Complete Guide to Woodworking Glues

Use the match-maker chart for all of your glue-up needs

By Joe Hurst-Wajszczuk

Unless your woodworking projects are limited to knockdown furniture and timber-frame barns, you are already quite familiar with a variety of tubes, bottles, bags and jugs of this sticky stuff. Over the years, you’ve probably grown used to working with a few favorites, and even learned some tricks to deal with less-desirable qualities.

Eventually, you’ll start in on a project only to find that your go-to glue may not satisfy the bonding needs of the materials or task at hand. When that happens, you’ll find yourself at the mercy of catalogs and home centers looking for the perfect product.

There are dozens of choices, but selecting a suitable adhesive needn’t be dizzying. I’ve divided the woodworking glues into a few basic categories and provided a side-by-side comparison to help you quickly weigh your options. In addition to the quick-reference chart on page 40, you’ll find adhesive advice focusing on common problems, as well as valuable suggestions destined to stick with you.
### Woodworking Glue Chart

<table>
<thead>
<tr>
<th>Glue</th>
<th>Simple (uncompounded Polyvinyl Acetate (PVA))</th>
<th>Compound PVA</th>
<th>Compound PVA</th>
<th>Compound PVA</th>
<th>Dry Hide Glue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pot Life</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Several days</td>
</tr>
<tr>
<td>Open Time</td>
<td>10 minutes</td>
<td>5 minutes</td>
<td>5 minutes</td>
<td>10 minutes</td>
<td>1 minute +</td>
</tr>
<tr>
<td>Clamp Time/ Cure time</td>
<td>60 minutes/ 24 hours</td>
<td>30 minutes/ 24 hours</td>
<td>30 minutes/ 24 hours</td>
<td>Clamping not needed (glue sets as it cools) / 24 hours</td>
<td></td>
</tr>
<tr>
<td>Color when dry</td>
<td>Clear</td>
<td>Yellow</td>
<td>Light brown</td>
<td>Amber</td>
<td></td>
</tr>
<tr>
<td>Cleanup</td>
<td>Water</td>
<td>Water</td>
<td>Water</td>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Water Resistance</td>
<td>Low</td>
<td>Very Good (Type II)</td>
<td>Excellent (Type I)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Shelf Life</td>
<td>2 years</td>
<td>2 years</td>
<td>2 years</td>
<td>2 years</td>
<td>Indefinite</td>
</tr>
<tr>
<td>Cost</td>
<td>$5 for 16 oz.</td>
<td>$8 for 16 oz.</td>
<td>$10 for 16 oz.</td>
<td>$15 for 1 lb.</td>
<td></td>
</tr>
<tr>
<td>Notes</td>
<td>Good for crafts, but not ideal for woodworking. Vulnerability to heat and moisture makes it suitable for instances requiring reversibility. Best all-around choice for joinery and casework on interior projects. Water resistance makes it a good choice for projects likely to face exposure to moisture or bad weather. Best PVA for projects that might get stressed when wet, but not suited for constant submersion. Additional working time a plus for large/complex glue-ups. Fast initial tack; favorable choice for veneer. Reversibility a plus for antiques and musical instruments. New glue bonds to old. Must mix with water in glue pot and heat to 140°-150°F.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Liquid Hide Glue

<table>
<thead>
<tr>
<th>Glue</th>
<th>Polyurethane</th>
<th>Epoxy</th>
<th>Urea Formaldehyde</th>
<th>Cyanacrylate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pot Life</td>
<td>N/A</td>
<td>6-50 minutes+</td>
<td>2-4 hours+</td>
<td>N/A</td>
</tr>
<tr>
<td>Open Time</td>
<td>10 minutes</td>
<td>15-30 minutes</td>
<td>5-30 minutes+</td>
<td>1 minute+</td>
</tr>
<tr>
<td>Clamp Time/ Cure time</td>
<td>30 minutes/ 24 hours</td>
<td>1-4 hours</td>
<td>15 minutes-15 hours+</td>
<td>5-15 hours+</td>
</tr>
<tr>
<td>Amber</td>
<td>Clear to Amber</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>Mineral spirits</td>
<td>Lacquer thinner, acetone, denatured alcohol, vinegar</td>
<td>Water</td>
<td>Acetone</td>
</tr>
<tr>
<td>Water Resistance</td>
<td>Low</td>
<td>Excellent (Type I and II)</td>
<td>Excellent; stable in temperatures up to 200°F</td>
<td>Low</td>
</tr>
<tr>
<td>Shelf Life</td>
<td>1 year</td>
<td>2-3 years</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Cost</td>
<td>$13 for 1 lb.</td>
<td>$11 for 12 oz.</td>
<td>$52 for 48 oz.</td>
<td>$25 for 4/4 lbs.</td>
</tr>
</tbody>
</table>

### Glossary:

**Pot Life**: The maximum amount of time you have to apply two-component glues to your work after they have been mixed.

**Open Time**: The maximum amount of time glued pieces can be left open to the air before assembly.

**Clamp Time**: The minimum amount of time required before you can remove the clamps from a glue-up assembly. (Note: PVAs and hide glue offer only 30-50% of full strength at stated time. If a joint is under stress, maintain clamping pressure for the full cure time.)

