

Acrylic Conductive Paints

This application guide outlines the equipment and recommended processes for applying MG Chemicals Acrylic Conductive Paints (AR Series). It is the user's responsibility to determine the chemical, mechanical, and thermal compatibility of the substrate prior to using any of the suggested methods.

The AR Series can be applied by paint brush, aerosol can, manual spray gun, and selective coating equipment. For large to moderate scale production runs, selective coating equipment and manual spray guns provide superior coating surfaces. The paint brush method can be used for repairs or for small scale applications, but usually do not achieve the same level of consistency and electrical conductivity as the spray methods. Dipping, while technically possible, generally requires too much effort to maintain consistent results.

Substrate Preparation

Most coating defects result from the presence of moisture, grease, oils, dirt, flux, and other board contaminants. Therefore, it is highly recommended to ensure the cleanliness and dryness of a surface prior to coating.

1. Wipe with a clean cloth, wash with soap and water, then rinse and dry.
2. Put on disposable gloves and clean with MG's 824 Isopropyl Alcohol or any other degreasing type solvent.
3. Let the surface dry fully. Elevated temperatures can accelerate drying.

To enhance adhesion, sometimes mechanical sanding or primers may be required for highly resistant plastics and non-plastics. After sanding and etching, clean the surface as per above instructions.

To save time, mask areas that should not be coated prior to spraying. While the AR series can be removed with the MG's 435 Thinner/Cleaner, masking is often more efficient. Painters tape or MG's 862 Solder Mask can be used for masking.



Mixing

The AR Series must be mixed carefully before use. If the filler is not evenly mixed, the conductivity, adhesion, and quality of the coating will vary.

Mix manually using a regular spatula, as outlined below. For larger containers, use a mechanical paint shaker or a high lift propeller mixer.

1. Use a spatula to scrape the bottom and sides to break up possible deposits.
2. Stir content until coating becomes smooth and homogeneous.
3. If lumps or deposit of material can be felt or seen, continue mixing.

After the coating has been properly mixed, it is suggested that it be kept under agitation during production.

Dilution

For most brush applications dilution is not required. However, when applying the AR series either by manual or selective spray equipment we recommend thinning to improve film coverage and precision.

The choice of which thinner to use will depend on the substrate type. For common plastics like ABS and polycarbonate, use MG's 4351 Thinner 1 system whereas for other plastics like polyamide

or PVC, a more aggressive thinner like MG's 435 is recommended. Refer to Table 1 below for suggested starting dilution ratios.

Cat. No.	Dilution Ratio
838AR	2:1
841AR	1:1
842AR	2:1
843AR	Not required

Table 1. Dilution ratios AR Series

Paint Brush

1. Dip a clean brush into the paint ($\frac{1}{3}$ of the bristle length) to load it.
2. Tap both sides of the brush lightly against the side of can. This avoids drips and runs.
3. Brush the coating on board using long, smooth strokes. This reduces possible air entrapment, helps create an even coat, and minimizes brush marks.
4. Reload brush as soon as the coating flow starts to break.
5. Keep subsequent brush strokes in the same direction; work brush into the edges of previously applied wet coating, but do not coat over wet areas.
6. Wait at least 3 minutes, and apply another coat. Keep brush from curing by dipping it in thinner, and dry brush before reuse.
7. Apply additional coats until the desired thickness is achieved.

Manual Spray Guns

Dilute your paint as per Table 1. Use a standard fluid nozzle gun to spray the diluted paint. The settings listed in Table 2 below are recommendations, however performance will vary between brands.

	LVMP	HVLP
Inlet pressure	5–15 psi	5–15 psi
Air flow	10–15 SCFM	8.3 SCFM
Air cap	5–10 psi	5–10 psi

Table 2. Recommended manual spray guns setting

Table 3 lists our recommendations for selecting a nozzle tip, depending on the type of filler that are used in our AR Series paints. However, nozzle tip with different diameters can be used depending on applications.

Cat. No.	LVMP	HVLP
838AR	1.2–1.4 mm	1.2–1.4 mm
841AR	1.2–1.4 mm	1.2–1.4 mm
842AR	1.2–1.4 mm	1.2–1.4 mm
843AR	1.2–1.8 mm	1.2–1.8 mm

Table 3. Nozzle tip diameter for spraying AR series paints

If using a pressure pot and agitator, keep the agitator at low mixing speed with air pressure of 20–50 psi. Use the lowest pressure necessary to keep the particles suspended.

For best results, keep the gun-to-surface distance constant. Move the gun in a straight line along the surface, avoiding arcing motions. Use spray-and-release strokes to avoid excess coat in one spot. If possible, start and end each stroke off the surface.

