

NEW SHIELDING POTENTIAL WITH METALLIC FABRIC

New ways to solve the acute needs for EMI/ESD shielding are rapidly being developed. Few, however, approach the problem with the flexibility of metallic fabric. Lightweight, washable, ranging from translucent to opaque, metallic fabric can be easily cut to any specific shape or size.

Manufactured from a unique woven fiber which has been coated with a microthin membrane of metal, the fabric not only provides a shield against RF and microwave radiation, but also reduces the buildup of static charges. Although possessing enhanced electrical properties, the cloth remains breathable, ductile, and flexible.

Virtually any fiber can be used as a base; polyester, polyamide, polyurethane, polyacrylate, rayon, and cotton, as well as inorganic substances, such as glass and carbon fibers. Metals used in plating include copper, nickel, cobalt, chrome, and when necessary, gold and silver, either pure or as alloys. By combining the type of fiber, the type of metal, and the depth and form of plating, the precise electrical properties necessary for a given application may be obtained economically.

Initial tests for shielding effectiveness were made on a recently patented variety of metallic fabric composed of polyester fiber with 20 percent nickel and a polyurethane coating. Using the coaxial transmission line method, the test results are recorded in Figure 1.

Using ASTM coaxial method at least 50 dB shielding effectiveness was obtained over the frequency range of 0.1 to 1000 MHz. Additional testing shows good shielding effectiveness to 21 GHz with a 12"×12" sample mounted on shielded enclosure walls. The data shows that this fabric is as good as, or better than, some sprays or coatings currently on the market—without the adverse side effects of flaking, peeling, scratching or poor uniformity.

This metallic fabric also stands up to repeated washings, as illustrated in Table 1.

After 20 washings under test conditions, the fabric retained approximately 90 percent of its shielding effectiveness and low surface resistivity. In addition, the material can be bonded with almost any standard method. Some forms of the fabric are available with adhesive backing, which makes applications to walls, windows, and casings relatively easy.

These features expand the usefulness of the fabric to

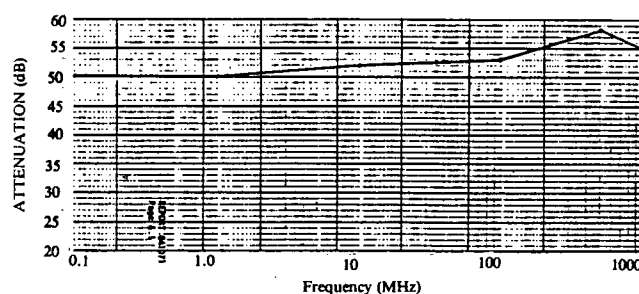


Figure 1. Shielding Effectiveness of Single Layer Metallic Fabric.

many military and commercial applications. Here, however, flammability concerns have been encountered. In response to demands for end uses with flammability regulations, research and development labs have been developing fire retardant properties for the fabric, with projected availability in Spring of 1985.

The search for, and development of, applications for this unique material are well under way. Three main applications emerge:

Environmental design. The fabric's physical beauty lends itself to controlled environmental design. Total predesigned or retrofit environments can be planned utilizing the material as wall covering, drapery, dividers, and window screening.

Equipment shielding. The fabric's lightness and flexibility suggest direct application on equipment such as gasket linings, cable shields, and VDT leak sealing. Bonding is an efficient process since some forms of the fabric come with adhesive backing.

Personnel shielding. Anti-static clothing and microwave suits are other obvious applications. Here the material has proven to be light, breathable, and easily washable.

As regulation standards become increasingly more stringent, organizations with EMI/ESD concerns will take imaginative advantage of metallic fabric's simplicity and versatility. They will find their EMI/ESD conditions considerably reduced and well within acceptable levels.

This article was written for ITEM 85 by Marden Smith, Trade Wind Traders Inc., Santa Cruz, CA, and Finbarr O'Connor, R&B Enterprises, West Conshohocken, PA.

(Radiation Shielding Efficiency in the 7.7 GHz band for repeatedly washed fabric)

Sample Number	0	1	2	3	4	5
Secondary Number	Original Cloth (no processing)	Resin Coating on One Side	Resin Coating on Both Sides	Foam Laminate on Both Sides	Knit Bonding on One Side	Knit Bonding on Both Sides
No. of Times Washed						
0	47.2 dB	47.0 dB	46.8 dB	47.2 dB	47.2 dB	47.2 dB
5	39.0 dB	43.6 dB	45.8 dB	44.8 dB	45.9 dB	47.0 dB
10	35.0 dB	39.0 dB	41.0 dB	35.2 dB	45.9 dB	47.0 dB
20	33.0 dB	39.0 dB	41.0 dB	32.0 dB	44.2 dB	40.2 dB

Table 1. Durability of Radiation Shielding Properties of Cloth Material (TexGuard™ Liner) with Washing.*

*Sample cloth used: TexGuard 102 C. Washing method: in accordance with JIS L0217, sec. 103.