

Instructions: Use of Minco Acrylic Pressure-Sensitive Adhesives

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(Supersedes SPI 00-0736, EI 138)

1. Overview

Minco Acrylic Pressure-Sensitive Adhesives (PSA) are film adhesives for bonding Thermofoil™ heaters, polyimide-insulated or aluminum-backed silicone rubber heaters, Thermal-Clear™ heaters, and Thermal-Ribbon sensors to flat or concave heat sink surfaces. These PSAs are NASA approved for vacuum environments (NASA reference publication RP 1061) with a useful temperature range from –32°C to 100°C (-25°F to 212°F). For sensors and heaters with a .003" (.076 mm) aluminum foil liner, the upper temperature limit is 150°C (302°F).

PSAs in more common use at Minco are Minco #10, #16 and #19. Additionally, Minco uses various 3M PSAs of the type 100, 100MP and 100HT adhesive varieties. The details of this document refer to usage of any of these PSA varieties.

2. Shelf Life / Warranty

Manufacturer (3M) Adhesive Types	Manufacturer (3M) Shelf Life (roll form)	Minco Shelf Life (converted / applied form)
100 941 (Minco #19) 965 966 (Minco #10) 9461P 9461PC 9462P	24 months from manufacture date	12 months from product ship date
100MP F9460PC (Minco #16) F9469PC F9473PC	24 months from manufacture date	12 months from product ship date
100HT 9082 9085	24 months from manufacture date	12 months from product ship date

Manufacturer Shelf Life Definition

The acrylic PSA materials listed above are supplied from the manufacturer (3M) on rolls, with the manufacturer shelf-life defined as the time from PSA manufacture date to when it should be converted (applied) onto a product (i.e. heater / sensor), in which it will later be used as bonding adhesive for

product installation. Once the PSA's supplied state is "converted", the manufacturer shelf life is no longer relevant.

Minco Shelf Life Definition

The acrylic PSA materials listed above are supplied from Minco in a converted state (applied onto Minco manufactured heater / sensor products), for use by the customer at product installation. The Minco shelf-life is defined as the time from Minco product shipment date (shown on packaging labels) to when the product should be installed (bonded). The 12-month time-frame represents a 100% Minco warranty shelf life.

Minco Shelf Life Validation / Controls

- Minco has determined that acrylic based PSA material (listed above) does not display adhesion degradation or performance change while stored in a temperature and humidity-controlled environment (16C/60F to 27C/80F & 40-60% RH), for up to 60 months of aging time (ref Minco report #2860916).
- Minco ERP manages all received material lots of acrylic PSA materials to ensure they do not exceed aging beyond manufacturer shelf life prior to converting (application). Minco manages product having applied acrylic PSA to ship within 42 months of PSA aging time.
- Storage in a cool, dry UV-free environment (16C/60F to 27C/80F & 40-60% RH) is recommended to assure optimum adhesive bond strength and adhesion of the release liner. Once the PSA is used to bond a heater/sensor to a heat sink, special storage is no longer required.

3. Surface Preparation

Remove dust, oil and other contaminants from the heat sink using a suitable solvent such as acetone or alcohol. These adhesives bond well to most smooth, clean surfaces. An etched or slightly roughened heat sink surface will enhance bond strength.

4. Mounting Procedure

Special care is required when applying acrylic PSA to a heat sink. Trapped air will impede heat transfer and may cause hot spots in the heater that could lead to heater failure. Follow these steps to reduce the likelihood of trapped air between the PSA and the heat sink.

1. With the PSA release liner still intact, place the heater/sensor onto the heat sink in the desired position.
2. Once the desired position is achieved, peel off the release liner from one corner of the heater/sensor while leaving the remaining release liner intact. Tweezers may be helpful for lifting the liner. Avoid touching the exposed PSA.
3. Apply the heater/sensor to the heat sink in its correct position, beginning at the corner edge of the exposed PSA using firm, even hand pressure.
4. Slowly peel off the remaining release liner from the PSA while adhering exposed PSA to the heat sink. Work from the adhered end outward to avoid trapping air.
5. The heater/sensor is now ready for operation. However, for the best adhesion, steps 6 through 8 are recommended.

