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Technical datasheet

Scotch® 23

Rubber Splicing Tape

1. Product description

Scotch® Rubber Splicing Tape 23 is a highly conformable, self-fusing EPR (Ethylene Propylene Rubber) based, high voltage splicing tape. It is a non-vulcanizing, shelf-stable tape with high electrical properties. Scotch® Tape 23 can be used as an insulation for low-voltage application as well as an insulation for splices up to 69.000 volts.

- Can be used to splice and terminate cables whose emergency overload temperatures can reach 130°C
- Based on Ethylene Propylene Rubber (EPR)
- Physical and electrical properties are unaffected by the degree of stretch
- Self-fusing tape
- High electrical properties
- A special polyester liner which will not stick to the tape upon unwind
- Compatible with all solid dielectric cable Insulation:
  1. Polyethylene (high and low density)
  2. Cross-linked Polyethylene (XLP)
  3. Polyvinyl Chloride (PVC)
  4. Butyl Rubber
  5. Ethylene Propylene Rubber (PVC)
  6. Oil-based rubber

2. Applications

- Primary electrical insulation for splicing cable from 600 volts through 69.000 volts on all solid dielectric cables
- Primary insulation for building stress cones on cables up to 35.000 volts on all solid dielectric cables
- Jacketing on high-voltage splices and terminations
- Moisture sealing electrical connections
- Bus bar insulations
- End sealing high-voltage cables

3. Typical properties

Physical properties	Typical value
Colour	Black
Thickness*	0,76 mm
Tensile Strength*	1,4 kN/1 m
Ultimate Elongation*	1000%
Operating Temperature	90°C
Emergency Operating Temperature	130°C
Fusion (ASTM D4388)	Passes
Thermal Conductivity (ASTM D1518)	0,0174 W/(m*K)
Modulus @ 130°C	See Characteristics & Test Data
Ozone Resistance (ASTM D4388)	Passes

Electrical properties	Typical value
Dielectric Strength* After Standard Conditioning After 96 hrs @ 96% RH	31,5 MV/m >90% of Std Condition Value
Insulation Resistance (ASTM D1000) (Indirect Method of Electrolytic Corrosion)	>1×10^6 megaohms
Dissipation Factor	See Characteristics & Test Data
Dielectric Constant	See Characteristics & Test Data
Dielectric Strength at Elevated Temperature	See Characteristics & Test Data

Properties measured at room temperature 23 °C unless otherwise stated.

3.1 Characteristics and Test Data

Modulus at 130°C:
A high-voltage tape that constantly maintains a rubber-like consistency throughout the life of a splice. One method of determining a rubber material consistency is by measuring the modulus of the material. The modulus of a material is the stress required to elongate the material to a given elongation.

Figure 1 shows the 100% modulus (stress required to elongate Scotch® Tape 23 to 100% elongation) after heat aging the samples at 130°C for a varying number of days. The results indicate a very stable product with excellent "body" or elasticity after oven aging at 130°C.

Scotch® Electrical Semi-Conducting Tape 13 can be checked for resistance with an ohmmeter. After elongating the tape 25% of its original width, probe points placed one inch apart on tape should measure 10.000 ohms or less. Figure 1 illustrates the type of results which may be expected in the field.

Dissipation Factor:
Figure 2 shows the dissipation of Scotch® Tape 23. This test was run according to ASTM D-150 at a stress of 2,0 MV/m and a frequency of 60 cycles per second.

Dielectric Constant:
Figure 3 shows the dielectric constant versus temperature of Scotch® Rubber Splicing Tape 23. This test was run according to ASTM D-150 at a stress of 2,0 MV/m and a frequency of 60 cycles per second.

