EMCoat Conductive Paint
Installation & Inspection guide

When installed properly, architectural shielding products from Faraday Structures are among the highest performing and most cost-effective electromagnetic shielding products available.

To ensure proper installation and prevent re-work, Faraday Structures recommends proper installation techniques and application quality control processes. The quality control steps described herein can be performed throughout the installation process by anybody that is sufficiently trained in the procedures contained in this guide. Performing simple quality control steps during installation can provide peace of mind and help to avoid costly re-work.

While there are many factors that determine the overall performance of a shielded room, an indicator of proper installation of our product can be obtained through taking a series of surface resistivity readings across installed surfaces, seams, or other features. If this is done throughout the installation process, it gives on-site installation crews a real-time method to confirm performance and correct any concerns. In addition to the resistivity method described below, simple continuity checks can also be used to verify electrical connection between treated areas and components.

Certification and Acceptance Testing should be done only by an authorized professional, but the quality control steps described herein can be performed throughout the installation process by anybody that is sufficiently trained in the procedures contained in this guide.

EMCoat Paint - Installation Guidelines

EMCoat conductive paint offers a unique combination of electromagnetic shielding capability and ease of application. EMCoat paints can easily be applied where other high-performance shielding materials cannot or where installation would be much more difficult, which makes them uniquely suited for a variety of applications.

Generally stated, a proven way to achieve high performance in electromagnetic shielding projects is to create a complete faraday cage enclosure. This requires attention to design and shielding treatment to all surfaces, entry and exit points, doors, windows, utilities and services, communication lines, or any other point that goes through the shield barrier. While this is not possible in every project or installation, users and installers of shielding products need to understand that there are many variables that affect the shielding performance of a space besides the surface coatings. A properly applied coating as part of a shielded space is only one component in shielding performance, and the actual shielding performance of the space will be a function of the “weakest” area – much as a chain is only as strong as it’s weakest link. Properly applied EMCoat will provide shielding performance to specified levels, thus product installations that are applied per guidelines and meet quality checks provide confidence that the coating is performing as needed.

The installation instruction provided below are identical to those found on EMCoat product labels. Please contact your point of sales or Faraday Structure with any questions or for further guidance.

EMCoat Paint - Installation Guidelines Cont'd

WHERE: For interior use on primed drywall, wood, metal or concrete surfaces. Can be overcoated with standard architectural finishes.

SURFACE PREPARATION: Surfaces should be free of dirt, oil, loose paint, construction debris and other foreign matter. Scuff sand glossy substrates and/or existing paint layers. Surfaces should be primed with compatible primers suitable for adherence to the substrate (latex primers on drywall, self etching primer on metal or concrete, etc). Proper preparation and installation is critical to overall product performance. Caulk or fill all gaps and holes and apply product liberally in corners, as even small voids or inconsistencies in the coating thickness will reduce shielding effectiveness. For large gaps, EMCaulk shielding caulk is recommended for best performance.

COVERAGE: 100-140 ft^2 per gallon when applied in two coats, depending on surface porosity. Higher shielding levels can be obtained with additional coats.

APPLICATION TEMPERATURE: Do not apply EMCoat in temperatures below 50°F and relative humidity above 85%. Air circulation can have a strong effect on drying times and recoat times. Any measure to reduce humidity and improve circulation in the application space will lead to shorter application times and dry times with improved performance results. Run dehumidifiers, fans, air conditioning, or other measures as possible during installation and before testing. In high humidity situations use multiple thin coats help reduce drips and runs.

THINNING: Do not thin or dilute.

APPLICATION INSTRUCTIONS: EMCoat is a high performance, high viscosity coating product with specific application instructions that must be carefully and completely followed. It is recommended that EMCoat be sprayed with commercial quality airless equipment, but it can also be brushed, or rolled. Settling of the conductive components is normal. Mix thoroughly to a uniform consistency immediately before use. Shaking is not adequate and use of a drill and impeller or other mechanical means will be necessary. Recommended mixing paddles should use straight vane construction with a square or rectangular head with rounded corners (such as mixing paddles for joint compound or grout). Helical style paddles are not recommended. Start slowly and mix carefully. If the material is mixed too aggressively it can lead to excess material losses or spilled buckets. It can take up to 15-20 minutes to initially mix a large pail. Take care to scrape all material from the bottom and corners of the container before beginning to use the product. Re-mix material at least every 10 minutes or use an agitator in the bucket to maintain dispersion of the conductive components. Product should be applied in a minimum of two coats to ensure uniform shielding coverage, with a full uniformly spread initial coat, followed by additional applications. Coats should be wet, full-bodied coats. If the product appears to be going on "dry" then a lower spray pressure or reduced fan width may be necessary. Apply product liberally in corners or over seams. Tight areas may need multiple light coats to ensure adequate coverage and avoid runs. Uniform and complete coverage is essential for product performance. It is recommended that experienced personnel are used for installation. On large jobs, it is best to work as teams with one person applying product and one person preparing and changing pails.

