

## PACT Recommended Packaging Procedure – version 4

Note: This procedure is a scaled up and slight modification of the recommendation found in Gauling et al.<sup>1</sup>

**Purpose:** This procedure when followed as described will meet all current PACT acceptance criteria.<sup>2</sup> This procedure is intended to be a quick reference guide. Questions regarding the procedure can be directed to Michael Owen-Bellini ([Michael.owenbellini@nrel.gov](mailto:Michael.owenbellini@nrel.gov)) or Laura Schelhas ([laura.schelhas@nrel.gov](mailto:laura.schelhas@nrel.gov)). Supplemental videos and tutorials can be provided by request.

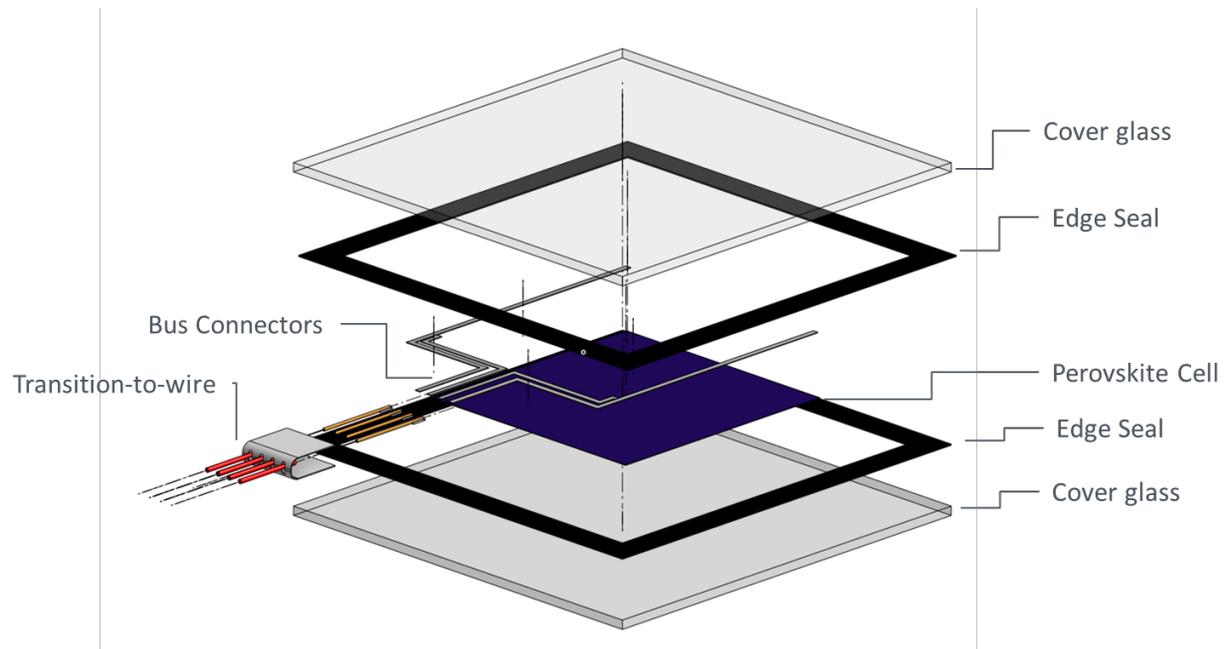


Figure 1: Exploded view of package form factor

### Package Procedure

- Cover glass should be 150mm x 150mm.
- A desiccated polyisobutylene (PIB) edge seal such as H.B. Fuller PIB6510/PIB6520 is recommended.
- Clean cover glass and bake off in the glovebox to thoroughly dry. One piece of cover glass will be the “hot” glass to heat up the PIB, and one side will be the “cold” glass where the PSC is deposited.
- Prepare PV solder coated ribbon wires.
- It is recommended that an ultrasonic soldering iron (such as S-Bond Technologies SB 9210) is used to solder ribbon wires to the PSC contacts.

<sup>1</sup> Gauling et al. in review

<sup>2</sup> <https://pv pact.sandia.gov/download/921/>

- Some strain relief is also recommended, this can be achieved by either ultrasonic soldering or using a small piece of PIB to adhere the ribbons to the glass at the mid-point. (See Figure 2)
- Cut 8 PIB strips to size (150 mm).
- Place 2 layers of PIB on 3 sides of “hot” glass, and 1 layer on the remaining side of “hot” glass. (More layers may be needed to account for additional thickness if using a separate PSC substrate)
- Place 1 layer of PIB on one side of the “cold” glass. This will serve as the sandwich where ribbon wires are fed through. (See Figure 2).
- Set hotplate to 145 °C
- Place metal plate (>1” thick) onto the hotplate. This plate will retain heat when transferring package from the hotplate to the mechanical press and prevent rapid cooling of the PIB.
- Place “hot” cover glass (PIB facing up) onto pre-heated metal plate.
- Let sit for minimum of 15 minutes to heat up the PIB.
- Align “cold” cover glass onto the stack, ensuring that the sides with 1 layer of PIB match up and the ribbon wires are fed through to create the sandwich.
- Transfer package with heat block to mechanical press (using heat block retains heat to stop PIB cooling too quickly and affecting the lamination quality)
- Apply pressure for 2 minutes with the regulator set to 120 psi (if using NREL-supplied mechanical press).<sup>3</sup>
- Figure 3 illustrates the pressing process.
- Figure 4 compares a successful press to an unsuccessful press. No bubbles should be present in the PIB after pressing.

