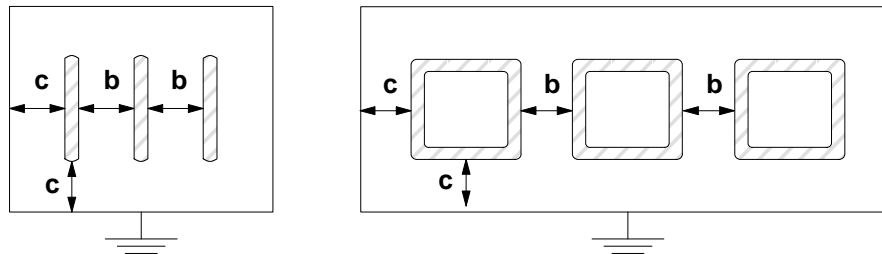
| 5, 8 & 15 kV: Inline Bolted Connections | | | | | | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|
| Rectangular Bar Width | BBI-3A | BBI-4A | BBI-5A | BBI-6A | BBI-7A | BBI-8A | BBI-9A | BBI-10A |
| 1.5 in.(38 mm) | 1 LAYER | | | | | | | |
| 2.0 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) |

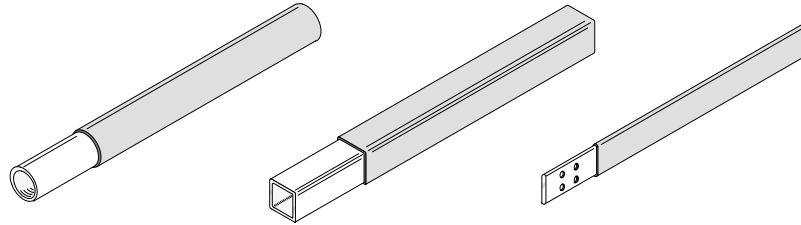
Typical Clearances for Rectangular and Square Bus Bars



| 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) |

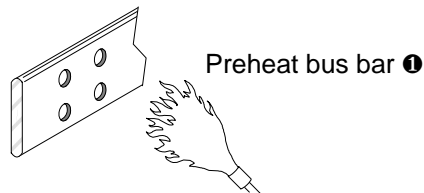
NOTE: b = minimum phase-to-phase dimension
c = minimum phase-to-ground dimension

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)

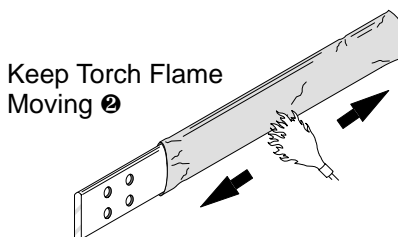


NOTE: Preheating significantly reduces shrink time

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

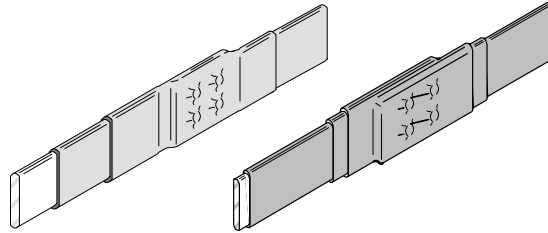
B. Shrink BBI–A Tubing

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

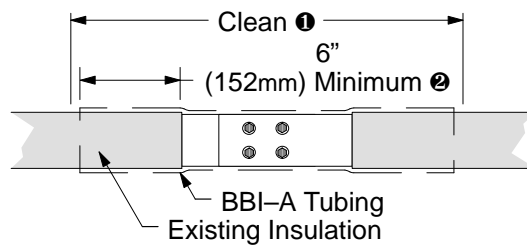
1. ***KEEP TORCH FLAME MOVING*** to prevent burning of BBI–A Tubing.
2. ***For rectangular bars:*** Shrink the edges of the BBI–A tubing first. This will achieve a more uniform insulation thickness around the bar.
3. BBI–A Tubing normally shrinks when it reaches approximately 250°F (120°C). ***CAUTION:*** 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.