Spray: Do not thin product. To avoid clogging of equipment do not allow product to settle inside of hose or pump. Start pressure at 50% of equipment rating and work up. Remove all filters from paint equipment except the main screen on feed tube. Strainers and filters must be 30 mesh or larger. Use a new screen at the start of each job. Recommended tip sizes: HVLP: 2.2 or larger. Airless: 417 or close equivalent.

EMCoat Paint - Installation Guidelines Cont'd

Roll: A high nap roller (3/4") will achieve the highest distribution of conductive particles and ease of application. Use of shorter nap or microfiber rollers is not recommended.

Brush: Use a high quality synthetic brush and apply product liberally. When brushing or rolling EMCoat, apply generously and do not overwork the product. Watch for and avoid high or low concentrations of conductive solids on the painted surface.

COATS: Multiple coats will achieve the most consistent coverage and best shielding performance. Apply first coat with 50% overlap and cross coat a second coat and third coat for best results.

RECOAT TIME: Re-coat when dry to touch.

DRY TIME: Full curing is required to achieve maximum signal attenuation. See notes on application temperatures to help reduce dry times. Allow at least 24 hours before testing product. Additional time may be necessary in high humidity or low temperature conditions.

CLEAN UP: Clean immediately after use with soap and warm water. Clean all equipment according to manufacturers specifications.

DISPOSAL: Dry product can be disposed of with with standard practices for paint products.

STORAGE: Store product at room temperature and do not allow to freeze. It is not recommended to store EMCoat products for longer than six months. Product must be remixed immediately prior to application.

PRECAUTIONS:

- Refer to Product Safety Data Sheet before use.
- Not for exterior use.
- Do not sand.
- Not recommended for use as a finished flooring product. EMCoat must be protected by a suitable architectural finish product for floor installations.
- Priming metal with non-conductive coatings can interrupt the electrical connection between the metal and the paint.
- Any connection to or through shielding layer can have adverse effects upon the efficacy of the shield. Consult a shielding professional for proper installation of fasteners.

GROUNDING: Grounding of conductive surfaces may be required by your local electric code. Please consult with a licensed professional electrician.

BASE: Water-borne Urethane **COLOR:** Dark Grey

TOTAL VOC: 111 g/L **VOC:** (less exempt solvents): 290g/L

DENSITY: 1452 g/L **VOLUME:** .88 gal or 4.3 gal per container

SOLIDS (WT.): 54% +/- 2% **SOLIDS (VOL.):** 31% +/- 2%

For complimentary products, or consultation to obtain maximum performance of a shielded enclosure, contact Faraday Structures at sales@FaradayStructures.com or see www.FaradayStructures.com

Surface Resistivity Inspection

Inspection is a key step in the installation of any architectural shielding product. Installations should always be inspected for any cracks, seams, gaps, or other areas where the shielding product does not create continuous, uniform coverage. The conductivity of both surfaces and seams or other joining features can be tested to ensure that there is sufficient electrical continuity between sheets and other features. This can also indicate areas where products have been improperly applied, which will lead to decreased shielding performance.

The shielding effectiveness of EMCoat paint depends on even and uniform coverage over a surface that the product is applied to. Surface preparation and attention to detail are critical. In addition to proper installation and visual inspection for gaps, surface resistivity checks can help to ensure that the product has been properly applied, with consistent coverage.

