BRAIDED COAX
VS SOLID METAL SHIELDS

AN ARTICLE
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Arguments abound when discussing the use of Coaxial Cables. Do you like the flexibility of a sufficiently Braided Cable, or the durability of the solid shield "Heliax" or "Superflex" type of cable with the difference being a Braided Shield system VS a Solid Shield system.

Suffice to say if these were the only criteria for selecting such a cable to move signals of any kind from here to there, and setting aside the considerations of Peak Voltage Breakdown in AC, and DC terms, Capacitance per foot, Inductance per foot, Impedance accuracy, Indoor against Outdoor ability, Crush Resistance, Phase stability, smell, color?? No matter what ancillary items you have to use to choose, the primary consideration "should" be leakage. Leakage? It's Coax, Leakage? As if all those things are not difficult enough, the crimp connectors typically used on Braided Cable don't Sweep worth Beans. It is rare to have a crimped connector do better then -22dB.

All types of cable, no matter if it is small signal cable, power wiring, or any type of Coax, all of them are subject to Magnetic Leakage. Every conductor on the face of the planet Leaks signals both out of their conductors, and receives stray signals in to the cable, nearly regardless of their shield type. The question is,,, How Much Is OK?

Coax or Coaxial Cable is as the name implies a concentrically distributed conductor set that encloses a primary center conductor that carries the desired signal from one place to another. The image to the right shows the simplified Coaxial arrangement. Typically the Coax is desired to be "Leak Free" as attempted by a continuous shield. There are circumstances where Leakage is desired. "Radiax" as it is known is a Leaky Coax that has the shield deliberately perforated in some manner such as slits, holes, or portals of some kind. This leaking of the internal energy can be utilized as both a transmitter antenna and a receiver antenna. Losses are high, coupling is poor but with proper link budget applications, Radiax is very useful.

Once you figure out that Radiax is not what you are looking for, the standard non-leaky versions of Coax are the contenders. In many R.F. intensive facilities, any type of errant signals flying about the plant is simply not tolerated.

With modern receivers operating in the -110dB and lower (higher?) range, generation or acceptance of unwanted signals from -110dB to -140dB are still considered destructive, though the primary signals that are deliberately radiated substantially higher than this it is easy to achieve levels of +85dB.

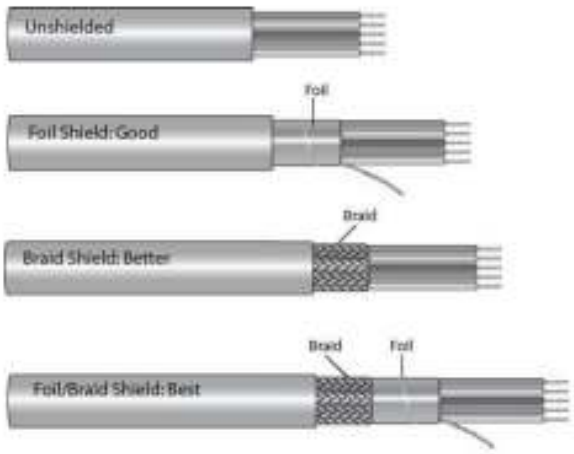
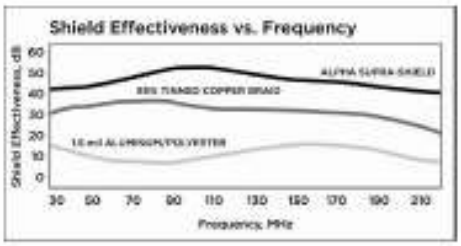


Figure 2. Typical shielding configurations



This is where operators of mixed use sites put their foot down and just prohibit the use of Braided Coaxial Cables at R.F. frequencies above 100kHz. I know, in for a penny, in for a pound, this is a rule that is often observed and at sites where braided cables are allowed. Housekeeping of stray intermod mix components are a sincere problem as is corruption of intended receive signal down in the dirt. Though the portrayal to the left is not Coax, you get the drift.

Now comes the meat and potatoes. While it is generally considered that a solid metal outer sheath, no matter the material construction type, is Leak Free. Solid metal shields of Lead, Aluminum, and Copper are prevalent in the communications world. Solid metallic shielding is considered to be 100% Leak Free. Now for the Electro-magnetic geniuses who read this article, I concede that there is no such thing as 100% because stray return currents on outer metal sheaths can carry flux fields but the intrusion level is also considered to be greater than -110Db from the worst nightmare of noise you can imagine if you take the chart below at face value which I personally feel is not deep enough. Lightning trashes this argument every time since the flux fields from a near field strike can be measured in a double digit Tesla scale. This is why grounding and bonding is so critical and cannot be adequately achieved with Braided Cables. -110dB is a breeze. I feel the isolation ability is more like -150dB at certain frequencies. Let's just agree to disagree that -160dB down from the worst adjacent signal source in the world is largely insignificant when you also understand that the standard Unobtainium intrusion levels of ordinary Braided Coaxial Cable in never better than 95%

Sample Number	Cable type	Shield Configuration	RF Leakage
1	M17/111-RG303	single round wire silver plated copper braid	- 50 dB
2	MI 7/60-RG142	double round wire silver plated copper braids	- 75 dB
3	LL142	silver plated copper strip braid, mylar, round wire silver plated copper braid	- 95 dB
4	SB142	silver plated copper strip braid, mylar, round wire silver plated copper braid	- 95 dB
5	SS402	spiral wrapped silver plated copper strip, round wire silver plated copper braid	-110 dB
6	SS405	spiral wrapped silver plated copper strip, round wire silver plated copper braid	-110 dB
7	M17/133-RG405	solid copper tube	-110 dB

Coaxial Leakage, in to or out of a cable can subtly corrupt any system. Video, Video Streams, Orthogonal sub 115dB levels, or higher powered R.F. signals in the hundreds of Watts range pushing +40dB, or pulsed signals that are even higher.

The choice is of course yours and the selection of available Coaxial products seems endless but in all my years of horsing around with some pretty super powered signals and as a interference hunter for a number of large Cellular companies, I believe that prohibiting Braided cable from your mind set is going to help you in the long run.

I can't hear you :)