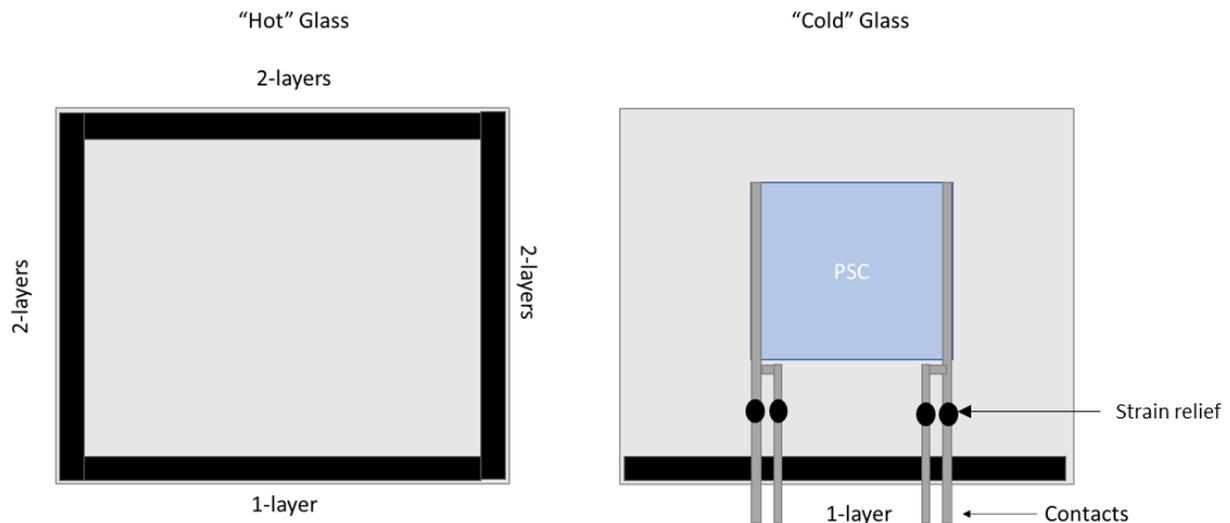


Figure 2: Top-down view of PIB lay-up. Black bars represent PIB strips.

<sup>3</sup> If you would like to make a press to NREL specs please email [laura.schelhas@nrel.gov](mailto:laura.schelhas@nrel.gov) for drawings/designs

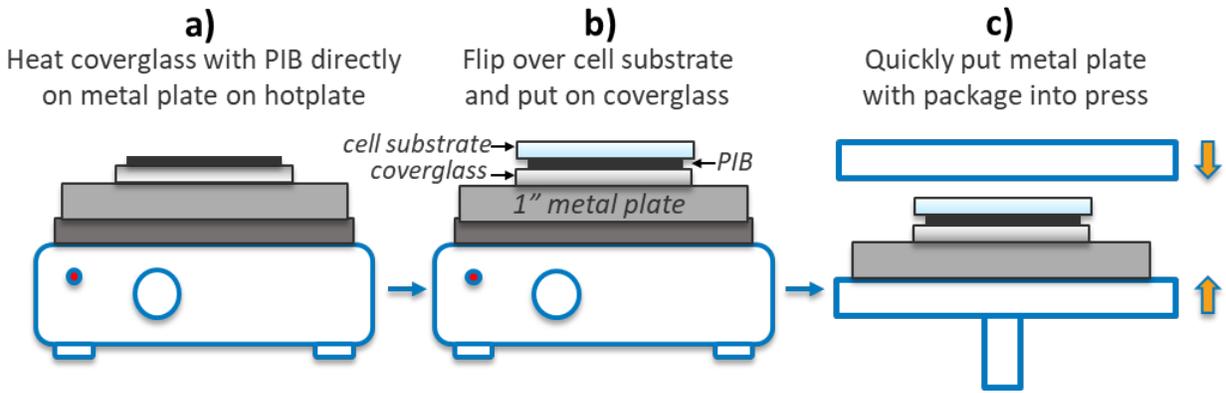


Figure 3: Process for pressing PIB package

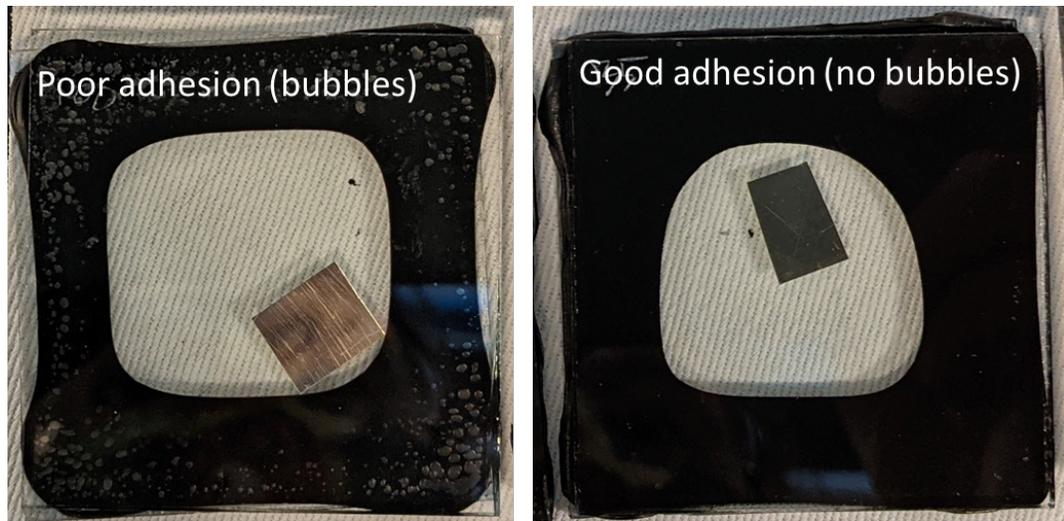


Figure 4: Photos of pressed package showing poor and good adhesion. PIB should "flow" when pressed, and have no bubbles