HOW-TO BOOKLET # 3102

SANDING ABRASIVES

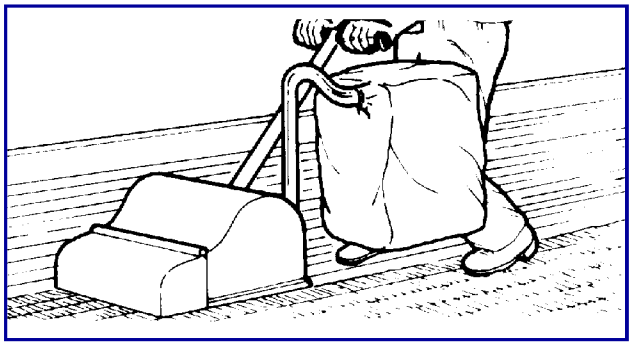
TOOL & MATERIAL CHECKLIST

- ❑ Abrasive Selection
- ❑ Sanding Block
- ❑ Power Sanding Equipment
- ❑ Sanding Sealer
- ❑ Tack Rag
- ❑ Vacuum Cleaner
- ❑ Wiping Cloths

Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in The Basics Listed Above

Sandpaper is an abrasive, but not all abrasives are sandpaper. For example, there's steel wool, glass, pumice, rottenstone—each product manufactured or innovated for a special smoothing job on wood, metal, plastic, glass, ceramic, and even concrete.

Before you apply a finish on most projects—and some that are not finished—you will have to smooth the surface by sanding. Knowing what sanding product to use and how to use it can save you plenty of time and money, and that's what this How-To Booklet is all about.



TYPES OF SANDPAPER

The term *sandpaper* is used to describe a variety of sheet abrasives. Among the most common are flint, garnet, emery, aluminum oxide, and silicon carbide. The abrasive particles may be mounted on paper or cloth, in "open-coat" or "closed-coat" density.

Flint. This is the least expensive sandpaper that you can buy. Flint is a gray mineral. Flint paper wears down quickly and is used mainly in removing paint finishes. Because paint will clog the grit on the paper and reduce its usefulness before the paper is worn smooth, pieces have to be discarded frequently. Use an open-coat when removing finishes. The open-coat doesn't clog or "fill up" as quickly, and therefore, you get more sanding action for your money. Once the finish is off, you can use closed-coat flint paper for smoothing purposes, but it is recommended that for fine finishes another abrasive be used, as detailed below.

Garnet. The grit on garnet sandpaper is much harder than on flint paper and is more suitable for use in woodworking. The cost is slightly more than for flint paper, but the cost is not prohibitive.

Emery. This abrasive is recognized by its distinctive black color. It is widely used as a metal abrasive, although more recently developed abrasives may be more effective. Cost: moderate.

Aluminum Oxide. This probably is the most popular sandpaper abrasive for fine woodworking and furniture finishing. It is also the best choice for power sanding. The oxide is reddish in color, and its grit is very sharp and much harder than flint, garnet, and emery. While it is popular for use on wood, it also can be used on metal surfaces. Aluminum oxide is more expensive than other abrasive paper, but it lasts so long that it usually is cheaper to use in the long haul.

Silicon Carbide. This is the hardest, sharpest sandpaper of all. The bluish-black material cuts extremely well and is commonly used for such tough jobs as finishing metal or glass, and for sanding hardwood floors before finishing/refinishing.

SANDPAPER CLASSIFICATIONS

Apart from the type of material that gives sandpaper its abrasive quality, there are other characteristics that affect the performance of abrasives.

There is a paper for any job from the roughest stripping to the most delicate finishing. The following are the basic classifications of sandpaper.

Grit. The grit—the particles that are glued to the backing material—are identified by the number of the labeling systems. There is a Retail System that carries word descriptions (coarse, medium, fine). The Old System identified papers by numbers that run from 10/0 to 4 to reflect increasing coarseness. The currently used industrial system identifies grit with numbers from 600 down through 16. In the industrial system, the grit specified is coarser as the numbers become smaller (see chart).