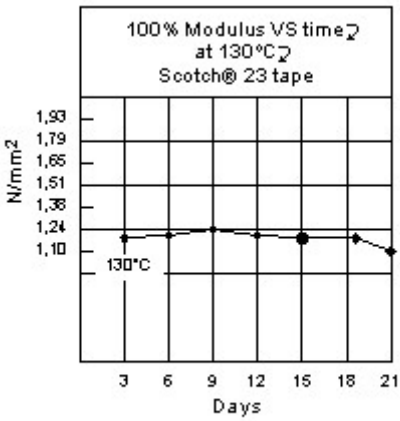

Figure 1

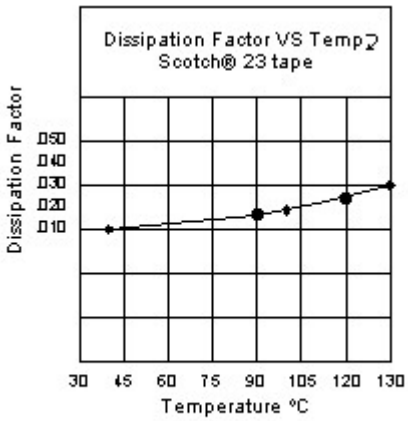

Figure 2

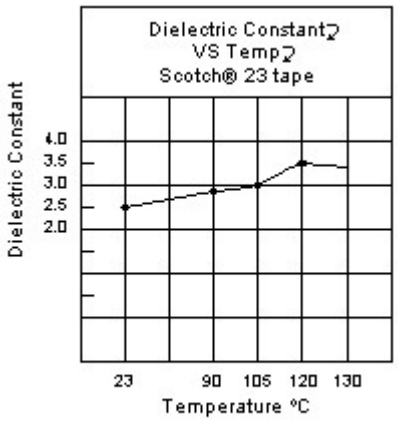

Figure 3

Dissipation Strength at Elevated Temperatures:
A high-voltage splice has a high dielectric strength at room temperature, but also good values at the temperature at which it is expected to operate. Figure 4 shows a plot of dielectric strength versus temperature. This test was run according to ASTM D-1000.

Dielectric Strength Versus Thickness:
Figure 5 shows a plot of dielectric strength in volts per mil versus thickness. This test was run according to ASTM D-1000.

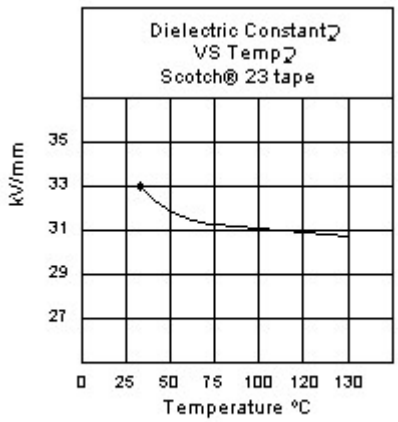

Figure 4

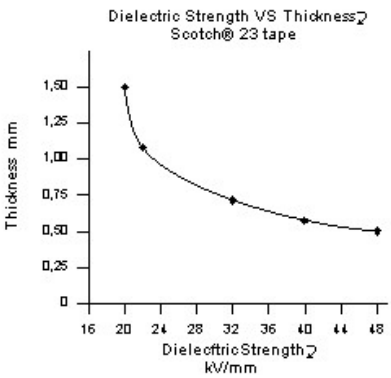

Figure 5

4. User information

4.1 Specifications

The high-voltage corona-resistant tape is based on Ethylene Propylene Rubber and is capable of operation at the emergency cable temperature of 130°C. Scotch® Rubber Splicing Tape 23 may be applied in either the stretched or unstretched condition without resulting in loss in either physical or electrical properties.

The tape is split resistant, crack resistant, slip resistant and flag resistant when exposed to various environments (indoor or outdoor). It is compatible with synthetic cable insulations. Scotch® Tape 23 has a dissipation factor of less than 5% at 130°C, and a shelf life of 5 years.

4.2 Engineering/Architectural Specification

Splicing and terminating solid dielectric cables shall be done in accordance with drawings engineered by the splice material manufacturer such as the 2047 Series available from 3M Company. Splices and terminations may be insulated using Scotch® Rubber Splicing Tape 23.

4.3 Installation Techniques

Scotch® Rubber Splicing Tape 23 should be applied in successive half-lapped, level-wound layers until desired buildup is reached. To eliminate voids in critical areas, highly elongate the tape.

Stretch tape in these critical areas just short of its breaking point. Doing so will not alter its physical or electrical properties. In less critical areas, less elongation may be used.

Normally, the tape is stretched to 3/4 of its original width in these less critical areas. Always attempt to half-lap to produce a uniform buildup. When using Scotch® Tape 23 for splicing cables from 35 kV to 69 kV, always elongate the tape throughout the entire splice.

Techniques for the proper use of this tape are contained in standard and special prints available through the 3M Systems for Splicing and Terminating Program. These are available through the local 3M Electrical Markets Division representative.

4.4 Storage

This product has a 5-year shelf life from date of manufacture when stored in a humidity controlled storage (10°C to 27°C and <75% relative humidity).

The tape is not impaired by freezing or by overheated storage up to the point of flow, which prevents removal from the package.

4.5 Availability

Please contact your local distributor.

5. Additional information

To request additional product information, see address below.

Important notice

All statements, technical information and recommendations contained in this document are based upon tests or experience that 3M believes are reliable. However, many factors beyond 3M's control can affect the use and performance of a 3M product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user's knowledge and control, it is essential that the user evaluates the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method or application.

Values presented have been determined by standard test methods and are average values not meant to be used for specification purposes.

All questions of warranty and liability relating to 3M products are governed by the terms of the respective sale subject, where applicable, to the prevailing law.

Electrical Markets Division

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