Removing Moisture within Large Double Glazed Windows

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This article gives the reasons and a method of removing accumulated moisture from double glazed windows, large or small. Cost to have window replaced quoted at £525. Cost of materials to repair < £15.

Moisture Before pump out

16 hours later after pump out

Double glaze glass panes are separated by a hollow extruded spacer bar filled with a desiccant and glued/sealed in position. The desiccant removes any residual moisture in the air/gas space between the panes during manufacture. If the peripheral seal is imperfect during manufacture or breached by a later seal leak, it may not be detected until a considerable time has passed, possibly years. Argon gas is sometimes used as a space filler to reduce the transmission of heat between the panes. A vacuum is not used as this would bend the glass and would eventually be lost as air diffuses through the sealant.

Once the integrity of the peripheral seal is breached by a leak, solar or room heating causes expanding air to blow out of the breached seal under positive pressure. On cooling, air which contains moisture will re enter the window space via the breach due to a partial vacuum created by the shrinking air volume. This pumping cycle continues indefinitely and when the desiccant within the spacer bar extrusion can no longer absorb further moisture, the moisture becomes visible as it condenses between the window panes. Eventually water may accumulate in the space at the lower edge of the window.

The foregoing causes many millions of double glazed Insulating Glass Units (IGU's) to be scrapped each year as replacements are fitted. It is a rich source of revenue for double glaze window salesmen as replacing large IGU's can run into hundreds of pounds.

To repair an IGU requires that the space between the windows is purged of all moisture and replace with dry air. Re introducing argon gas to fill a cavity is not a practical proposition.

Two Methods of removing the Moisture.

1) Drill the window glass.

Currently there is a method by which a hole is drilled through each diagonal opposing corners of the inner window glass. Dry air is pumped into one hole via a fitted nipple and exhausted via the second hole to purge the moisture from between the panes. Miniature non return valves are then fitted which allow dry air in but not out via the drilled holes. This develops a positive pressure within the window panes so that any leaking through the peripheral seal is always outgoing. The air entering the widow must be dry otherwise condensation will eventually occur when the outer window gets cold.

This repair is fraught with potential problems since drilling glass is not easy, especially if the window is vertical since water must be applied to the tungsten drill tip which needs to be at 10,000 or 15000 rpm. It also requires a skilled DIY person to carry out this method. It may not dry out the desiccant within the spacer bar since the air flow route is in via the miniature valve and out via the leaking seal. There are window sales people who offer this service but the cost is still relatively expensive, enough for the salespeople to recommend the expensive exchange of window IGU's. Its a basically we can do it but prefer to charge you a lot more for a new window.

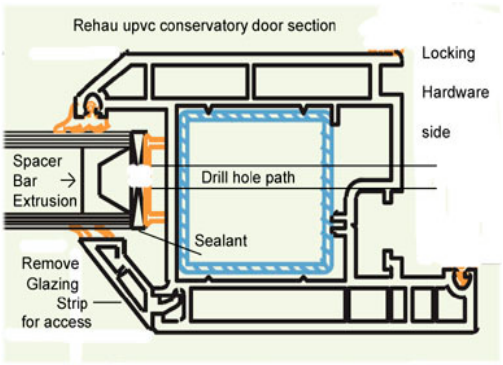
2) Drill the Spacer Bar

This alternative proposed repair method I have used is tried and tested, fully successful and well within the capabilities of the average DIYer. It requires access to the inside extruded spacer bar at the double glazed edge seal. In order to dry out the desiccant within the spacer bar, dry air will need to be forced into the extrusion via an external hole which will then be vented out via a second hole on the opposite side of the window. Using a low pressure air pump similar to those used in fish tanks (**See Note 1**), the spacer bar can be vented sufficiently to allow the desiccant to dry out. It may take several hours to complete but should allow any further moisture to be absorbed after purging.

Access will require removing one or two of the side strips which secure the IGU to the frame. If the window is a tilting type then it will be required to drill through the upvc frame side and observe the drill as it enters the external spacer bar sealant. This is necessary to prevent the drill bit hitting the glass end on, drilling by guesswork is not an option. Otherwise, the IGU will have to be tilted on its base or removed completely from the frame.

Choosing the best position to make the holes need not be a problem. If the spacer bar is continuous, being bent at 90 degrees for each corner in a rectangle, then the best position might be near the bottom since moisture droplets could have accumulated here. This would depend on where the spacer bar ends meet. The venting air flow will obviously take the least resistant path. A spacer bar may have been glued together at the corners, being butt jointed against corner stops. Either way, air pumped in one spacer bar will find its way out via another spacer bar with a hole drilled in it. This will

be by way of the spacer bar perforations designed to absorb the vapour moisture within the window panes.



Cross Section of a Conservatory Door **Glazing Strip removal.**

Expose the IGU edges.

First examine the upvc glazing strip which holds the inside window seal for a suitable starting point from which to open a gap between the strip and window frame. This should be on the room side of the frame, being virtually undetectable as a join line along the strip/frame interface. Do not start at the window corner as the strip has mitred ends which will not lift out until the strip is bent sufficiently.