ABRASIVE PAPERS

Grade (Industrial system)	Grit (Old system)	Description (Retail system)	Use
16	4	very coarse	very rough work; unplaned wood;
20	3 1/2	very coarse	initial machine
24	3	very coarse	sanding of floors
30	2 1/2	coarse	initial sanding when necessary
36	2	coarse	
40	1 1/2	coarse	
50	1	coarse	
60	1/2	medium	intermediate sanding especially of
80	1/0	medium	softwoods
100	2/0	medium	
120	3/0	fine	preparatory sanding of
150	4/0	fine	hardwoods; final smoothing
180	5/0	fine	especially of softwoods
220	6/0	very fine	final sanding; sanding between
240	7/0	very fine	finish coats
280	8/0	very fine	
320	9/0	extra fine	sanding between finish coats;
360		extra fine	smoothing the final
400	10/0	extra fine	coat of finish
500		super fine	sanding metal, plastic,
600		super fine	ceramics

Density. Another factor that affects the way sandpaper functions is the density of the grit—that is, how close together the granules are on the backing. There are two classifications: closed-coat and open-coat. Closed-coat indicates that the grit material blankets 100 percent of the surface while open-coat indicates that the grit covers from 50 to 70 percent of the surface. Open-coat may not look very "open" especially when the abrasive is a fine density. The backing looks "full" of grit.

As a rule of thumb, closed-coat sandpapers are designed for fine finishing.

Closed-coat paper tends to clog quickly. Wood particles are caught and fill the spaces between the pieces of grit. Because open-coat sandpapers do not clog as easily they are a better choice when you do a first sanding to remove a lot of material from the wood. The usable life and cutting action of any sandpaper can be extended and improved by rapping the paper on a hard surface from time to time to dislodge wood particles or by cleaning the paper with an old toothbrush or stiff scrub brush.

Adhesives. The grit is held to the backing on sandpaper by any one of a variety of glues.

Hide glue is used on sandpapers intended for light to medium work. Hide glue is not waterproof, so the paper cannot be used on a wet surface.

Thermo-setting resin is used to secure grit on papers where the work is harder, such as floor sanding. Waterproof resin bonds grit to backings that are waterproof. Such glue allows the paper to be used with oil or water for extra fine and smooth finishing purposes.

Weight and Backing. The backing of the sandpaper may range from paper or cloth to a combination of cloth and paper or even a plastic material. The paper comes in various weights, which lend certain advantages or disadvantages.

"A" weight paper is the lightest of all and the first to wear through. Use it only for lightly touching up wood prior to finishing it.

Moving up the scale, "C" weight is stiffer and stronger than "A" weight and it is used for coarse machine sanding. "D" weight is even stronger and is for heavy machine sanding. "E" weight is to be used with floor sanding machines or belt sanders.

In cloth backings, the weights are "J" weight and "X" weight. "J" weight is the lighter of the two and is used on curves and other shapes. The "X" weight cloth is designed for coarse grit abrasives used with a belt sander. Fiber weight backings are very heavy and are usually not needed by the do-it-yourselfer.

OTHER ABRASIVE PRODUCTS

There are two powdered stone abrasives commonly used in fine finishing. These abrasives are applied with an oil. Depending on the situation, you may mix the powdered stone with lubricating oil and apply with a cloth, or you may dip the cloth in the oil and then the stone before applying it.

Pumice. This is a lava. The stone is porous and relatively soft. When pumice is crushed to a powder, the stone is a medium to fine abrasive.

Rottenstone. This is decomposed limestone, a form of sedimentary rock. The material crushes to a very fine abrasive powder. Applied with oil, rottenstone is used to create a smooth finish to projects such as furniture.

Either pumice or rottenstone may be used to create the glassy finish of a French polish.

