

3M Data Sheet

Scotch™ 2228

Rubber Mastic Tape

1. Product Description

Scotch™ 2228 Rubber Mastic Tape is a conformable, laminated tape consisting of an ethylene propylene rubber (EPR) backing bonded to a tacky, temperature stable, mastic. It is available in 50.8 mm wide rolls, 1.65 mm thick, for quick and easy insulating, padding and sealing of bus bar connections and other electrical splice connections rated up to 1000 Volts. It is also suitable for padding, smoothing and providing environmental and corrosion protection for high voltage bus bar connections. The tape is designed for use on copper or aluminum conductors rated at 90°C, with an emergency overload rating of 130°C. It offers excellent resistance to moisture and ultraviolet exposure for outdoor, weather-exposed applications.

Product Features

EPR Backing:

- Conformable for good handling characteristics on applications over irregular surfaces
- Excellent weather and moisture resistance for use in outdoor, direct burial or submerged locations
- Flame retardant
- Excellent electrical and physical properties
- High thermal conductivity

Mastic:

- Good adhesive characteristics for sticking to copper or aluminium bus, and power cable connectors and jackets
- Good temperature stability to maintain sealing characteristics at conductor temperatures up to 130°C
- Conformable and moldable for easy applications over irregular bolted connections
- Good sealing properties for use in weather exposed or submerged locations

Scotch™ 2228 Rubber/Mastic:

- 1.65 mm thickness provides quick application build-up and padding over connections
- Laminated construction provides good jacketing and handling along with good sealing and conformability

2. Applications

- For electrical insulating of bus bar connections rated up to 1000 Volts
- For electrical insulating of cable splice connections rated up to 1000 Volts
- For moisture sealing of electrical connections rated up to 1000 Volts
- For moisture sealing of electrical connections rated up to 1000 Volts
- For providing corrosion protection on low and high voltage bus bar connections
- For use on electrical conductors rated 90°C, with an emergency overload rating of 130°C
- For jacket sealing on JCN cable applications
- For jacket sealing of cable on crimped lug applications

3. Typical Properties*

Scotch™ 2228 Rubber Mastic

Color	Black
Thickness¹	
Overall	1.65 mm
EPR Backing	0.76 mm
Mastic Layer	0.89 mm
Adhesion to Steel¹	43.8 N/10 mm
Water Absorption²	0.15%
Electric Strength³	
Dry	25.9 kV
Wet	30.5 kV
Electric Constant⁴	3.84
Dissipation Factor⁴	0.50%

EPR Backing

Thickness¹	0.762 mm
Tensile Strength¹	
Original	2.26 MPa
Aged 500 hrs at 130°C	1.62 MPa
Ultimate Elongation¹	1035%
Thermal Resistivity (3M Transient Method)	300°C cm/Watt
Ozone Resistance⁷	Passes
Heat Resistance⁷	Passes
UV Resistance⁷	Passes
Weatherometer	Passes
Flame Resistance⁵	Passes
Electric Strength³	32 kV/mm
Insulation Resistance⁶	>10 ⁶ MΩ
Dielectric Constant⁴ 500 V at 60 Hz	
23°C	3.5
65°C	3.6
90°C	3.6
Dissipation Factor⁴ 500 V at 60 Hz	
23°C	0.70%
65°C	1.60%
90°C	2.00%

*There are typical properties and should not be used for specification purposes.

¹ IEC 60454-2
² ASTM D-570
³ IEC 60243
⁴ VDE 0303-4
⁵ IEEE Std. 27
⁶ IEC 60426
⁷ ASTM D-4388

4. Specifications

Product

All bus bar connections rated 1000 Volts and less shall be insulated with a rubber backed mastic tape. The tape shall be 50.8 mm wide, with a backing of 0.76 mm thick ethylene propylene rubber (EPR) laminated to a 0.89 mm thick mastic layer. The tape shall be black in color. The product must be rated for continuous operation on connections rated up to 90°C, with an emergency overload rating of 130°C. The tape must be compatible with all common synthetic bus bar insulations. The product must be specified by the manufacturer as suitable for outdoor, weather exposed locations.

Engineering/Architectural

All bus bar connections rated 1000 Volts and less shall be insulated with Scotch™ 2228 Rubber Mastic Tape. Application of the tape shall be performed in accordance with the instructions packaged with the product: All bolted connections and other irregular surfaces shall be padded with an initial application of Scotch™ 2228 Tape, then the entire splice/connection area shall be insulated with at least one half-lapped layer of Scotch™ 2228 Tape.

5. Performance Tests

A. Mastic Stability Test

The mastic was applied as a seal between 2 pigtailed 600 V. cables and an EPR splice jacket. Samples were over aged at 140°C for 45 days to determine if the mastic sealant would flow. Although the mastic first softened, then stiffened, it retained its original seal position.

B. Water Seal Test

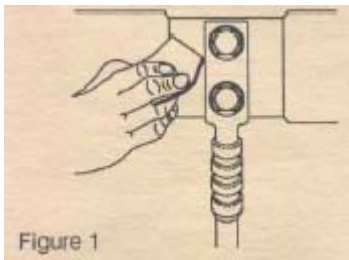
Samples were constructed using the mastic as a seal between PVC cable jackets and connecting ground wire. The specimens were thermal cycled in water baths at 25°C and 90°C. The total test time of 336 hours revealed no significant change in insulation resistance. Test results exceed the requirements listed in UL 486D “Standard for Insulated Wire Connectors for use with Underground Conductors,” paragraph 7.1, insulation resistance, and paragraph 8.1, dielectric voltage withstand.

6. Installation Techniques

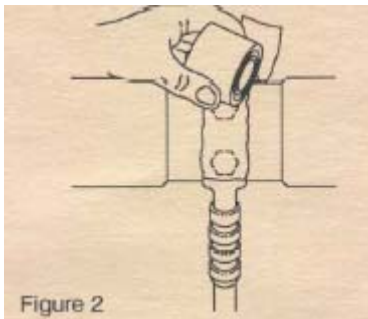
The tape shall be normally in half-lapped layers with sufficient tension to conform to the bus bar, cable, connection, etc. It can also be formed or molded for the padding and smoothing of irregular connections and surfaces.

The following is a typical installation for insulating a cable to bus bar tee connection:

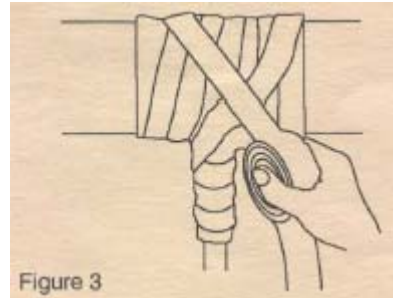
- a. Clean connection area (Figure 1)



- b. Start Scotch™ 2228 Tape application by first applying it as padding over irregular surfaces (such as nuts and bolts, corners, etc.). Form the Scotch™ 2228 Tape padding to the shapes using moderate finger pressure. (Figure 2)



- c. Continue applying the Scotch™ 2228 Tape, mastic side down, over the entire connection area (including the previously applied padding). Apply a minimum thickness of one half-lapped layer, tensioning it moderately so it conforms to the connection. Extend Scotch™ 2228 Tape coverage onto existing bus insulation for at least 25 mm. (Figure 3)



7. Maintenance

Under normal storage conditions, Scotch™ 2228 Tape has a 5 years shelf life. The tape is not impaired by freezing nor by overheated storage prevents removal from the package.

8. Availability

Scotch™ 2228 Rubber Mastic Tape is available in a 2 in by 10 ft roll. The tape is available from your local authorized 3M electrical distributor.

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