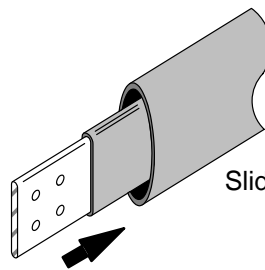
5 – 15 kV (See Additional Instructions on Page 9 for 25 and 35 kV)

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)

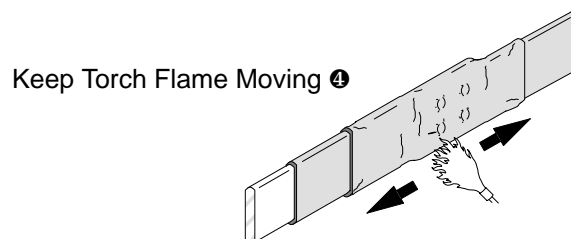


4. Slide BBI-A tubing onto one bus bar.❸ (See figure below)

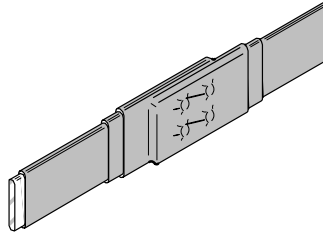


Slide BBI-A Tubing Onto One bus bar ❸.

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).



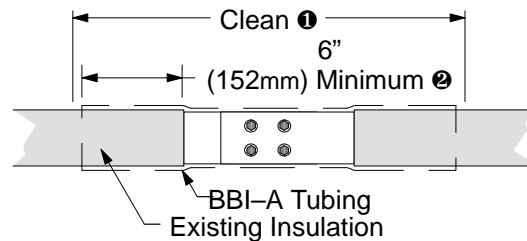
8. Refer to "Application Tips" on page 5.



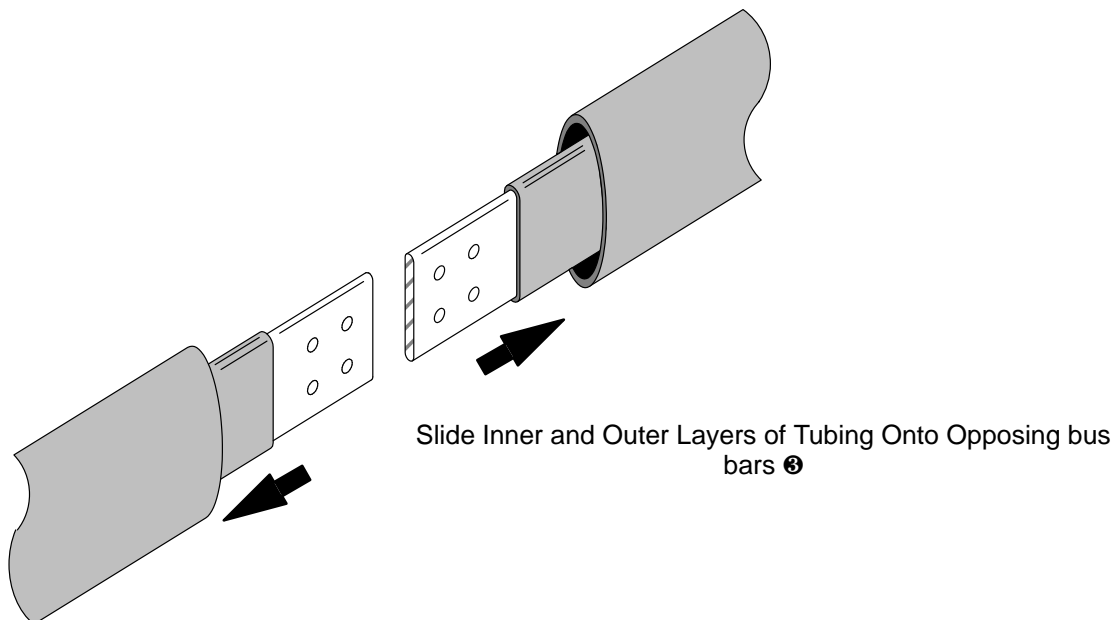
15 – 35 kV

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.

