

Technical Bulletin SP-02

Fabrication of C-350™ Coated Plastics (Bending Grade)

SciCron Technologies C-350™ static dissipative plastic substrate has a polymeric, crosslinked coating which exhibits excellent clarity and chemical resistance with suitable bending properties to facilitate the fabrication of formed machine covers and other bent plastic parts.

This Bulletin suggests fabrication guidelines for C-350 coated plastic sheet products.

General Precautions

The C-350 coating is only approximately one micron thick making it susceptible to damage if the plastic sheet is handled roughly or carelessly. As a general rule, all fabrication of C-350 coated plastics should be undertaken as carefully and gently as is practical to avoid unintended damage. Whenever possible, fabrication procedures should be carried out with the protective masking left on the sheet surfaces to minimize the possibility of damage, **however, paper masking must be removed before any heat forming procedure.** Work surfaces should be free of chips and debris which might scratch the plastic.

Note: Some plastic substrates occasionally contain internal stresses which can cause cracks or crazing during fabrication. In such cases, it may be necessary to anneal the plastic before fabrication. Testing of coated substrate should be done to evaluate fabrication techniques prior to cutting all parts.

Cutting and Machining

It is unlikely that the presence of the C-350 coating would necessitate any significant change in typical cutting and machining procedures during fabrication. Generally, the same techniques, cutting blades, machining tools and tool speeds are used as would be used normally with the base plastic. Wet sanding, buffing and scraping procedures can be used for edge finishing but flame polishing is not recommended for finishing C-350 surfaced plastics.

Caution!

1.0 Use of inappropriate equipment and tools, not designed for plastic fabrication, can result in melting, cracking, or shattering of the plastic substrate during fabrication procedures. This can damage the plastic permanently and could result in serious injury to equipment operators. **Always observe appropriate safety precautions when fabricating SciCron Technologies products.** Contact SciCron Technologies or your distributor for information about appropriate equipment and fabrication procedures.

2.0 Procedures that excessively heat the plastic, like laser cutting and flame polishing of cut edges, can induce stresses in the plastic. This can cause cracking or crazing at the cut edges if the edges subsequently come into contact with solvents. Therefore, these fabrication techniques should be avoided if the edges are to be glued with a solvent cement, or coated, as with SciCron Technologies Trim Fluid™.

Heat Bending

C-350 coated plastics are designed to be heat formed and bent but care must be taken to avoid inducing damage by excessive application of heat or by forming very small radii. Such damage can cause loss of electrical continuity at the bend. If a break in the coating does occur, SciCron Technologies Trim Fluid can be applied to the affected area to restore electrical continuity.

For optimum bends, observe the following guidelines:

- Use conventional wire line heaters, rod heaters, or bar heaters **but keep the heat to a minimum** to avoid damaging the C-350 coating.
- Keep the heat source at least 1/2 inch (13mm) away from the C-350 surface.
- Bend at these maximum recommended temperatures:
 - 250 °F (121 °C) for acrylic substrates
 - 280 °F (138 °C) for polycarbonate substrates
 - 225 °F (107 °C) for PVC substrates(as measured with an infrared heat probe)
- Dry polycarbonate at 250 °F (120 °C) before bending to prevent bubbles in sheets thicker than 1/8 inch (3mm).
- **Apply heat to the outside radius surface only**, especially when forming small radii. For thicknesses over 1/4 inch (6mm) it may be necessary to apply some heat to the inside radius surface also, particularly when bending polycarbonate.
- **Do not heat until the plastic becomes soft and limp!** Bend when the plastic first starts to yield to firm pressure. Remove from the heat source as quickly as possible. Restrain until the bent contour is cool.

Employing these techniques usually produces a smooth, clear, uniform bend, unless the bend radius is small. Some slight distortion in the bend area is normal. On tight bends, particularly in thicker materials, there may be some very fine craze lines in the sharpest part of the bend.

(continued below)

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Heat Bending (continued)

Note: *The cured C-350 coatings do not stretch or flow as much as the thermoplastic substrate at elevated temperatures. Consequently, the higher the temperature during bending the greater the potential for distortion and crazing of the coating. Use the minimum amount of heat to obtain the best bends.*

Solvent Welding

Although C-350 coated materials can be joined with solvent cements without first removing the C-350 coating, this technique is not recommended. The C-350 coating may not be adequately softened or removed by short-term contact with solvents commonly used in solvent based cements. This can result in significantly reduced bond strengths. Consequently, it is recommended that the C-350 coating be removed from the substrate prior to adhesive application to develop optimum bond strength. Removal can be achieved by light sanding with very fine grit sandpaper or by other mechanical techniques, such as routing.

Acrylic and polycarbonate substrates can be bonded with methylene chloride-based cements while PVC substrates can be bonded with cements containing acetone, methyl ethyl ketone (MEK) and tetrahydrofuran (THF).

Note: Welding techniques using 100% solvent welding liquids (e.g. 100% methylene chloride) often do not yield strong bonds due to rapid evaporation of the solvent. For improved bond strengths, the cement can be formulated with some dissolved plastic content. This slows evaporation allowing the solvent time to bite into the substrate to make the bond.

For best results, note the following recommendations:

- **Observe appropriate safety precautions when using solvent cements. Provide adequate ventilation during application.**

- Cut edges should be flat, square and smooth and should fit together well. If the edges contain stresses induced by cutting or machining it may be necessary to anneal the plastic before allowing the stressed edges to come in contact with a solvent cement.

- Clean the surfaces to be bonded with isopropyl alcohol (IPA), if necessary, to remove any residue.

- Apply the welding liquid to both surfaces. Join quickly (a few seconds) after application.

- **Clamp the pieces together** (pressure is necessary to achieve a good bond) and hold for one to three hours allowing the bond to develop some green strength. The length of time needed to achieve enough green strength to move the pieces will vary with cement type and ambient conditions. Although high bond strength is achieved in 24 to 48 hours, the bond continues to strengthen for several weeks.