CAUTION: Do not cure PSA in the oven if the heat sink cannot withstand the temperatures recommended in the following steps. In particular, avoid placing LCDs in an oven unless you know that they can withstand these temperatures.

6. Use a rubber roller to press the heater/sensor onto the heat sink. Roll from the center toward the edges to remove trapped air.

7. Place the installed heater/sensor in a 100°C (212°F) oven for five to ten minutes. While the adhesive is still warm, repeat step 6 above. A two to three-day wet-out time will maximize adhesion.
8. If the heater/sensor will be operated in a vacuum environment, Minco recommends that step 7 be performed in a vacuum oven to remove any trapped air. The temperature should be set at least as high as the operating temperature, but not above 150°C (302°F) for polyimide insulation.

5. Applying PSA Supplied as a Separate Item

1. Remove dust, oil and other contaminants from the heater/sensor surface using a suitable solvent such as acetone or alcohol. These adhesives bond well to most smooth, clean surfaces.
2. There is a layer of release liner on both sides of the PSA. Before removing either liner, lay the heater onto the PSA to confirm placement.
3. Remove the heater/sensor and cut the PSA into a shape that is approximately 1" larger than the heater. Handling is easier if the rough shape is kept square.
4. Peel the white paper release liner from one corner of the PSA while leaving the remaining release liner intact. A tweezers may be helpful for lifting the liner. Avoid touching the exposed PSA.
5. Apply the PSA to the heater/sensor in its correct position, beginning at the edge of the exposed PSA using firm, even hand pressure.
6. Slowly peel the release liner from the PSA while adhering exposed PSA to the heater/sensor. Work from the adhered end outward to avoid trapping air.
7. **CAUTION:** Great care is required to avoid cutting the perimeter and surface of the heater and its leadwires. Replacement of the heater/sensor will likely be necessary if any component is cut. Heater current leakage as a result of damage from cutting may cause heater failure, assembly damage, or personal injury.
NOTE: An X-Acto knife is recommended for this work. Razor blades and scissors do not allow for a sharp angle, which is necessary to trim curves and corners.
Lay the unit on a flat work surface with the heater/sensor facing up. Carefully trim the excess PSA and its release liner from the unit by following the perimeter of the unit with a sharp blade.

6. Adhesive Removal and Reapplication

Partial PSA removal and reapplication is not recommended. If an area needs partial PSA replacement, remove and replace the entire piece of PSA. Minco can supply additional PSA if required. A clean, flat work surface is required for this work. Heaters/sensors and their leadwire connections are susceptible to damage during this step. Heaters with aluminum heat spreader layers are prone to wrinkling damage.

1. Remove the PSA release liner from the adhesive if it is still attached.
2. Lay the heater/sensor flat with its exposed PSA facing up. Soak the PSA with acetone using a stream from a solvent wash bottle and/or a tissue or cloth. Use just enough solvent to cover the PSA. Do not immerse the heater/sensor in acetone.
3. Wait approximately one minute, but no longer than three minutes.
4. Pat the PSA dry with a tissue. Firmly press masking tape onto the PSA.
5. Firmly hold the heater/sensor down flat on the work surface (do not use the leadwires to hold the heater/sensor in place). Begin pulling the tape slowly at an angle greater than 90 degrees to confirm that the heater is fully supported. When it is clear that the heater/sensor will not be damaged by the tape removal, finish the work with a quick pulling motion. PSA that was in contact with the tape should be removed.
6. Apply masking tape to all or part of the remaining PSA and repeat step 5 until the PSA is completely removed.

7. Before applying new PSA, clean the surface thoroughly with a tissue or cloth dampened with acetone or isopropyl alcohol.
 8. Apply new PSA per the instructions in section 5.
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We believe this information to be reliable, but the customer must assume responsibility for heater performance in the intended application. Minco accepts no liability beyond our standard warranty for consequences of improper installation and/or heater or adhesive failure.

If any questions or problems occur, contact your Minco sales representative or the factory for assistance.