**Cure Time**: The time it takes for a glue joint to achieve full 100% bonding strength.

**Shelf Life**: The period of time that glue remains useable. (Note: Excessive heat, humidity, or repeated freeze/thaw cycles will cause glues to spoil prematurely. Under ideal conditions, adhesives remain useable for longer time periods. If a glue appears abnormal, test first, or toss it in the trash.)
Glue-Choosing Considerations

Under the ideal situations, all woodworking glues are capable of creating bonds stronger than the wood. Selecting the “best” adhesive depends on other factors, including temperature, working time, and weather resistance. Here’s a quick-pick guide to help you select the right glue for new work or old, indoors or outside, and the variety of materials woodworkers use.

In some cases, several glues can fit the bill. Study the working properties of each glue in the chart to see if you can use what you have on hand, or if it’s time to go shopping.

Water-Resistance

There’s a difference between waterproof (Type II), water-resistant (Type II) and constant immersion. Type I testing involves several boiling/backing cycles and then testing the samples while they’re still wet. Type II testing involves three soaking cycles and three drying cycles before the samples are tested. Despite type-ratings, all PVAs will soften in a constant marine environment.

Avoid: White and hide glues. Their bonds can be undone with hot water. (This can be an advantage when expecting repairs. Conservators prefer hide glue because new glue reactives old.)

Try: Epoxy is the only adhesive suited for constant water contact but for typical outdoor projects, Titebond II, polyurethane, and urea formaldehyde will all hold their own. For projects that might be exposed to hot water, consider Titebond III. (Boiling water activates Titebond III crosslinking polymers, improving Titebond III’s bond. At temperatures above 200°F epoxy and urea formaldehyde lose stability.)

Avoid: Polyurethane glue. It foams as it cures, but the dry froth has no significant strength. PVA might also seem like a quick fix, but that gap-filling puddle will shrink as it dries. In both cases, the adhesives create a film that seals the cell walls, complicating a future fix. (PVAs work if you can pack the joint to establish a gap-filling specialist.)

Try: Epoxy is the best choice for structural, gap-filling repairs. You can build epoxy fillets around joints for additional reinforcement.

Custom PVA Blends

Special-blend PVAs possess certain abilities that have made them shop favorites. With a 15-minute open time (twice as long as regular Titebond), Titebond Extend is useful in complex glue-ups. For cabinetry, try Titebond Melamine. As the name suggests, this PVA sticks to melamine, and also vinyl, high pressure laminates (and wood). Titebond No-Run, No-Drip stays put and grabs quickly, making it perfect when installing molding and trim. Glue-lines shouldn’t show, but when they might, Titebond II Dark can prevent the lines from standing out on darker woods.

Temperature Sensitivity

Woodworking in poorly heated spaces during winter months often leads to glue failure. If the temperature drops below a certain point, or if the stock was cold to start with, some glues can’t cure (or stick) like they should.

Avoid: PVAs. Most of these require a temperature above 50°F to work. When yellow glue dries white, it means that the temperature fell below the glue’s chalk temperature and that the joint will likely fail.

Try: Epoxy. These cure best at 70°F, but some mixes work in temperatures as low as 35°F. (In chilly conditions, you can use a heat lamp or hair dryer to help the epoxy kick in.) Titebond III can be used as low as 45°F. Liquid hide glue begins to gel at 50°F, but if you keep the bottle warm, it can be used in colder weather.

Flexibility/Creepl

A little plasticity is necessary to allow for some wood movement, but slipping or stretching (often the result of constant long-term loads) that doesn’t snap back is called creep. In smaller projects, creep means visible glue lines and laminations that lose their shape. In larger structures, creep can spell joint failure.

Avoid: White glue. It creeps the most, but most PVAs can stretch under long-term loads.

Try: Urea formaldehyde. It contains formaldehyde, a skin and lung irritant, and possible carcinogen. Polyurethane and epoxies contain sensitizers that can trigger allergic reactions. CA fumes irritate eyes, nose, and lungs.

Avoid: PVAs. These are nontoxic and clean up with water. Hide glue is made from skins and hooves. You wouldn’t want to eat the stuff, but you needn’t worry if your dog happened to find your glue pot.

Working Time

Open time, working time, and curing time all relate to how long it will take to glue up a project from application to maximum bonding. Depending on the project, speed can be an ally or enemy.

Fast: Hot hide glue tacks in minutes, but with the aid of an accelerator, CAs bond instantly. If you can afford a few minutes, fast-curing epoxies cure in minutes, but offer considerable strength.

Slow: Titebond II and liquid hide glue offer more time for complex or multi-stage glue-ups. Even more time, try Titebond Extend (see sidebar, right). Polyurethane allows a comfortable working time for complicated glue-ups, but keep the clamps on until final cure or the foam can cause joints to open. You can double epoxy’s working time with slower hardener. (Lowering the temperature will also buy more time.)
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