STEEL WOOL ABRASIVE

Steel wool is also used for smoothing wood. Like sandpaper, it comes in a variety of grades. Each has a number and name description.

Specially-packaged steel wool for furniture finishing costs more than the regular stuff and you will know it by price. The reason for the cost is that the steel wool has been degreased.

0000. This is the finest grade of steel wool usually available. It creates a satin-smooth finish on fine woods. It is used for such jobs as rubbing down shellacs, lacquers, varnishes, waxes, and oils. It also is used for cleaning delicate tools.

000 Extra Fine. This is used for both cabinet work and auto finishing as well as to remove minor cracks or checks and burn marks in a finish. The grade performs well in removing paint spots and splatters. It is also the grade used to polish metal.

00 Fine. This grade is used to cut gloss finishes of paint to a semi-gloss. It is also desirable for cleaning and polishing wood floors, plastic tile, and terrazzo. A varnish remover is applied with 00 fine steel wool to remove old finishes.

0 Medium/Fine. This grade is not widely used in woodworking. It is primarily used for cleaning aluminum, copper, brass, or zinc and many metal objects around your home such as barbecues, pots and pans, and for removing rust and corrosion.

1 Medium. Use this grade to prepare wood for a first coat of paint. It is also used with soap and water to clean various flooring materials such as rubber, asphalt, linoleum, and resilient floors.

2 Medium Coarse. This grade is used to clean rust and dirt from garden tools, glass, brick, metal, and stone. It is not often used on wood.

3 Coarse. This grade is used to remove old paint and varnish. After the remover has caused the paint or varnish to liquify, 3 coarse steel wool can be rubbed over the surface to loosen the remaining paint. The steel wool fibers will clog quickly.

SANDING BY HAND

For most woodworking projects, hand sanding is the technique to use because the results can be controlled better. Also, hand sanding is unquestionably safer than machine-sanding.

The object of sanding, of course, is to smooth the surface—wood or metal—or remove old finish to a smooth surface. The final character of the smooth surface will be dictated by the finish chosen so there is some variation in final smoothness from job to job. If you plan to paint the piece with enamel, you do not have to sand as smoothly as you would if you were going to use a clear finish. The enamel finish will be glasslike as long as the sanding is reasonably smooth and the paint is applied with careful brush work. A clear finish requires an extremely smooth surface for a high-quality surface.

Using a Sanding Block. You will undoubtedly get a smoother finish and find the job easier if you use a sanding block when you sand a flat surface. There are commercially made sanding blocks available and the cost is not prohibitive. Or, you can make a sanding block from a piece of wood.

If you are sanding a curved surface, glue felt or foam rubber around a piece of dowel or a broomstick and wrap sandpaper over it. This tool will help smooth inward curves.

POWER SANDING TOOLS

Although hand sanding is primary to fine woodworking and other projects, there are some jobs that may be done by machine. There are basically three kinds of sanding machines: disc, belt, and the finishing sander. The first two have very limited use, if at all, for fine wood finishing.

For fine woodwork, the finishing sander is the tool to use. This sander uses a rectangular pad and precut pieces of sandpaper. The action of the sander is either straight line (back and forth) or orbital. Most finishing sanders are orbital. However, some are made with both actions. A combination pattern sander has a lever that permits you to use either straight-line or orbital sanding action.

All of these machines, like most portable power tools, are available with all-plastic housings. They are double-insulated to guard against electrical shock. Many models also come with dustbags and vacuum action. This feature reduces the irritation and mess of sawdust in the air.

The straight-line action of a finishing sander is slow, but it produces a smoother finish than the orbital action. Although the orbital does go against the grain in its round-and-round action, many workers end up satisfied with the smoothness of the finish that it produces.

The secret of using a finishing sander is not to press down on the sander. Let the weight of the tool do the work. If on a vertical surface, apply only a small amount of pressure. Easy does it.

