Making Your Own Interior Storm Windows

Windows are great for letting in sunlight during the winter to heat your home, but at night an under-insulated window will usually lose more heat than it lets in during the day. In summer, windows let in a tremendous amount of heat and unwanted sunlight. Making your own interior storm windows out of acrylic plexiglass sheets will save you the much bigger expense of replacing your older windows or buying commercially available storm windows. The extra insulation value that traditional storm windows provide is small relative to their high cost. With a little of your time and small expense, you can easily custom create your own permanent interior storm windows that never need to be taken out, while achieving optimal energy efficiency and quick return on your investment dollars. And you can do all this for merely a fraction of what traditional storm windows would cost. Even if you simply wish to increase the insulation value of your newer double-pane windows, making your own acrylic interior storm panes is easy, inexpensive and effective at reducing your energy use.

The advantages of installing an interior acrylic storm pane:

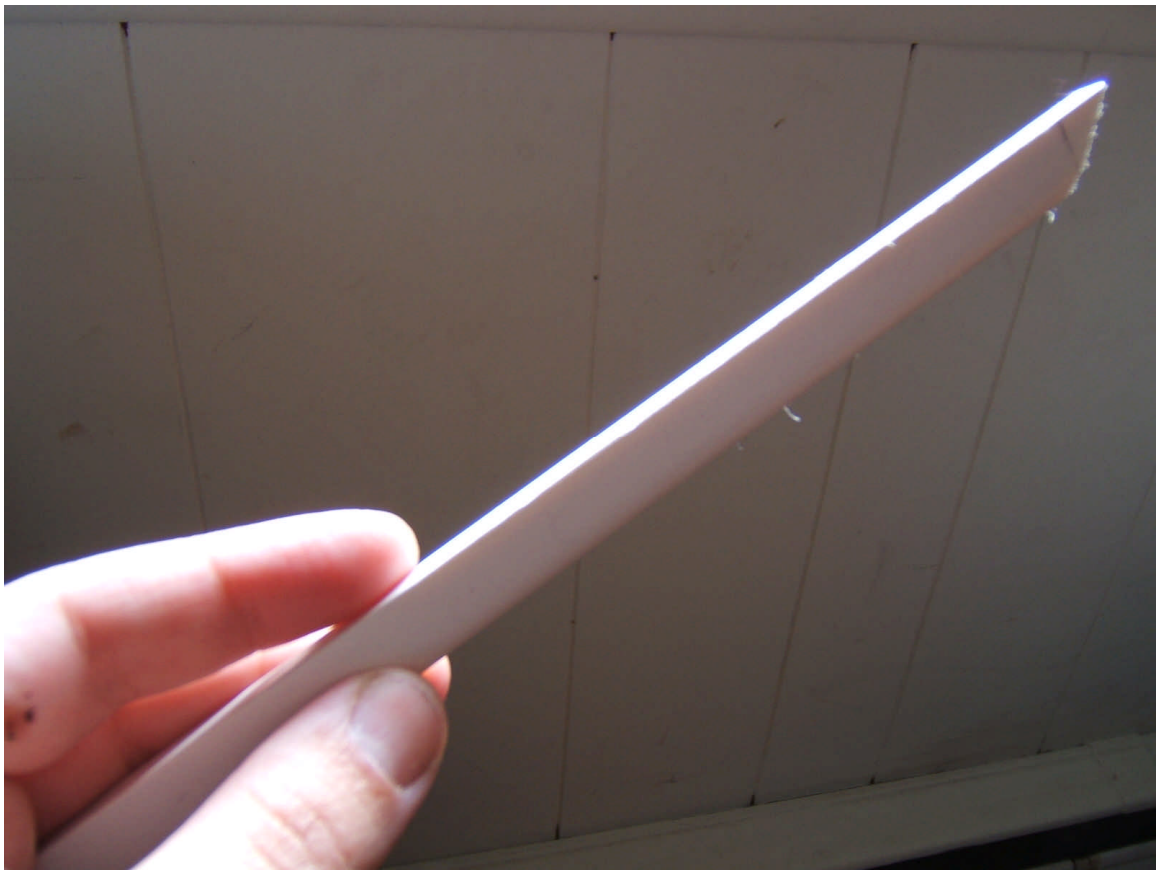
a) can remain in place permanently if mounted accordingly
b) durable and nearly maintenance free
c) lets over 90% of sunlight through for winter heating
d) virtually invisible; no hardware to block views in or out
e) eliminates or greatly reduces condensation
f) a fraction of the cost of commercial storm windows
g) cuts heat loss/gain through typical windows by one-third to one-half

