

## IN-PROGRESS TESTING OF RF SHIELDED WELDING SYSTEMS

The use of welded steel to provide the required RF shield in the general construction of buildings is becoming commonplace. Benefits in savings, both in time and money, make the use of welded steel a popular method of RF shielding. Making proper applications of welded steel has been an exercise in learning to avoid problems associated with installation and testing.

One method of avoiding major problems with welded steel is the use of in-progress testing. In-progress testing is required by many specifications and is one area of welded steel which has undergone marked improvement in cost effectiveness and efficiency. In-progress testing refers to testing that is performed during the installation period. Monitoring during installation offers an assurance, in part at least, against the day when final testing will be performed. No in-progress test is 100% sure and infallible. However, careful testing measures during the welding procedures can provide up to a 95% assurance that final testing will be met with little or no problem areas.

Installation and material work is performed on a contract basis. The general contractor usually holds the prime contract with the owners. Contract award depends on the cost at which the contractor can acquire component sections and services associated with the RF shield, including in-progress testing. In the past the contractor was presented with two choices with respect to in-progress testing. The contractor could subcontract shielded enclosure manufacturers and testing companies to perform in-progress testing. Or, the contractor could buy the in-progress testing which was usually packaged with other testing services and RF components. Often, the package included the complete RF shield section, testing and installation services which may have been unnecessary and expensive. This arrangement allowed small latitude for cost savings and installation efficiencies by the general contractor.

In response to this situation, a new piece of testing equipment has been developed and marketed. The component is an advanced in-progress test system which is available to any installer of welded RF shield systems. The system was

designed for the general contractor, who can use his own staff and work at his own convenience, thus offering the advantages of cost efficiency and flexibility. The component manufacturer supplies field training in the proper use of the equipment. Because operation of the component is simple, only a minimum of field training time is required.

The theory behind the in-progress test equipment operation is called "The Magnetic Field Anomaly." The test equipment creates a magnetic field which is injected into the welded steel seams. Small anomalies are normal and expected throughout the welding. A sharp or great anomaly indicates an area in the welding that needs adjustment. If a low frequency magnetic anomaly (25kHz-100kHz) is detected, then the likelihood is that the anomaly will be apparent at a high frequency check (400MHz, 1GHz, 10GHz, etc.) during final testing.

While a good indicator of high frequency problems, low frequency anomalies are not the final and full answer to in-progress testing. Too great an emphasis on the Magnetic Field Anomaly Detectors should be avoided. Other techniques must be used in a successful installation. These include well-designed RF shield details; certification of welders; training of welders in RF shield tactics; thorough visual weld inspection; and the highest grade of materials.

Once purchased, the cost of this new test equipment can be amortized over several projects, resulting in long-term savings. On future projects, a contractor owning the in-progress test system will have a distinct advantage over other bidders. Owners' benefits include lower prices, improved products, increased control and a shortened installation time. In the future, welded RF shields will become more common, more intricate in design, and wider in scope of operation. These developments will create the need for additional bidders and new technical advances.

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