BASIC SANDING PROCEDURES

Always start a sanding job with the smoothest usable grade of adhesive. If you start with material that is coarser than needed, the paper will cut small grooves in the surface. The grooves will have to be removed in subsequent sandings. This means more work for you and less chance of a complete success in the finished project. To prepare bare wood, follow the steps below to achieve a smooth surface suitable for a clear finish.

1. Start sanding with a 220 or 280 paper. If the wood is softwood, use a 220 paper. If the wood is hardwood, use a 280 or finer paper.

   Always sand with the grain of the wood. Wipe the dust off the surface regularly, and use a tack rag to get the wood clean of all loose dust and grit.

   Keep sanding until the surface is as smooth as you want it. If you intend to paint the surface with enamel, the smoothness achieved with a 150 paper is plenty good enough.

2. At some point, you will figure that the wood is about as smooth as it's going to get.

   At this point, raise the grain. First, wipe away all dust with a dry, lint-free cloth. Then soak a clean cloth in water, wring it out, and dampen the sanded surfaces. Let the wood dry at least 24 hours.

   Run your hand over the wood. If you feel a fine fuzz, the water has expanded the wood and the grain has been raised. Rub the surface gently with a fine sandpaper to take off the "whiskers." Repeat this procedure, if needed, and keep repeating it until no grain is raised.

3. You may achieve an even smoother finish by using a sanding sealer.

   These sealers are available in the Paint Department of home center, hardware, building material, and specialty paint stores. The sealers come with instructions for application.

   The sealers also are used over wood filler material so that after wood is filled, application of a final clear finish does not lift the filler. It also is used over raw wood to prevent excessive absorption of stain.

ALL ABOUT WOOD FILLERS

Open-grained woods are often treated with wood filler to create a super-smooth surface before finishing. Oak, ash, walnut, beech, elm, teak, and rosewood may be so open-grained and porous that filing is mandatory for a satisfactory finish.

Fine-grained woods—pine, fir, cedar, maple, redwood, cypress—are seldom filled.

Wood fillers are available in paste and liquid form. Paste fillers are composed of inert stones dissolved in pure linseed oil and are best for open-grained woods. They are available in almost any wood tone and can be mixed with oil colors to match the wood to which they are being applied exactly. Read the label for thinning instructions.

Usually, the paste is thinned with turpentine, benzine, or paint thinner to the consistency of heavy cream—just enough so that it can be brushed on easily. The surface to be filled should be wiped clean with a lint-free cloth and lightly dampened with the thinner. Apply the filler with a brush, working it along the grain so that every wood pore is penetrated.

When the entire surface has been covered, allow the filler to almost dry on the surface, usually about 10 to 15 minutes. The surface should appear cloudy. With a pad of burlap, rub the surface across the grain to force the filler firmly into the wood and remove any excess. When all traces of the filler have disappeared from the surface, use a clean, soft cloth for final rubbing along the grain. Let the filler dry for 24 to 48 hours, then sand lightly with very fine abrasive paper—220 or 240. Dust the surface thoroughly.

Liquid fillers are used to fill fine-grained woods. These usually have a base of varnish or lacquer, with relatively little solid matter.

The filler is brushed along the grain onto the wood surface. After it dries completely, the surface is sanded with fine (150 to 180), then very fine (220 to 240) abrasive paper. If some wood pores remain unfilled, apply a second coat of filler, allow it to dry, and then sand the surface smooth.

HARD MATERIAL ABRASIVES

Concrete bricks, concrete blocks, ceramic tile, and other hard materials may be smoothed with abrasive "stones" made especially for these materials. The "stones" look like porous gray brickbats with handles. To use this tool you simply rub it over the material to be smoothed. It will not handle uneven concrete and brick surfaces, however. But the stone will cut away concrete debris splatters and even out rough edges on fractured tile. If concrete is not too uneven, a coarse abrasive on a machine such as a floor, disc, or belt sander sometimes works. Use an open-coat abrasive for this smoothing job.