Tools and materials needed:

a) clear acrylic pane (cut to size)
b) acrylic cutting tool (optional)
c) tube of clear silicone gel
d) rope caulk or other putty-like material
e) wood trim spacer and double-sided tape (both optional)

The first step is to find an appropriate place on your window frame to mount your new storm pane. Here there are two main points to remember. First, try to choose a mounting surface that will allow you to open and close the window freely, so that ideally you will never have to remove your new custom pane. This might mean using separate panes for top-and-bottom windows. If you find that you need or want a removable storm pane, then I recommend affixing magnetic stripping to the window frame and new storm pane (more on this later).

Second, you need to ensure that you can achieve at least a ½-inch to ¾-inch space between the new pane and existing window glass. Remember, it is not the panes in your window system that are insulating, it is the air gaps between them. Data show that with less than a ½-inch gap, the insulation value of that air space drops significantly. Although bigger air gaps of one inch or more between the panes are OK, they actually do not provide any more (or less) insulating value than a ¾-inch space. In my case, there was only a ¼-inch depth between the existing glass and surrounding frame, so I had to place an inexpensive wood spacer on the vinyl window frame using double-sided tape. This gave me an ideal 5/8-inch air gap (see photo below).



If you have wooden window frames, you may want consider the likelihood that affixing a spacer to the frame might damage the wood if you ever need to remove the spacers.

The spacer I used was sold as a simple molding trim for about $2.50 for an eight foot length. There is no sense in installing the storm window if it is spaced too close to the existing glass to insulate fully – unless you have no other choice. You can cut the corners of the wood spacers at 45º angles with a miter saw to give a seamless look. Fill any gaps where the segments come together with the appropriate color caulk or silicone gel. If you have an exterior door 9-lite pane (or similar pane with molded trim around it), there is usually a convenient lipped

recess right in the molding that makes a great surface to mount the acrylic. This usually gives you perfect ½-inch to ¾-inch gap from the existing glass which eliminates the need to add a spacer.

Now measure the dimensions of the total window glazing and frame area that you wish to cover. Then you will need to buy a sheet of clear acrylic (plexiglass) large enough to cover the area. These sheets are so clear that they are virtually invisible to the eye. Make sure to include in your window measurements enough extra height and width for the sheet to give at least a one-half inch overlap on the flat part of the window frame around the perimeter of the existing glass. You do not need to buy a very thick piece of acrylic unless you have a particular need for shatterproof protection. The thinnest acrylic is generally suitable for most applications.

I have found that large home improvement centers, building supply stores and local hardware stores usually carry a wide variety of acrylic sizes at reasonable prices (generally around $2.00 per square foot), and they may even cut the sheets for you (call ahead and ask). Hunt around until you find a seller that does it for free – most of them in my area do. You can also buy an acrylic cutting tool for a few dollars if you have to do it yourself, but on thicker pieces it might be much easier to use a jigsaw. Just put a piece of thick masking tape over the area that you intend to cut to reduce burrs and chips.

The following mounting options will help you easily install an airtight acrylic storm pane:

1. Before you mount the storm window, MAKE SURE THAT BOTH THE GLASS PANE YOU ARE COVERING AND INSIDE OF THE ACRYLIC SHEET ARE CLEAN. If not, you will either have to endure the headache of taking down the storm window (and reinstalling it) at a later time for cleaning, or be subjected to looking at the trapped dirt and smudges forever!

2. If possible, have someone hold the acrylic pane in place for a few minutes while you work to temporarily secure the pane to the window frame.