At production end or before extended stoppages, clean pot, purge fluid lines, and clean gun.

Selective Coating Equipment

For higher volume applications, paints can be applied via selective coating equipment.

Use a system with constant fluid recirculation to keep the particles from settling in the lines. Refer to Table 3 for choosing the fluid nozzle diameter. Fluid pressure of 5–10 psi is recommended depending on nozzle size. Thin the paint to adjust the viscosity to the level appropriate for the valve being used. Recommended dilution ratios in Table 1 can be used as the starting point.

Agitated Pressure Pots or Cups

Use a recirculation set up with an agitated pressure pot or a cup with agitator to prevent filler settlement. Transfer the pre-mixed paints to the pressure pot. Set mixing speed sufficiently high to avoid settling issues, but not so high as it can cause centrifugal effects that collect filler to the sides. Usually, 20 rpm

or more is required. Preferably, use separate air lines for the air-driven mixer and the air gun. This avoids drop in mixing speed during spraying.

Aerosol Cans

Acrylic conductive paints also come in a convenient aerosol packaging. These cans are ready to spray.

1. Shake the can vigorously.
2. Spray a test pattern to ensure good flow quality.
3. Tilt the board at 45° and spray a thin, even coat from a distance of 20–25 cm (8–10 in). Use spray-and-release strokes with an even motion to avoid paint buildup in one spot. Start and end each stroke off the surface.
4. Wait 3 min before applying another coat, to avoid trapping solvent.
5. Rotate the board 90° and spray again to ensure good coverage.
6. Apply additional coats until desired thickness is achieved (go to step 3).
7. Let dry 3 min at room temperature before applying heat cure.
8. After use, clear the nozzle by inverting the can and briefly spraying until clear propellant comes out.

Curing Process

At room temperature, the AR Series is dry-to-touch (known as recoat time) in 3 minutes and is dry enough to handle after 20 minutes. A full cure takes about 24 hours. To accelerate the curing time let the coating dry at room temperature for 20 minutes; no wet spots should be visible. Then, put in a convection oven at 65 °C [149 °F] for 30 minutes.

Heating a fresh coat before flashing off can trap solvent in the binder system. This can cause bubbles and blistering, as well as harming the final coat properties and thickness.

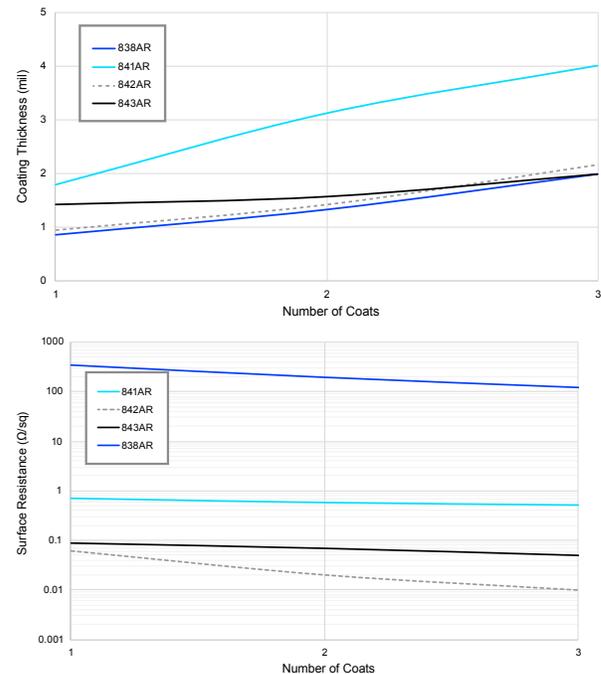
Coating Thickness

Surface resistance of conductive coating depends on the coat thickness. Typical individual coat thicknesses for each of the AR Series can be found in Table 4.

Cat. No.	Thickness per Coat	
838AR	1.0 mil	[25 µm]
841AR	1.5 mil	[38 µm]
842AR	0.75 mil	[19 µm]
843AR	2.0 mil	[51 µm]

Table 4. Typical coating thickness of AR Series

Below figures shows thickness and surface resistances of AR Series per number of coats.



Disclaimer

This information is believed to be accurate. It is intended for professional end-users who have the skills required to evaluate and use the data properly. M.G. Chemicals Ltd. does not guarantee the accuracy of the data and assumes no liability in connection with damages incurred while using it.

Contact Information

MG Chemicals, 1210 Corporate Drive
Burlington, Ontario, Canada L7L 5R6

Email: support@mgchemicals.com

Phone: North America: +(1)800-340-0772

International: +(1) 905-331-1396

Europe: +(44)1663 362888