Instruction Sheet
Polyethylene glycol (PEG) is a chemical treatment used on green wood to prevent warping, cracking and shrinking. PEG is a white waxy substance that is solid at room temperature. It is non-toxic, non-flammable and soluble in water. No special safety precautions are required when working with it.

The numbers 1000 and 1450 refer to the average molecular weight of the polymer chains of PEG. PEG-1000 is supplied in solid blocks and melts at 98° to 103°F (37° to 39°C). PEG-1450 is supplied in flake form and has a higher melting temperature, 110° to 115°F (43° to 46°C). Because of the larger molecule size, PEG-1450 is absorbed more slowly into wood, but will not bleed from wood as PEG-1000 will in hot, humid conditions.

Choice of Woods
For PEG to be effective, the wood to be treated must be green, with a moisture content (MC) above 30%. PEG will not restore dry wood to its original dimensions, nor will it stabilize already dry wood. The higher the moisture content, the more effective PEG is. Wood at 100% MC treated with PEG will reduce its shrinkage by 90%. Because of this, it is important to maintain the moisture content of the wood while working it by keeping it covered with plastic or dampened sawdust.

All woods will behave differently with PEG. Woods most suitable are low to medium in density, and with a high moisture content. Avoid woods with high resin or oil content. Listed below are some woods that have been effectively treated with PEG and some that have proven to be difficult to treat.

### TREATABLE WOODS
- Poplar
- Walnut
- Red Oak
- Beech
- Pine
- Apple
- Aspen
- Soft Maple
- Spruce
- Fir
- Redwood
- Butternut
- Hickory
- Elm
- Willow

### UNTREATABLE WOODS
- Cherry
- Hard Maple
- White Oak
- Tropical Hardwoods

Preparing Woods For Treatment
PEG has a limited penetration into wood no matter how long it is left to soak. The maximum penetration into exposed end grain is about 2” . Penetration into side grain varies from 1/2” to 1”. Green wood should be worked quickly so that as little moisture as possible is lost from the workpiece. Pieces should be worked to within 1/4” of its final dimensions before being treated to get the best penetration and to reduce the amount of PEG lost in shavings in final working.
Treat Wood With PEG

To treat wood with PEG you must immerse the workpiece in a solution of PEG and water for a period of time. Best results can be had by using a 30% to 50% solution. Equal parts by weight of PEG and water will give a 50% solution (which works out to approximately 10 lb of PEG per gallon of water). Three parts PEG with 7 parts water will give a 30% solution (which works out to approximately 4 1/2 lb of PEG per gallon of water). Use hot water and cut PEG-1000 into small chunks to ensure quick dissolving of the PEG. Once made, you can check the strength of your PEG solution with a thermometer and hydrometer. Check your readings against the chart below to see if you have to add water or PEG to the solution. Sap will diffuse into the PEG solution to dilute it while evaporation of water will concentrate the solution.

The PEG solution can be reused by adding enough PEG to the vat to keep it within the 30% to 50% range.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>30% Solution</th>
<th>50% Solution</th>
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</thead>
<tbody>
<tr>
<td>70°F</td>
<td>1.05</td>
<td>1.08</td>
</tr>
<tr>
<td>90°F</td>
<td>1.045</td>
<td>1.077</td>
</tr>
<tr>
<td>110°F</td>
<td>1.038</td>
<td>1.068</td>
</tr>
<tr>
<td>130°F</td>
<td>1.03</td>
<td>1.059</td>
</tr>
</tbody>
</table>

Mix the solution in a plastic, ceramic or glass container. Avoid metal containers as the metal will react with wood sap and discolor the wood. Temporary soaking vats can be made from plywood boxes lined with 6-mil polyethylene film. The vat must be deep enough to submerge your work. Use a container as close to the size of your work as possible to minimize the amount of PEG you have to mix at once. Use small spacers under the work to provide even absorption on all surfaces and weigh the wood down to keep it submerged.

Penetration of PEG is accelerated by heating the solution. You can heat the vat with a thermostatically controlled immersion heater or by placing the vat in the sun or near any other heat source. Do not heat the solution above 140°F (60°C); some woods, such as cherry, will develop honeycomb cracks when treated at elevated temperatures.

The length of time to leave a piece of wood in PEG depends on the species, the wall thickness, the strength of the solution, and the solution temperature. In general, the lower the density of the wood, the shorter the time required to soak while stronger solutions and higher temperatures will reduce soaking time. You cannot soak a piece too long – when in doubt, let it soak longer. The chart following will give a guide to the length of time to treat wood.

Stir the solution each day and make sure the wood is fully immersed.
Drying PEG-Treated Wood

Once the wood has soaked for the appropriate period of time, remove it from the PEG solution and wipe the surface off with a damp cloth. The wood must be dried before reworking it. Unlike untreated wood, PEG-treated wood can be dried very quickly without fear of warping or checking. Small pieces can be force dried in a kitchen oven at temperatures up to 200°F (93°C). Some woods may discolor at high temperatures, so test a sample first. Larger pieces can be dried in a kiln or by placing them in a sunny window. If cracks appear in the wood, it indicates that the wood was not treated long enough.

Working With PEG-Treated Wood

PEG-treated wood is easier to machine than untreated wood. The PEG acts as a lubricant for the tool edges. To glue treated wood, first joint the edges, then wash them with lacquer thinner and then wood alcohol. Use epoxy or resorcinol glue.

Finishing Treated Wood

Sandpaper clogs quickly with PEG and sawdust, but can be easily cleared with warm water and a bristle brush. For this reason, use wet or dry-type sandpaper and use water as a lubricant for fine-grit papers. Allow the wood to dry thoroughly before applying a finish.

PEG is hydroscopic. On humid days the PEG will absorb moisture from the air and will make the surface of unsealed wood feel damp. Unsealed wood will also discolor when exposed to light, so it is important to apply a protective coating as soon as possible after finish sanding. The best finishes for PEG-treated wood are moisture-cure polyurethane, epoxy coatings, or penetrating oil finishes such as Danish oil or tung oil. In all cases, flush the surface with wood alcohol and let dry before applying the first coat of finish. Apply the finishes as you would to regular wood.

For more information on PEG see *Understanding Wood* by R. Bruce Hoadley, Taunton Press, 2000.