# Connector Weatherproofing: Everyone Has an Opinion

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As a regular reader of TowerTalk and a few other online ham radio groups, I have watched in wonder as dozens of fellows expounded on their favored method of weatherproofing coaxial connectors. As they say about opinions, everybody has one... and everyone else's stinks. There were some really amusing methods, but eventually I detected a consensus that also aligned with some published recommendations.

The table below summarizes what I found. Column headers are the various materials, and in each cell is the sequence in which they might be applied, starting with number one as the base layer.

| Source | Vinyl tape, Scotch 33/88 | Scotch 33/88, sticky side out | Silicone tape (e.g. Rescue; Scotch 70) | Self-fusing tape 3M 2155, 2242, 130 | Liquid Elec Tape | Heat-shrink | Double-wall Heat-shrink | Skotch-kote | Coax Seal | PTFE Tape |
|---|---|---|---|---|---|---|---|---|---|---|
| DXE TechTip, NK7Z, W0QT, WJ4X, W9FX | 2 | | | 1 | | | | | | |
| K2ASP | | | | 1 | | | | | | |
| W6SX | | | 1 | | | | | | | |
| ARRL, K4IA | 1, 3 | | | 2 | | | | | | |
| K4ZA | 3 | | | 2 | | | | | | 1 |
| W6XU | 3 | 1 | | 2 | | | | 4 | | |
| W2IRT | | | | 1 | | 2 | | | | |
| W3LPL | 3 | 1 | | 2 | | | | | | |
| K6EWN | 2 | | 1 | | | | | 3 | | |
| K9YC, NA6O, KL7UW, NF4L | 2 | | 1 | | | | | | | |
| N4XY | 2 | | | 1 | 3 | | | | | |
| KL7UW | | | | 1 | | | 2 | | | |
| NM5G | 1, 3 | | | | | | | 2 | | |
| WW5L | 1 | | | | | | | 2 | | |
| NI1N | 1 | | | | | | | | 2 | |
| AC0H | 1,4 | | | 3 | | | | 5 | 2 | |
| VE7RF | 1,3 | | | | | | 2 | | | |

The wackiest one starts with a coating of silicone grease, wrap with a trash bag, then apply vinyl tape but NEVER use 3M tape because that's no good. And by golly, it's the BEST way and I've been using it for 40 years and no other way will ever suffice. I left that one off the chart...

Most of us in NorCal have it easy with our mild weather, and more than a few get away with nary so much as a quick wrap of electrical tape. Still, some kind of weatherproofing on your connections will likely improve long-term reliability and make those connections easier to maintain. And if you're setting up shop in the Caribbean, you really need to get this right.

**Three Layers**
The consensus points to a three-layer system. First is typically vinyl tape, acting as a release layer or courtesy wrap, which aids you when it comes time to remove the tougher upper layers. (Some skip that one.) Second is a self-vulcanizing, sealing layer. This is the critical one that provides the primary moisture seal. Finally, an outer layer of vinyl tape protects the more vulnerable sealing layer from the sun and abrasion.

Everyone recommends 3M Scotch Super 33 or the heavier 88 vinyl tape, those being known quality products. Not much more to say about that choice. A double wrap is usually applied as the final layer and it has a very long service life. *Tip:* Cut it, don't tear it, and it's less likely to "flag" in the wind.

As for the self-vulcanizing layer, there are several popular choices. First are the various self-fusing rubber tapes, also known as splicing tape. 3M makes several types (such as 2155, 2242, 130C). All of these are available at Home Depot and are perfectly acceptable for our purpose. Note that two of these actually have a UV resistance specification and it's possible to use them without an overwrap.

2155: 30 mil. Has a clear liner strip.
2242: Premium grade. UV-resistant, 30 mil. No liner strip. Easier to use!
130C: Similar to 2242 but additionally rated for high-voltage applications.

The second choice is silicone rubber tape. Examples are Rescue Tape, F4 Tape, and countless others, available everywhere. This material doesn't really stick to the substrate, but bonds well to itself. Like the rubber tapes, it's very stretchy and provides an excellent moisture seal. Also it comes off very easily when touched by a knife. Because of its poor cut resistance, it really needs an overwrapping.

The third choice for a sealing layer is what the commercial boys often use, butyl rubber mastic. It comes as a rolled-up sheet on a removable liner. You basically mold it around the connector. Examples are 3M 2212 (available from DXE and online suppliers), and Andrew (Commscope) 42615-4 as part of their weatherproofing kit p/n 221213. Note that this material does not turn to permanent disgusting slime like CoaxSeal!

**Dielectric Grease**
Another enhancement that you'll see on commercial connectors that I learned about while dealing with all sorts of military stuff is a careful application of silicone dielectric grease. The material I'm talking about is Dow Corning 4 Electrical Insulating Compound. Get it at Amazon. You apply a tiny amount to connector threads—just a film—and also to the male and female contact areas. The less you use, the better it works. It is highly water repellent, and that's the reason for its use here. Any moisture vapor that makes its way through to the connector will stop when it hits this material. Also it acts as a lubricant for the threads and does not break down in the presence of high voltage. And no, it does not effect electrical conductivity in properly-assembled connectors.

**Tighten Up**
Before mummifying your connection, be sure those connectors are truly tight. PL259s have a couple of little bumps on their faces. Those mate with small notches in the SO239 sockets. Make sure those are engaged, then spin the shell on. Those faces are where the shield connection is actually made, not through the threaded shell. Then use pliers to snug it up a bit beyond hand-tight. (But please go easy and don't chew up or crush the shell.) The last thing you want is a deeply-hidden intermittent connection. 7/16 DIN and N connectors don't have any funny notches to deal with, but they do have torque specifications for installation, in case anyone wondered.

**Do Something!**
Whether you choose to apply the full multilayer treatment or not, please do *something* to protect your connectors. Even a quick wrap of vinyl tape will help to shed the rain and keep out the grit. You'll appreciate that later when you need to service them.

**References**
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