With highly conductive architectural shielding product from Faraday Structures, there is a correlation between surface resistivity (measured in ohms-per- square, or ohms/sq) and shielding effectiveness (SE, measured in decibels). Highly conductive surfaces (low resistivity) offer higher shielding performance. While there are many other factors at play in a shielded room (leaks or openings, unfiltered power or data shield penetrations, etc), confirmation that the shielding materials are adequately conductive and well connected can be an indicator of a successful installation and provide confidence that they are shielding as intended. Higher surface resistivity readings (lower conductivity) can indicate flaws in the application of the shielding material. Taking surface resistivity readings throughout the installation process offers an opportunity to confirm performance or correct flaws prior to next steps in a project and full testing.

Surface Resistivity reading must be taken when the surface is fully dried. This can take between a few hours and several days, depending on installation size, temperature, humidity, and most of all circulation. Surface resistivity readings can be an indication of dryness – if the readings are no longer getting significantly lower with time, then the coating is fully dried.

Typical surface resistivity reading averages across an applied surface for a standard 2 coat application of EMCoat should be 0.6 ohm-per- square range or lower, per kelvin probe methods with an SRJ1 ohm-per-square jig (one-inch unit square) as described below. Field verification allows for an opportunity to discover areas of non-uniform application or low conductivity while it is simple to correct. The surface resistivity will go down as multiple layers of paint are added, per the chart below. A surface resistivity characterization kit can be purchased from Faraday Structures (Part Number FS-SRK1).

# of Coats*	Acceptable Surface Resistivity (ohm/square)**
1	0.08 or lower
2	0.06 or lower
3	0.05 or lower

* it is recommended in all installation that an initial coat consisting of a light surface prep “prime” coat be applied to the surface before any full, uniform coating layers. Additional coats do not require a prep coat. See installation recommendations for more details.

** as installed by approved methods, fully dried, and before overcoating or sealants. With FS-SRK1 surface resistivity jig used in a four wire Kelvin probe configuration. Readings below range are acceptable.

Surface Resistivity Reading Method

All of the benefits of surface resistivity testing described above can be obtained through a few easy steps. Surface resistivity is measured in ohms/square (Ω/sq), which is a measurement of the resistance (Ω) over a given distance, normalized throughout an equivalent length section of the material being tested. Milli-ohm meters and the 4-point square jig required to test the surface resistivity can be obtained through Faraday Structures.

1. Adjust the sensitivity reading on the milliohm meter to the 2Ω setting or lower. This will adjust the decimal placement so that you can see the significant figures required for effective testing.
2. Place the jig on the surface being measured and apply consistent pressure until a stable reading is observed. Rotate the jig slightly to ensure good contact and to check for directionality.
3. Take measurements in all critical areas, such as seams or connection points for penetrations.
4. Take additional measurements at regular intervals on all surfaces (for example, 1 reading per square foot or square meter, depending upon the scale of your project).
5. Document each reading and average the results. If you find isolated spots with inconsistent or high readings, these are the areas that can be addressed by applying supplemental coating over affected areas.

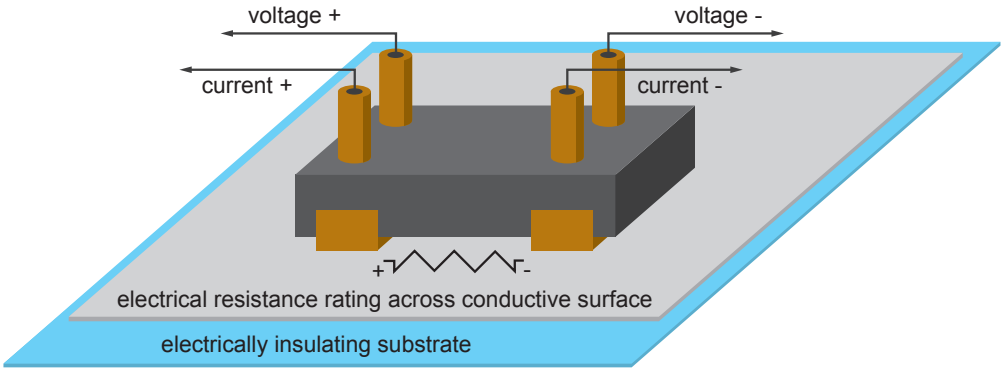

FIGURE 2: Surface Resistivity Testing with Jig (SRJ1)

Surface Resistivity Jig (SRJ1)

Milli-ohm meter with four point Kelvin probe surface resistivity configuration

Apply pressure until reading stabilizes. The jig can be rotated in plane to check for directionality

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