

## IMEDCO RF Enclosure Considerations

IMEDCO appreciates the analysis you are undertaking regarding the choice of MR Shielding Suppliers for your project. We would like to offer you some additional information regarding different shield designs and include features that we believe are unique to IMEDCO.

### **Galvanized Shielding (typical)**

#### Advantages

- Initial cost
- Re-locatable
- High initial attenuation

#### Disadvantages

- Susceptible to condensation
- Life expectancy
- System weight (6-7 lbs/ft<sup>2</sup>)
- Seam integrity – pressure fit, 4 seams
- Furring – limited to floor & ceiling line
- Flooring – Particle board/plywood with clamping (pressure fit)
- Moisture Barrier & dielectric – 0.0254mm plastic

Material conductivity: 0.30

Oxidation conductivity: Zinc-oxide is semi / non-conductive

### **Copper Shielding (typical)**

#### Advantages

- Life-expectancy & Longer Warranty
- High long-term attenuation
- Ease of modification
- Re-locatable
- Oxidation properties
- System Weight (3 lbs/ft<sup>2</sup>)
- Seam integrity – single, overlapped
- Furring – Fire retardant, floor perimeter, framing around all windows, doors, pen panels and verticals on 16" centers
- Insulation – 2" acoustical & thermal in all wall panels
- Flooring – Special composite of high-density, water-resilient, chip/particle board & tempered masonite
- Moisture barrier & dielectric – 4mm tar sheet and 6mm tempered masonite

#### Disadvantages

- Initial cost

Material Conductivity: 1.00

Oxidation Conductivity: Copper oxide is 100% conductive

The **conductivity factor** should be carefully examined, because it points out one of the most important differences between the two designs. A seamless surface is what we all look for; leaving no possibility for openings that would enable RF noise to penetrate. Openings in RF Shields of course are necessary, but they all must be engineered to prevent RF leakage. Filters, special screened windows etc., prevent openings from causing RF leakage problems. Oxidation however could create an opening that cannot be filtered and should be avoided. But, since both steel (even galvanized) and copper are subject to this oxidation, the conductivity of this oxidation is a factor. As

you can see from the comparison, copper is fully conductive (1.0), while galvanized steel is less conductive (0.3). What's more significant is that zinc oxide, which forms when moisture reacts with galvanized steel, is only semi-conductive at best. Copper oxide is fully conductive, which is why the long-term attenuation is better.

The method used to connect the panels is also a source of potential leak that is affected by the conductivity factor. The galvanized panels are pressure fit into extrusions that create 4 seams for every panel. Oxidation could form at any point along these seams and create a void, at least in terms of conductivity. This could create a source for RF leakage. Each copper panel is fastened to the next mechanically. Since the copper foil is wrapped around the 1 3/4 " wood frame, which is bolted at 5" intervals, the overlap and contact surface is substantial. Furthermore, should oxidation occur between the panels, there is no possibility of a leak because of the copper oxidation's conductivity, which maintain the continuity and the shield integrity.

We realize that the shielding suppliers offer various **warranty packages**. But few, if any, are able to match our standard Copper design warranty which is **10 Year Warranty** on the general RF Integrity of our standard design and a **5 Year Warranty** on our seismic design. We also offer a **3-5- Year Warranty** on the critical RF components including the RF Door, RF Window and all the Power Filters. Only you and your clients can determine if any initial cost savings and standard limited warranties can be offset by potential damage caused by potential oxidation.

We included reference to the **ease of modification** because we know that MRI technology will continue to evolve. The self-supported copper shield design from IMEDCO lends itself to expansion and modification, whether it is for additional waveguides for HVAC capacity, new electrical filters, medical gases or an increase in shield dimensions made necessary by future MR system upgrades. The solid galvanized panels are not as cost effectively modified.

IMEDCO has offered **furring and insulation** as part of the package. IMEDCO furring is coated with a Class A, UL-listed flame retardant and it is not only fastened to the floor and ceiling room seams, but also around the RF door, the daylight and control windows and the penetration panels, and run vertically on 16" centers for quality drywall application.

We hope that you upon your review of this information and the IMEDCO quotation that you will see fit to choose IMEDCO for this project. IMEDCO thanks you for the opportunity to present this package and we look forward to working with you.

Respectfully,  
IMEDCO AMERICA