3. Using a roll of the putty-like “rope caulk” (or similar material), form several pieces each into the size of about half a cigar. Firmly press each piece into several spots along the edges of the acrylic pane so that they wedge the pane against the window frame. **This will temporarily hold the acrylic pane in place so that you can now seal the edges** (see photo below). Proceed to Step 4.

You can also opt to place double-sided tape onto the inside of smaller acrylic sheets and mount the pane directly onto the window frame instead of using the temporary rope caulk method. However, it may be very difficult to perfectly align the panes onto the window frame. Good double-sided tape will be *very* unforgiving if you align the pane incorrectly and need to peel off the tape from the frame! In any case, even if you do use the double-sided tape method, you will still want to proceed to Step 4 below.

If instead you prefer an easily removable storm pane mount, then affix a ½-inch magnetic strip around the entire perimeter of the window frame and also on the entire edge of the inside face of the acrylic sheet. Visit www.custom-magnets.com for good prices on 100-foot rolls of magnetic stripping. Keep in mind that the black magnetic stripping may be highly visible (depending on your window treatments and frame color), and will not be quite as perfectly airtight as the other mounting methods (although it usually comes close). However, this method will allow you to remove the pane with ease if need be. You may also consider hiding the magnets by affixing a piece of molding or trim to the edges of the storm window on the

side facing the living space. If you opt for the magnet mount, then skip Steps 4 and 5 and proceed to Step 6.

4. Using a tube of clear silicone, lay a bead of the gel in the gap along the edges of the acrylic pane where it meets window frame. Smooth over the perimeter bead *immediately*. Don't worry about removing all the excess silicone or sealing the spots where the rope caulk or putty is – you will deal with this later. The silicone gel will not only securely hold the pane in place after it dries, but it will also form an airtight seal around the edges. This is *essential* for maintaining the highest insulation value of the new trapped air space. High quality silicone is very long-lasting, but you may want to check the seal yearly to ensure airtightness.
5. Let the initial bead of silicone dry overnight, then gently remove the supporting pieces of rope caulk or putty (be sure to remove any residual bits from around the edge). Now lay a silicone bead into the short lengths of the perimeter where the rope caulk was, and smooth over with finger. When this application of the gel dries, you can gently rub off any unsightly dried silicone with your finger, or use rubbing alcohol and cotton balls to easily remove stubborn spots.

6. If you wish to completely hide the edge of the acrylic where it meets the spacer or window frame, you can affix a piece of inexpensive vinyl or wood trim to overlap and conceal the edge, making your new storm window completely undetectable. You are now ready for your new storm pane to start saving you energy and money (see photo below).

If you have single pane windows, the addition of one properly spaced acrylic storm pane can reduce the heat loss or gain through your window glazing by about 50%. Even if you have double pane windows, the same pane will still reduce heat transfer by about 33%. The acrylic panes are also EXCELLENT at eliminating or greatly reducing condensation. If you are installing the new storm panes over existing double pane windows, the new total insulating value will likely be at least R-3 (or a U-factor of no higher than 0.33). This may qualify you for a **federal tax credit** of 10% of the purchase price of the acrylic and any spacers or silicone used for purposes of reducing air infiltration or increasing thermal insulation. Visit the Internal Revenue Service site at http://www.irs.gov/newsroom/article/0,,id=154657,00.html; or the Federal Energy Star site at http://www.energystar.gov/index.cfm?c=products.pr_tax_credits for more information.

Here is the cost breakdown of an acrylic storm pane that I recently installed over a roughly 2'x3' window:

One 24"x48" acrylic pane - $16.03
10-foot length of wood trim spacer - $3.32
partial tube of silicone gel – approx. $1.00
double-sided tape (partial roll) – approx. $2.00
reusable rope caulk – no net cost

TOTAL COST = $22.35 (including sales tax, but not including federal tax credit). This comes out to approximately $3.73 per square foot of window.

Compare this to the high cost of exterior storm window hardware that has no greater insulating value than your own custom acrylic storm window!