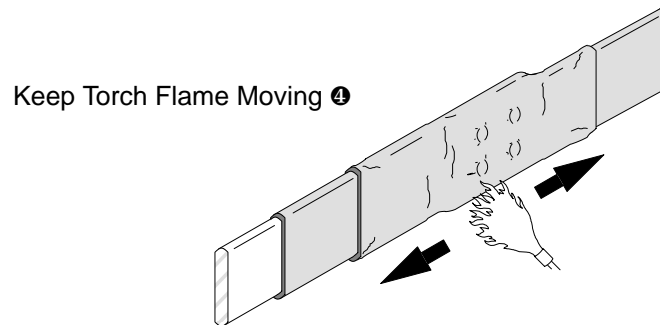


5. Slide inner layer of BBI-A tubing onto one bus bar. Slide the outer layer of BBI-A tubing onto the other bus bar. ❸ (See figure below)



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

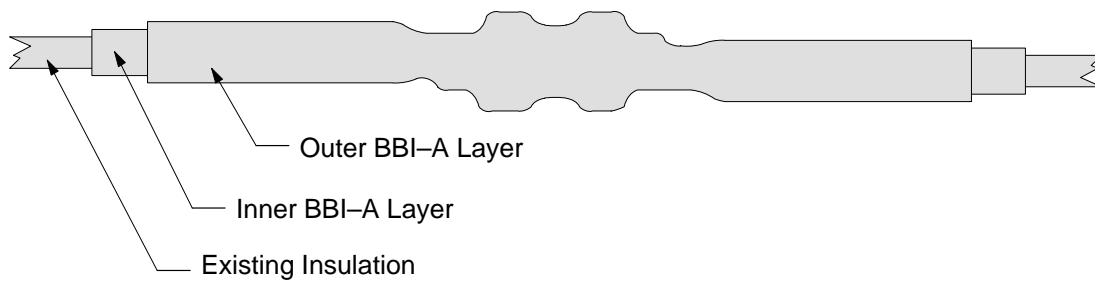
8. Shrink BBI–A Tubing onto bus bar and bolted connection using standard industry methods ④ (e.g Heat shrink torch). (See figure below)



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.

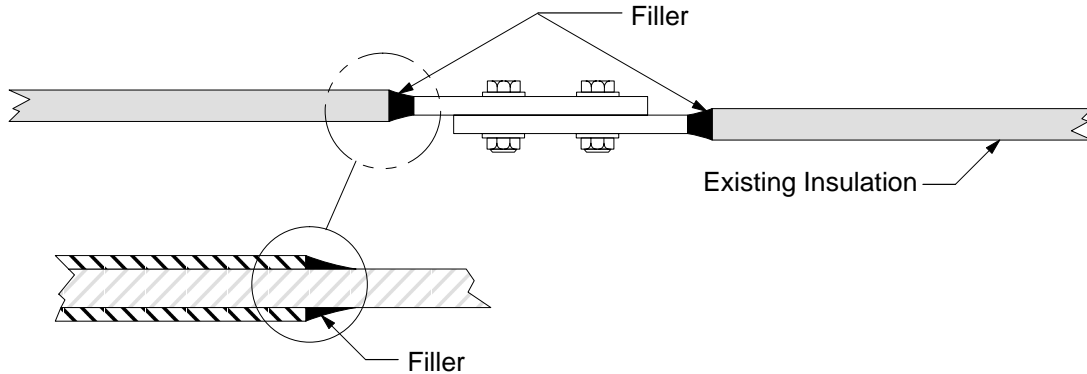
11. Shrink the outer layer of BBI–A tubing. (See figure below)



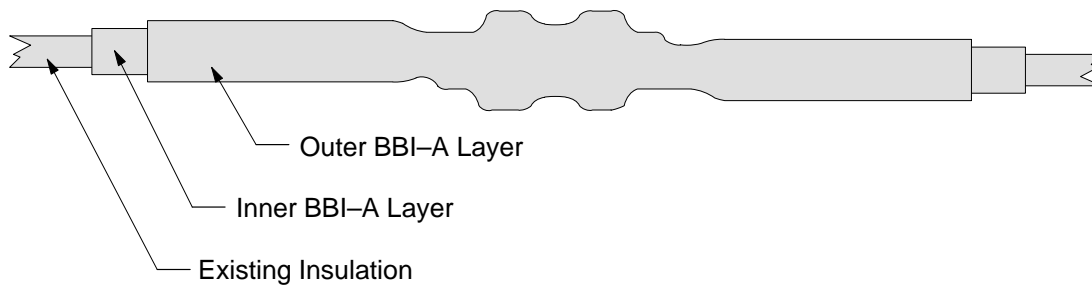
Use Following Instruction Steps in Addition to 5 – 15 kV Instructions

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.

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