

Electrical Taping Skills: A Lost Art?

Although some may consider the practice old school, electrical taping is a valuable skill you shouldn't let slip away

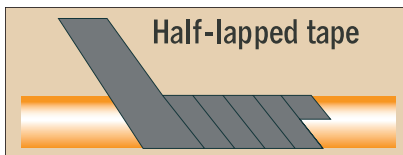


Three different types of tape are used to connect feeder cables to motor leads. In the last step, a quality vinyl electrical tape is stretched as it is wrapped for good conformance to the underlying structure and to complete the moisture seal. This tape withstands the effects of vibration while providing electrical insulation and protective jacketing.

By Bob Goodman and Rodney G. Brown, 3M

With all of the new products and electrical insulation kits currently on the market, the use of conventional electrical tapes has gone down. As a result, electricians today may not possess the taping skills that once were such an important part of their predecessors' work. Nevertheless, there is still good reason to master this craft — especially for those times when repairs are needed quickly and other products are simply not available.

According to Steve Anderson, a National Joint Apprenticeship and Training Committee (NJATC) director, the NJATC believes strongly in the importance of splice and termination taping skills for electricians and linemen. "Taping is the first thing covered in our cable splice training course, and we spend a lot of time in this area," Anderson says.



Half-lap tape application enhances adhesion and insulation functionality.

Anderson points out that repair situations can arise in the field where a splicer does not have access to a particular kit for the job. However, knowing how to make proper use of tape can save the day, getting the customer back online quickly. “It’s far more economical to complete a job on the spot with tape than to go in search of a kit,” Anderson maintains.

Taping tips. The primary tapes used in electrical applications are vinyl, rubber, mastic, and varnished cambric. These products have been used in electrical work for many years, are code approved, and conform to key industry standards, including UL 520, ASTM D1000, and CSA 22.2. The **Table** on page C23 lists the primary uses for each of these types of tape.

The function of moisture-sealing tapes such as vinyl, rubber, and mastic products is to exclude moisture from the insulation assembly and provide electrical insulation. One of these tapes — or alternately a mastic pad — generally forms the second layer of the insulation assembly. Rubber, mastic, and filler tapes are also used to pad the underlying surface by covering sharp edges.

Rubber tapes are generally non-adhesive, and are either equipped with a liner or are linerless. Stretched and overlapped layers will fuse or bond together to form an effective electrical insulation and moisture barrier. For low-voltage (1000V or less) applications, rubber tapes should be stretched during wrapping so that tape width is reduced to approximately 75%. For high- and medium-voltage applications — where the electrical stresses are high (e.g. connector areas, lug areas, and cable shield cut-back areas) — tape should be stretched just short of its breaking point.

Vinyl tape forms the final outer layer and serves several important functions in addition to electrical insulation,

including abrasion protection, corrosion resistance, UV resistance, and protection from chemicals including alkalis and acids. Conformable vinyl tape is tougher than the softer, stickier surfaces of rubber, mastic, and putty tapes it protects.

Several grades of vinyl electrical tape are available — all of which differ in conformability, ease of unwinding, resistance of the adhesive to heat and cold, and loosening (flagging). While general-use vinyl tapes are appropriate for bundling, wire pulling, and other ancillary tasks, premium-grade vinyl tape is the best choice for permanent insulation work as it handles the broadest range of environmental factors and functions, such as cold weather.

You should use a minimum of two half-lapped layers of vinyl tape to insulate and jacket low-voltage components. A half-lap (see **Figure** above) consists of overlaying each turn by one-half the width of the tape. The general rule of thumb calls for a tape thickness of 1.5 times the thickness of existing wire or

connections. Let’s take a look at some guidelines for each.

Motor lead insulation. In the case of low-voltage motor lead connections, the tape insulating process consists of connecting feeder cables to motor leads and arranging the conductors for easy wrapping. You should begin by wrapping two layers of varnished cambric tape, which is available with or without adhesive. For the adhesive type, apply with the adhesive side out for clean re-entry.

Follow up this first step by wrapping four half-lapped layers of rubber insulating tape over the cambric tape, which creates a moisture barrier and provides the primary insulation in the connection. Finally, over-wrap the assembly with a minimum of two half-lapped layers of vinyl electrical tape. This should extend approximately two tape widths beyond the ends of the rubber tape. Stretch this tape as you wrap it so you get good conformance to the underlying structure. This also helps complete the moisture seal.

Inline splice insulation. You can protect a low-voltage inline splice in a similar

Tale of the Tape

The first commercial tape for electrical insulation was cotton friction tape, which became available in the early 1930s. Vinyl electrical tape was introduced in the mid 40s. This advanced material provided dramatic advantages over friction tape, including improved adhesion and moisture protection. Vinyl tapes have been refined substantially over the years, and other tape products have been added as well. Today’s tapes offer long-term performance, excellent adhesion, and temperature resistance — not to mention smooth unwind from the roll. Resistance to adhesive transfer, superior conformability, high tensile strength, good elastic memory and recovery, and wider installation and operational temperature ranges characterize premium products.

cable insulation. In every case, tension on the tape should be sufficient to conform the tape evenly to the surface. A slight reduction in tension is encouraged for the final wrap. Trim the tape end and allow it to return to shape before pressing down with the thumb to avoid lifting or flagging.

Useful applications. When properly applied, quality tapes can serve as valuable standby resources for jobs such as insulating motor lead connections, inline splices, and split bolt and bus bar

manner by wrapping the installed connector with four half-lapped layers of rubber mastic tape or rubber splicing tape, and then over-wrapping it with two half-lapped layers of premium vinyl electrical tape.

Split bolt connection. Protection of a split bolt connection begins with installing the connector and wrapping it with two layers of varnished cambric tape. Next, wrap the splice with four half-lapped layers of rubber or rubber mastic tape. Complete the job by over-wrapping with at least two half-lapped layers of

premium vinyl electrical tape.

Bus bar. A common method of insulating a bus bar connection is to first wrap it with two layers of varnished cambric. The subsequent steps consist of four half-lapped layers of rubber or rubber mastic followed by two half-lapped layers of premium vinyl tape.

Electrical tapes are versatile, suited to a multitude of tasks, and when installed properly provide a long-term, effective insulation. According to Anderson, both the NJATC headquarters and local training efforts are strongly supported by industry suppliers, which provide sample products and assist with course

development and hands-on instruction. In addition, manufacturers of electrical-grade tapes are generally willing to provide technical support and instruction on proper taping techniques.

“There are many kits and products available to electricians today that simplify their work and help increase productivity,” Anderson says. “The properties of electrical tapes have also been steadily improved over the years. These proven products can be adapted to many important electrical insulation tasks, and they continue to be valuable assets for our industry. For that reason, we continue to stress the importance of taping skills and strong product and application knowledge.”

EC&M

Goodman is a technical service engineer and Brown is a technical service senior engineer with 3M in Austin, Texas.

| Electrical Uses | Vinyl Tapes | Rubber Tapes | Varnished Cambric | Mastic & Filler Putty Tapes |
|-----------------------|-------------|--------------|-------------------|-----------------------------|
| Protective jacketing | X | X | | |
| Electrical insulation | X | X | X | X |
| Moisture sealing | | X | | X |
| ID and color-coding | X | | | |
| Harness and bundling | X | | | |
| Mechanical padding | | X | X | X |
| Shaping | | X | X | X |
| Re-entry | X | | X | |

The primary uses for each of the different types of tapes available are outlined in the table above.

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