Cold Shrink EPDM Tubes
Connector Insulators 8420 Series

Data Sheet

Product Description

3M Brand PST Cold Shrink Connector Insulators are a series of open-ended, tubular rubber sleeves, which are factory expanded and assembled onto a removable core. They are supplied for field installation in this pre-stretched condition. The core is removed after the tube has been positioned for installation over an inline connection, terminal lug, etc., allowing the tube to shrink and form a waterproof seal. The insulating tube is made of EPDM rubber, which contains no chlorides or sulphurs. Six diameter sizes will cover a range of 1000 volt cables, copper and aluminium conductors.

PST features are:

- Simple installation, requires only workman's hands
- Accommodates a wide range of cable sizes
- No torches or heat required
- Good thermal stability
- Seals tight, retains its resiliency and pressure even after prolonged years of ageing and exposure
- Excellent wet electrical properties
- Improved tough rubber formulation to withstand rough backfilling
- Waterproof. Meets water seal requirements of NEMA Pub. No. PP-C1
- Resists fungus
- Resists acids and alkalis
- Resists ozone and ultraviolet light

Applications

- Primary electrical insulation for all solid dielectric (rubber and plastic) insulated wire and cable splices rated to 1000 volts
- Directly buriable or submersible
- For indoor, outdoor, or overhead use
- Physical protection and moisture sealing for high-voltage, air-insulated connectors and lugs such as spacer cable and lug connections to bus bar
- Insulation of secondary splices copper or aluminium conductors
- Relocation of service
- Dig-in repairs
- Sheath repairs
- Insulation of inline conductor transition connectors (see Figure 1)

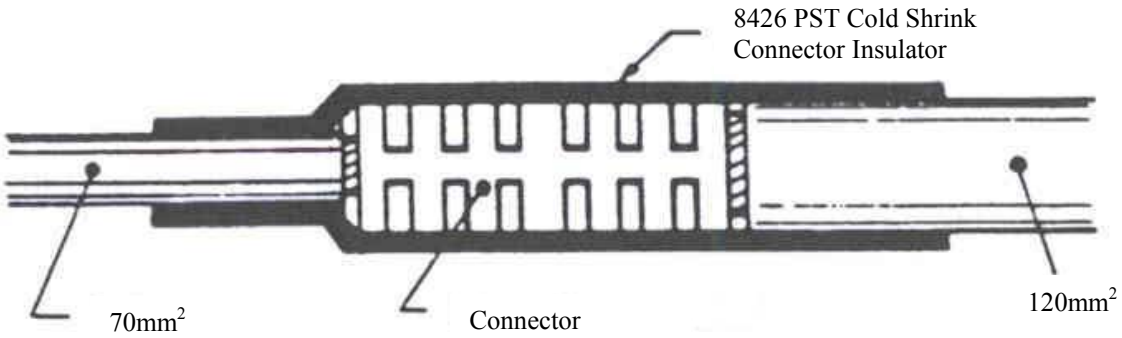

Figure 1

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Data: Physical & Electrical Properties

PST Selection Table

	Min. diameter (mm)	Max. diameter (mm)	Length (mm)
8423-6	7.8	14.3	152
8425-7	9.9	17.8	178
8425-8	10.2	20.8	203
8426-9	13.0	25.4	229
8426-11	13.0	25.4	279
8427-6	17.5	33.0	152
8427-12	17.5	33.0	305
8427-16	17.5	33.0	406
8428-6	24.0	49.3	152
8428-12	24.0	49.3	305
8428-18	24.0	49.3	457
8428-24	24.0	49.3	609
8429-6	32.2	67.8	152
8429-9	32.2	67.8	229
8429-12	32.2	67.8	305
8429-18	32.2	67.8	457
8430-9	42.6	93.7	229
8430-18	42.6	93.7	457

Typical Physical & Electrical Properties

Physical Properties

Test Method	Typical Value
Colour	Black
100% Modulus ASTM D 412	(1.17 Mpa
300% Modulus ASTM D 412-75	4.7 Mpa
Ultimate Tensile ASTM D 412-75 Original	11.6 Mpa
Ultimate Elongation ASTM D 412-75 Original	635%
Die C Tear ASTM D 624C-73 Original	38.5KN/m
Fungus Resistance ASTM G-21 28 days exposure	No growth
Shore A Hardness ASTM D 2240-75	48
Permanent Set 3M test method @ 250% strain 5 minute recovery	RT 8.8% 4.4°C (40°F) 14.6%
Moisture Absorption	Wt. Gain
24hrs 90°C H_2O	1.3%
7 days 90°C H_2O	3.2%

Electrical Properties

Dielectric Strength ASTM D 149-75 Original @ 1.78mm	19.1 MV/m
7 days in H_2O at 90°C	18.1MV/m
Dielectric Constant Original	5.0
7 days 90°C H_2O	5.6

Specifications

Product

Splicing of all 1000 volts or less inline power cables from 6mm^2 to 500mm^2 shall be done in accordance with the instructions provided with 3M Brand PST Cold Shrink Connector Insulators.

