CHO-SHIELD® 2044

Electrically Conductive Nickel Acrylic EMI Coating

Parker Chomerics CHO-SHIELD 2044 is an electrically conductive, one-component nickel-filled acrylic coating that is specially formulated for application on plastics to provide EMI shielding.

CHO-SHIELD 2044 is ideal for use on electronic enclosures and assemblies. The electrical conductivity of the durable, nickel-composition paint allows for simple, standard application using conventional equipment with minimal dry-time and handling.

CHO-SHIELD 2044 is ideal for use on electronic enclosures and assemblies where abrasion resistance and coating durability are important. This durable, conductive coating derives its hardness from its nickel composition and may provide limited amounts of H-field shielding. Given its relatively low conductivity as compared to other metal fillers, the nickel provides exceptional shielding for enclosures where both external RF fields must be excluded, and internal radiated emission must be attenuated.





Product Features

- Easy to use, can be applied with standard spray paint equipment, no expensive capital equipment required
- Thermoplastic acrylic
- Material dries at room temperature-no high temperature cure ovens required, fast throughput. Good adhesion to a variety of plastics
- Cost-effective solution for electronic enclosures and assemblies which require a moderate level of EMI shielding and conductivity
- Good abrasion resistance, won't chip or crack easily

Typical Applications

- Moderate EMI shielding (see shielding effectiveness curve)
- Anti-static protection
- Surface grounding
- Coating of ABS, PC/ABS, and many other types of plastic enclosures

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CHO-SHIELD® 2044 Product Information

Typical Properties	Typical Values	Test Method	
Polymer	Acrylic	N/A	
Filler	Nickel	N/A	
Mix Ratio (A/B by weight)	1-part	N/A	
Color	Charcoal	N/A	(Q)
Spray Viscosity	15 to 21 seconds	Zahn Cup Number 2	(Q)
Surface Resistance at 0.002 inches (50 µm, 1 mil)	1.000 ohms / square	CEPS-0002	(Q/C)
Shielding Effectiveness	>50 dB (see graphs below)	CHO-TM-TP11*	(Q)
Recommended Dry Film Thickness	.002" (50 µm)	N/A	
Wet Density	1.2	ASTM D792	(Q/C)
Average solids (weight - concentrated as supplied) Thin per application note 2	42%	Calculated	(Q)
Continuous Use Temperature	-40 to 85°C (-40 to 185°F)	N/A	(Q)
Pot Life	Unlimited	N/A	(Q)
Drying Time - Room Temperature Tack Free	0.5 hr @ 21°C (70°F)	N/A	
Drying Time - Room Temperature Full Dry	24 hrs @ 21°C (70°F)	N/A	
Drying Time - Elevated Temperature Full Dry	0.25 hr @ 21°C (70°F), followed by 0.75 hr @ 66°C (150°F)	N/A	
Calculated VOC	755 g /L	Calculated	
Theoretical Coverage at Recommended Dry Film Thickness	0.034 ft^2/gram 0.0032 m^2/gram 156 ft^2/gallon	N/A	
Shelf Life, unopened, from date of manufacture	12 months	N/A	(Q)
Storage Conditions	70°F/21°C +/- 9°F/5°C	N/A	

Notes: N/A – Not Applicable, (Q/C) - Qualification and Conformance Test, (Q) - Qualification Test
* This test method is available from Parker Chomerics.

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CHO-SHIELD® 2044 Shielding Effectiveness

