HOW MEANINGFUL ARE COMPARATIVE TESTS ON R.F. ENCLOSURES?

In R.F. enclosures, like in most other early scientific endeavors, comparative testing has had much influence on the evolution of today's technology. Verification of material properties enables us to determine which materials provide the best combination of properties for use in shielded rooms. Subsequent testing identified those design characteristics which provided the best attenuation characteristics.

In 1976, E.A. Lindgren presented a collection of comparative tests on R.F. enclosures. This report was based upon more than eight years of comparative test data and research work collected by Lindgren. Each of the tests presented in this report were made in accordance with generally accepted guidelines established by military specifications and carried out by professional engineers employed by independent testing companies experienced in testing R.F. enclosures. The same information was presented to the IEEE EMC Symposium in 1975. These tests confirmed the findings of the Stanford Research Institute that a double wall R.F. enclosure, which is isolated except where it is connected to ground, provides the best possible R.F. attenuation characteristics.

Figures 1 and 2 show the attenuation characteristics of two different types of screen materials on similar rooms of double electrically isolated construction. While both provide 120 dB attenuation in the electric and plane wave frequencies between 14 KHz and 1 GHz, attenuation in the magnetic field is only 6 dB for the copper screen compared to 38 dB for the bronze screen. However, the bronze screen will exhibit less degradation over a period of time due to oxidation. While this degradation is not significant it would be considered where maximum performance is desired.

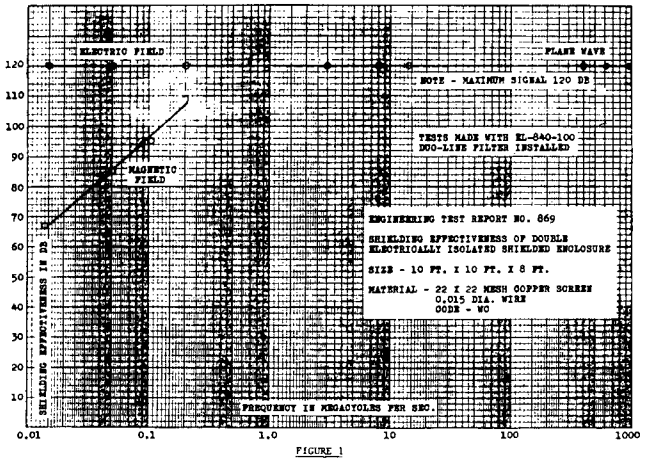

FIGURE 1

Figure 3 shows the performance characteristics of a double electrically isolated room made with 24 gauge solid steel shield on the outside and 24 oz. solid copper on the inside. This room exhibits 120 dB attenuation at 14 KHz in the electrical field and 115 dB attenuation at 14 KHz in the magnetic field. As can be seen by comparing this test with the prior tests, the use of steel improves attenuation in the magnetic fields.

Figure 4 shows the attenuation characteristics of a room which uses 3 oz. copper in place of the 24 oz. copper on the inside wall. As in the previous test attenuation of 120 dB is achieved between 14 KHz and 1 GHz. However, attenuation in the magnetic field is 70 dB at 14 KHz compared to 115 dB for the previous test. Since both of the above tests were performed on rooms of doubled electrically isolated construction, there is a reasonable basis for comparing the performance characteristics of the two different weight materials used for the inside shield.

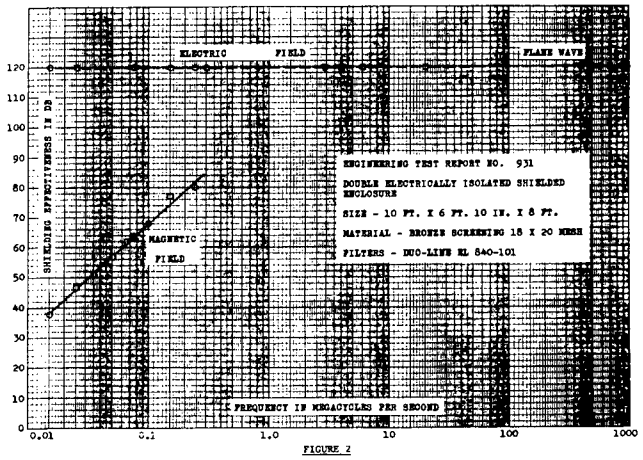

FIGURE 2

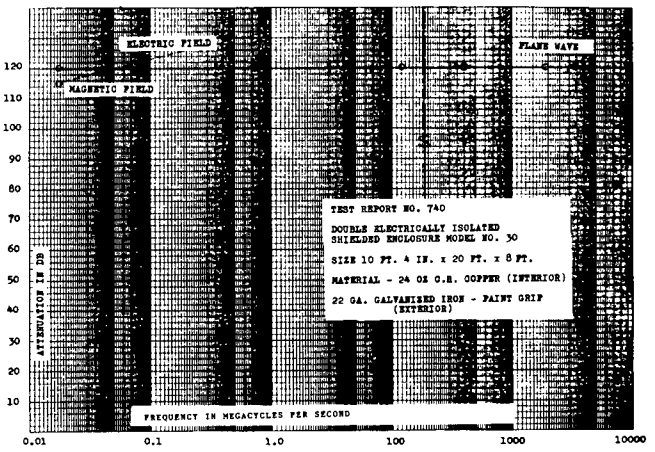

FIGURE 3

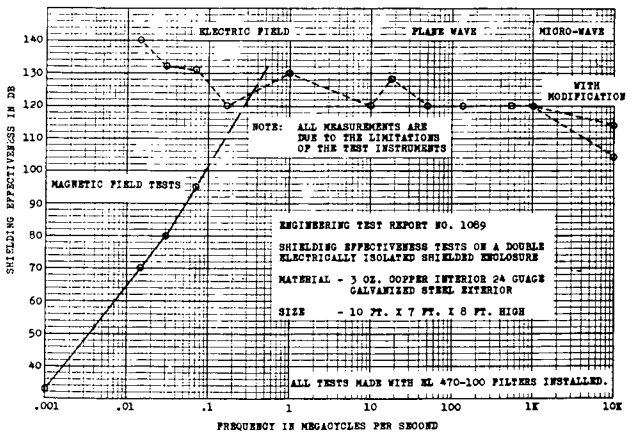

FIGURE 4

This article was prepared for Item by Erik A. Lindgren, President, Erik A. Lindgren & Associates, Chicago, IL 60640