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Engineering/Architectural
The connector insulator must be capable of operation at emergency overload cable temperatures of 130°C. It must be usable without additional covering or adhesive, both indoors and outdoors, in overhead, direct buried or submersed applications, on cables rated up to 1000 volts. It must be applied without additional heat or flame and, when applied according to the manufacturer's directions, but immediately energizable. It must not be adversely affected by moisture, mild acids or alkalis, ozone or ultraviolet light. It must be compatible with all rubber or plastic insulated 1000 volt cables. It must conform to the requirements of ANSI C119.1 1974, appropriate sections of Western Underground Guide 2.14 and UL 486D. It must have been accepted by the US Dept of Agriculture, Rural Electrification Administration, for both submersible and aerial application.

Performance Tests

The characteristic which is vital to the performance of the PST is permanent set. Permanent set is defined as "the percentage of the original stretched deformation not recovered in a given period of time after the deforming force (core) has been removed". Because the PST tube has not been allowed to return to its original ID by the cable, a live rubber force exists between the cable insulation and the PST tube.

The 8420 series tubes are installed on the core at approximately 250% stretch. The permanent set test is done in the tension mode and reflects the elastic memory property of the material. Field experience combined with laboratory test data has shown that our EPDM PST/Cold Shrink™ compounds exhibit excellent long-term elastic memory characteristics.

Moisture, Heat and Seal Tests
3M Brand Connector Insulators meet or exceed the test requirements of UL486D and ANSI C119.1.
Test Sequence.

1. 24 hours in room temperature water (30cm deep).
2. Insulation resistance at dc (500 to 1000V), 1 minute.
3. Dielectric ac withstand, 1 minute at 2200V.
4. Heat at 90°C (±5°C) for 72 hours.
5. Flex test: 10 cycles for 90° right and 90° left.
6. Twist test: twist 15° clockwise and then 15° counter-clockwise from centre 5 times.
7. Water immersion as in Step 1.
8. Insulation resistance as in Step 2.
9. Cold temp. 4 hours at –18°C ± 5°C. Bend and twist per Steps 5. and 6. at temp.
10. Flex per Step 5.
11. Twist per Step 6.
12. Water immersion as in Step 1.
13. Insulation resistance as in Step 2.
14. Current cycle and water submersion test:
    a) Heat conductor with current to 90°C for 1 hour.
    b) De-energize.
    c) Plunge in 25°C (± 5°C) water within 3 minutes of Step b) for ½ hour minimum.
    d) Repeat Steps a), b) and c), 25 times.
    e) Measure insulation resistance per Step 2.
    f) Repeat Steps a), b) and c), 25 times.
    g) Dielectric test as in Step 3.
15. Dielectric withstand as in Step 3.
16. Leakage current in water 600V 60hz. 2.5mA max. leakage.

PST's will seal within 5 minutes at –1°C even on the absolute minimum cable size. Thus, warming with the hands is not necessary, even below freezing.

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Resistance to UV
Samples were mounted 50cm from two UA-3 type GC Brand bulbs. The samples were examined after 70 hours. No cracks were observed.

Chemical Resistance
Samples of rubber were immersed in solutions for 30 days at room temperature and the physical characteristics were measured (Figure 2).

	% Retention		
	100% Modulus	Breaking Strength	Breaking Elongation
10% Sulfuric Acid (H_2SO4)	100	90	95
10% Sodium Hydroxide (NaOH)	81	78	104

Figure 2

Installation Techniques

1. Remove loose core end from cut and welded end of PST.
2. Slide PST assembly onto cable and install connector (figure 3).
3. Remove defects from surface of cable in seal areas.
4. Hold PST assembly and cable in proper position in one hand and unwind core in counter-clockwise direction with the other hand (figure 4).

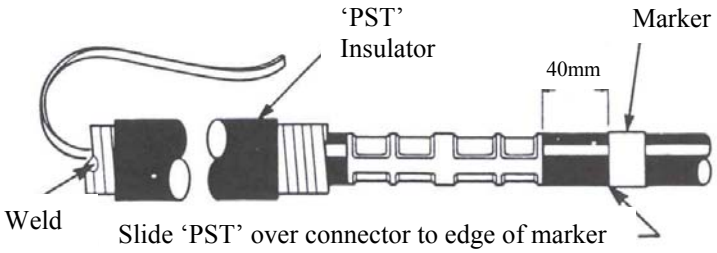

Figure 3

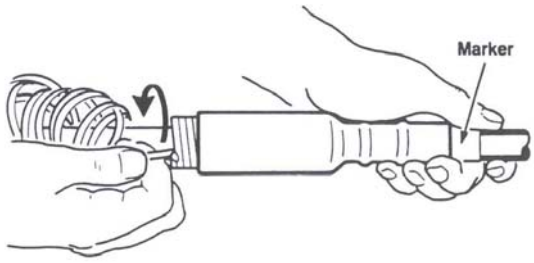

Figure 4

Maintenance

Components of 3M PST Connector Insulators are stable under normal storage conditions. They are not impaired by freezing or overheating due to the ambient temperatures found in storage or shipping. Normal storage and stock rotation are recommended.

Availability

3M PST Cold Shrink Connector Insulators are available in 8 diameter sizes covering an application range of 8 → 94mm. They are available from your authorised 3M electrical distributor..

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