

The supporting role of backings and bonds

The backing's stiffness and flatness influence the quality and speed of the sandpaper's cut. For the most part, manufacturers choose adhesives and backings to augment the characteristics of a particular abrasive grit. You will have a hard time finding an aggressive abrasive mineral, for example, on a backing suited to a smooth cut.

The stiffer the paper, the less the abrasive minerals will deflect while cutting. They will cut deeper and, consequently, faster. Soft backings and bonds will allow the abrasives to deflect more, giving light scratches and a smooth finish. You must even consider what's behind the backing. Wrapping the sandpaper around a block of wood will allow a faster cut than sanding with the paper against the palm of your hand. For instance, an easy way to speed up your orbital sander is by exchanging the soft pad for a stiff one (photo below). The other consideration is the flatness of the backing, which has nothing to do with its stiffness. Flat backings position the minerals on a more even level so they cut at a more consistent depth, resulting in fewer stray scratches and a smoother surface.



Soft pads let the sandpaper deflect. Soft backings on sanding tools won't support the sandpaper and make it cut more slowly.

Cloth is the stiffest but least-flat backing. It will produce the coarsest and fastest cut. Cloth comes in two grades, a heavy X and a light J. Paper is not as stiff as cloth but it's flatter. It comes in grades A, C, D, E and F (lightest to heaviest). A-weight paper that has been waterproofed is approximately equivalent to a B-weight paper, if one existed. Polyester films, including Mylar, look and feel like plastic. They are extremely flat and pretty stiff. They will give the most consistently even cut and at a faster rate than paper.

The backings for hand sheets and belts are designed to flex around curves without breaking. This is not true for sanding discs for random-orbit sanders. They are designed to remain perfectly flat, and if used like a hand sheet, the adhesive will crack off in large sections (photo below). This is called knife-edging because the mineral and adhesive, separated from the backing, form knife-like edges that dig into and mark the work.



Discs don't flex, they break. The adhesive and backing on a random-orbit sanding pad can crack if the disc is folded like ordinary sandpaper.

Adhesive bonds on modern sandpaper are almost exclusively urea- or phenolic-formaldehyde resins. Both are heat-resistant, waterproof and stiff. Hide glue is sometimes used in conjunction with a resin on paper sheets. It is not waterproof or heat-resistant, but hide glue is cheap and very flexible.

Aluminum oxide is a sharp and blocky mineral. It is the most common, all-purpose woodworking abrasive, and for good reason. It is the only abrasive mineral that fragments under the heat and pressure generated by sanding wood. This characteristic is called friability and is highly desirable. As you sand, aluminum oxide renews its cutting edges constantly, staying sharp and cutting much longer than other minerals.



Trade names: Adalox, Aloxite, Imperial, Metalite, Production, Three-M-ite

Aluminum oxide is also a relatively tough abrasive, which means that its edges won't dull much before they fragment. Its friability and toughness make aluminum oxide the longest lasting and the most economical mineral.

All aluminum oxides are not created equal. 3M alone manufactures 26 different kinds, ranging greatly in toughness and friability. The toughest grades are nearly white in their raw form and are used on premium-grade sandpapers. The softest grades are dark brown and more appropriate for sandblasting than sanding. Some cheap sandpapers have blast-grade aluminum oxide on them. No manufacturer is going to tell you which kind is on which sandpaper, however, and it's impossible to judge by the color of the sandpaper because a size coat covers and colors the mineral. If one brand's aluminum-oxide paper doesn't work well, don't judge all aluminum oxides by it. Simply try another.

Silicon carbide is black and iridescent, and the grains are shard-shaped (photo below). Unlike aluminum oxide, there is only one kind of silicon carbide. It is harder and sharper than

most aluminum oxides, making it the better choice for cutting hard materials, such as finishes, paint, plastic and metal. Consequently, you'll probably find the widest range of silicon carbide sandpapers in a good auto-body supply store.



Abrasive grains are little sawteeth. This is 24-grit silicon carbide sandpaper before a size coat has been applied. It is easy to see how sharp the particles are.

Silicon carbide sandpapers for woodworking are almost always on waterproof paper and intended for sanding finishes. Though silicon carbide is a friable mineral, it is so hard that sanding wood will not cause it to fragment and renew its cutting edges. Though it will sand faster at first, it will dull more quickly than aluminum oxide. It is also generally more expensive than aluminum oxide.



Trade names: Durite, Tri-M-ite, Fastcut, Powerkut, Wet-or-dry

Ceramics come in a wide variety of shapes, from blocks and heavy wedges to flake-like shards. They're all more costly and less common than other abrasive minerals. All of them are very tough and very aggressive.



Trade names:
Norzon, Dynakut,
Regalite

Like silicon carbide, ceramics are not friable, and do not renew their cutting edges when sanding wood. But they don't dull as quickly because of their extreme toughness. This makes them the best choice for hogging off stock, roughing out shapes, removing finish and leveling uneven boards. For this reason, they are generally available only in coarse-grit cloth belts for stationary and portable sanders.

Ceramic mineral names and the trade names they're sold under are not easy to sort out. Though Cubitron sounds like a trade name, it's a ceramic mineral. One of its trade names is Cubicut. When mixed with aluminum oxide, it's sold as Regalite. Alumina zirconia is the name of a ceramic mineral. Sometimes it's marketed as aluminum zirconia, as if it were another type of mineral. It's also sold under the trade names Norzon and AZ as a ceramic mineral.

Abrasive manufacturers make these names intentionally confusing to avoid losing their copyrights. If a trade name becomes synonymous with the product in the public's mind (think of a thermos), then any company can use it.

Garnet is the only natural abrasive mineral still widely used for woodworking. Like aluminum oxide, it is blocky in shape. Unlike aluminum oxide, it is non-friable, not very tough and dulls very quickly. This is not necessarily a defect. The softer cut of a garnet paper, though slow, will produce the smoothest finish of all the abrasives within a given grit size. Because it is so soft, garnet will not leave pigtail-like scratches the way an aluminum oxide will when used on a random-orbit sander. This makes it well-suited for final sanding of wood surfaces.



Trade names:
None

Garnet is an excellent choice for final sanding end grain and blotch-prone wood. Garnet's peculiar tendency to burnish wood--close off pores--makes a stain penetrate far more evenly though less deeply.



Pigmented stain prefers a garnet-sanded surface. Both sides of this test board were sanded to 150-grit, the left with an aluminum-oxide paper and the right with a garnet paper.