Insert about a 10 or 12 mm sharp wood chisel between the frame and upvc strip join (not the window and seal) using the chisel corner until sufficient gap is opened for the chisel edge to gain purchase at the interface. Once started, lever the chisel to ease the strip up and out of the frame, then firmly push the chisel between the strip and frame where it can be slid along to ease out the upvc strip completely. This should take no more than a few minutes. Repeat for the opposite window side (**See Note 1**). Leave the top & bottom strips in situ.

Find the IGU Centre Line

Once the upvc side strips are out, the edge of the IGU glass is exposed together with the upvc support frame gaps around the glass. Measure the position of the glass from each side the frame to determine where the centre line of the IGU is located. On a 60 mm thick frame the glass would be about 20 mm from the inside or outside of the frame making the centre line 30mm from the frame edges. The IGU is therefore 20 mm thick and with 4 mm glass the gap is about 12 mm filled with rubber sealant, enough to pass a 5mm drill through. The air flow joiner fittings have a 5 mm OD later to be inserted.

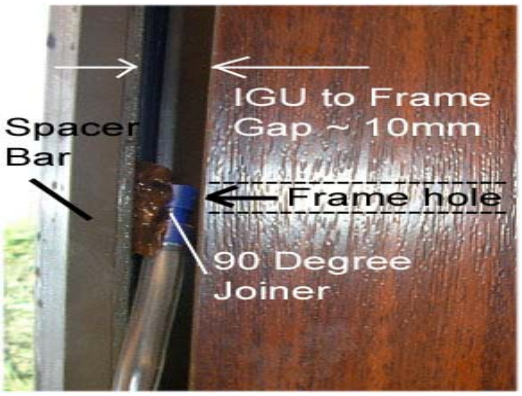
Drill the Holes through the Frame & Spacer Bar

Mark the outer edge of the frame and drill a 3 mm pilot hole through the frame until it becomes visible on the inside of the frame. Check for position by pushing a suitable probe through the hole to see if the probe meets the gap in the IGU edge. When satisfied, drill through the rubber seal into the aluminium desiccant filled strip with a 5 mm drill. As the drill enters the spacer bar, ease the drill firmly until the break through into the spacer bar then remove the drill.

Finally open the hole in the frame to 7 mm diameter so that the air tubing and joiner can pass through the frame together. In each case I found the desiccant to be dry powder at mid window level. Time taken about 15 minutes for the drill operations.

If the frame contains a locking slide bar remove some of the attachment screws, pop one bar end out of its dogtooth engaging claw and move the bar sideways to allow drilling access. It may be possible to fit a 90 degree air pipe fitting into the spacer bar if the gap at the edge of the IGU is large enough. If side frame access cannot be achieved the whole IGU will need to be tilted out of the frame and supported temporarily.

Drilled hole through Window Frame Side



90 Deg Air Connector into Spacer Bar

Fit the Air Tube Joiners & Air Pump

Having drilled through the frame & sealant and into the extrusion desiccant, insert a suitable 5 mm OD joiner, tube attached, as used with 4 mm ID / 6mm OD plastic fish tank tubing, into the spacer bar sealant hole. These are available from aquarium suppliers. Repeat the above process for the second hole. The joiner fittings can be sealed in position if required, straight or 90 degree can be used.

The end of one tube can then be attached to the pump via a desiccant container which will dry the air before entering the window space. At first, the spacer bar perforations nearest the feed hole should allow air to enter the window space. It may be that the perforations nearest the exhaust hole may be clogged with wet desiccant and an out flow is not possible. This can be tested by attaching a rubber balloon over the exhaust tube or dabbing some saliva over the tube end. If no flow is present then it is clogged and the only solution left is to drill the hole through the spacer bar into the window cavity.

Important: **Do not use a high pressure tyre pump, manual or electric to force a venting path since this may cause the glass to explode. Even a bicycle pump can produce many tens of pounds per square inch, enough to burst a window.**

The external desiccant for drying air could be contained inside a small diameter plastic tube with the ends adapted for the pump tubing but as it

happened, no external desiccant was used during the pump out just to see the effect. The result was unexpectedly quick, less than 16 hours, producing a clear window. A few minor water marks remained and this was considered an acceptable result considering the cost saved.

Next, seal the second hole tube and disconnect the pump leaving the first hole tube to act as a breather via the desiccant container.

Desiccant filled window Breather tube.

As air moves in and out of the window cavity it will continue the drying process until no further moisture can be removed. The breather pack can be made from some miscellaneous tubing, filled with desiccant and readily exchanged at any time. Tuck this into the space between the IGU and frame. Finally, replace the glazing strips by fitting the mitred ends in situ and tapping in the strip to the frame. Check the rubber seal doesn't distort out of position, a little soapy water helps things along. Job done!

Cost breakdown:
Aquarium pump: £13.49
6 mmTube & Joiner pack: £2.50,
Sealant as required
Desiccant , miscellaneous tubing.

Tools required: 3,5,7 mm Drill bits, Power drill, screw drivers, wood chisel.

Note 1.
It should be possible to vent the IGU without the use of an air pump. If a non return check valve (such as those used to vent wine brewing bottles or prevent back flow in aquariums) was introduced in the breather tube air feed, this will allow dry air in but prevent air exiting via the breather tube.

With the check valve operating, only one hole need be drilled into the spacer bar since the out going moist air when warmed, will be under positive pressure and pass through the original leak point. On cooling, the breather tube will supply dry replacement air. It may take several heat - cool cycles over several days to clear the window.