

How to bond acrylic (plexiglass) sheets

Material:

Acrylic sheets can be bought from the Cornell Store or McMaster-Carr (≥ 1400 microns).
ePlastics.com sells acrylic as thin as 700 microns.

Weld-on 3 or Weld-on 4 fast-setting solvent adhesive. (McMaster-Carr).

Tools needed:

CNF Hot Press (Duffield 224)
Art paint brush (CNF-supplied)
Glass petri dish (CNF-supplied)
Clean room wipes (CNF-supplied)
glass slides (CNF-supplied)

NOTE:

*This is a new process so plan on adjusting the parameters based on your material and features.
Wear gloves and a face shield, and work in the solvent hood with the Weld-on adhesive.
Use a glass container to hold the weld-on-soaked wipes.
You should be trained on the Hot Press beforehand.*

Process (for 1400 micron-thick acrylic with channels that were etched with the VersaLaser)

1. Blot the side of the acrylic to be bonded on weld-on-soaked wipes two times.
2. Quickly press the acrylic together and paint the edges of the sheets sparingly with Weld-on.
3. Sandwich the acrylic between glass slides on the hot press.
4. Apply just enough compressed air to raise the press stage and keep pressure between 150 – 300 PSI (higher pressures will compact channels. The pressure slowly falls, so keep an eye on it throughout the heating. If the pressure drops below 140 PSI, the stage will drop.
5. Ramp the temperature from room temperature to 95 °C (15- 20 min).
6. Hold at 95 °C for 20 min.
7. Ramp down to 80 °C.
8. Anneal at 80 °C for 30 minutes.
9. Cool to 75 °C (or lower, as needed).
10. Release the pressure and remove the device.