Figure 1 - Typical Shielding Effectiveness

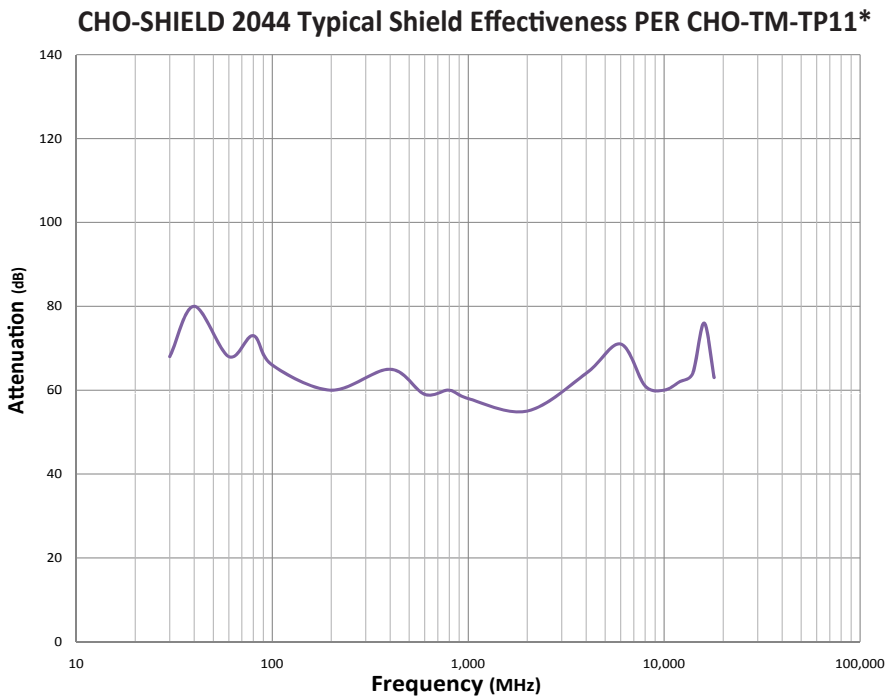
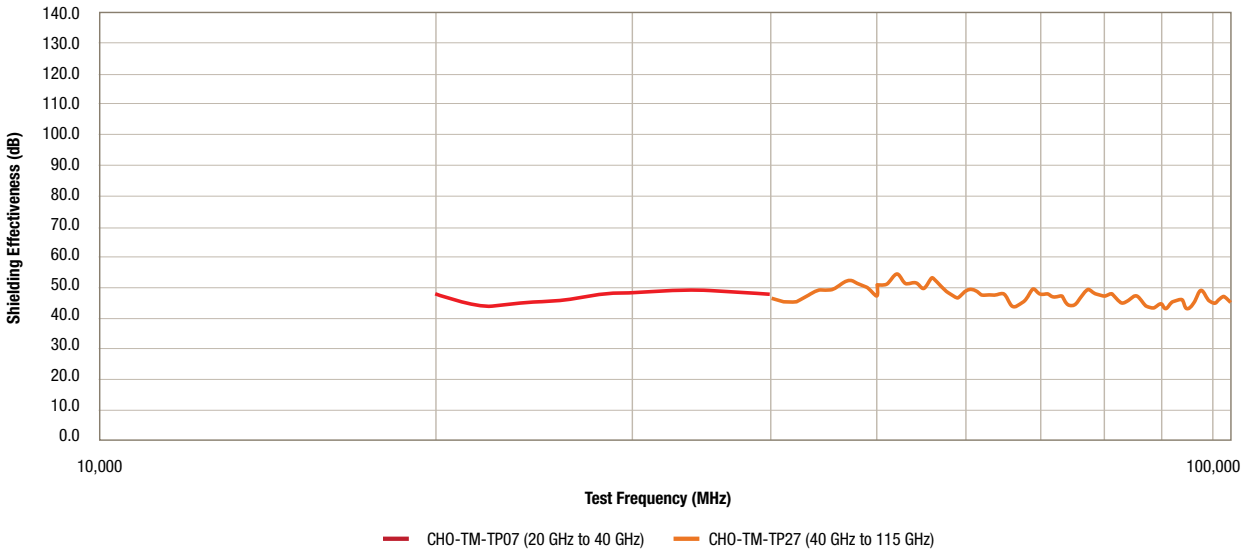


Figure 2 - CHO-SHIELD 2044 Typical Shielding Effectiveness per CHO-TM-TP07 and CHO-TM-TP27



A Note on Test Methods Used

Figure 1 illustrates traditional shielding effectiveness test data from 30 MHz to 18 GHz using the CHO-TM-TP11 test method. This method used a 26 inch (660.4 mm) square test sample size, mounted on a 24 inch square (609.6 mm) aperture on the shielded room wall.

Two new test methods are used for testing the frequency range from 20 GHz to 110 GHz. Test methods CHO-TM-TP07 (20 GHz to 40 GHz) and CHO-TM-TP27 (40 GHz to 115 GHz) were developed to be able to use the same test sample throughout the wide frequency range.

Figure 2 illustrates the new test data using a 5.25 inch diameter (133.4 mm) test sample size over the frequency range from 20 GHz to 110 GHz. This smaller test sample size is required to cover such a wide frequency range.

Further information on the testing can be found by downloading the referenced test methods, available from parker.com/chomerics, or upon request from Parker Chomerics Application Engineering.

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CHO-SHIELD® 2044 Application Information

Recommended Preparation

1. Clean the substrate: The substrate surface should be clean, dry and free of oils, release agents, dirt, and lint.
2. Mix the material: CHO-SHIELD 2044 is supplied at 42 weight % solids and should be thinned using MEK (Methyl Ethyl Ketone) to a suitable viscosity for application with your specific spray equipment.

   Chomerics recommends the material be sprayed at approximately 30% solids (CHO-SHIELD 2044 may be sprayed at slightly higher or slightly lower weight % solids depending upon your equipment). Table 2 below shows the approximate weight of solvent which should be added to the CHO-SHIELD 2044 to achieve the corresponding weight % solids.

Table 2 - Thinning of CHO-SHIELD 2044 for Application

CHO-SHIELD 2044 Weight % Solids	Weight of MEK per gallon of CS 2044 (grams)	Weight of MEK per quart of CS 2044 (grams)	Weight of MEK per 100 grams of CS 2044 (grams)
28	1960	490	50
30	1568	392	40
32	1225	306	31

   When spraying CHO-SHIELD 2044 in a humid environment (R.H. > 50%), retard blushing by substituting 200 grams of n-butanol (also called n-butyl alcohol CAS# 71-36-3) for MEK per gallon of CHO-SHIELD 2044 before spraying.
3. After thinning with solvent, mix the material well by placing the can on a paint shaker for 3 to 4 minutes or mix by hand with a large spatula until all solids are in a homogeneous suspension. Check that no unmixed material remains on the bottom or the sides of the container.
4. Optional: Strain the material to reduce or eliminate the potential for clogging the spray nozzle. The paint can be strained through a coarse mesh (1000 micron) flat strainer into a pressure pot for spray. All metal fillers should be transferred, although a small amount of filler clusters might be collected in the strainer.

Fluid Delivery System

Use a pressure pot (15 psi, 103 kPa, typical) with large diameter, paddle-type agitator at low mixing speed to keep the metal fillers in uniform suspension.

Conventional spray equipment such as HVLP (High Volume, Low Pressure) or DeVilbiss EGA 503 with propeller agitator pressure pots may be used for spray application with approximately 20 to 50 psi (138 to 345 kPa) atomizing air. Use lowest possible pressure.

Re-circulation of the paint from the mixing pot through the spray gun and back via a pump delivery system is recommended for greater filler uniformity.

For large volume applications, a robotic spray system with an HVLP spray gun should be used to minimize material loss due to overspray and maximize paint transfer efficiency. Siphon feed equipment can be used for small or prototype runs.

Spray Gun and Pressure

Use a standard HVLP spray gun with approximately 20 to 40 psi (138 to 276 kPa) atomizing air.

A fluid nozzle with a minimum orifice diameter of 0.040 inch (1.016 mm) is recommended.

To obtain maximum adhesion and conductivity, dry spraying should be avoided. Adjust the spray pressure to achieve a proper wet film when applying the conductive coating.

Nominal Dry Film Thickness

A nominal dry film thickness of 0.002 inches (50 µm, 2 mil) is recommended to obtain > 55 dB shielding effectiveness from 80 MHz to 18 GHz. However, a thinner or thicker coat may be acceptable depending on the shielding requirements of the device being protected.

Allow material to dry 10 to 20 minutes at room temperature between coats to avoid solvent entrapment.

Drying Conditions

Dry at room temperature for 10 to 20 minutes.

Continue drying for 45 minutes at 65°C ± 5.5°C (150°F ± 10°F) for 0.002 inches (50 µm, 2 mil) thickness.

Dry longer if thicker film, shorter if thinner film, to achieve desired conductivity.

Note: Drying at room temperature for 24 hours will achieve similar performance.

Clean-up

The spray system, including spray gun, mixing pot, and containers can be cleaned with MEK or Acetone (VOC exempt solvent). Masks can be power-washed with Challenge 485S barrier coat.

Storage and Handling

CHO-SHIELD 2044 should be stored at 50°F to 86°F (10°C to 30°C) and has a 12 month shelf life from the date of manufacturing in the original sealed container. CHO-SHIELD 2044 is a flammable liquid. Please consult the material safety data sheet for proper handling procedures before use.

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CHO-SHIELD® 2044 Ordering Information

Product	Weight (grams)	Packaging	Part Number	Primer
CHO-SHIELD 2044	3920	1 gallon aluminum can	52-03-2044-0000	Not Required

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.



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