"True Grit"

Scotch-Brite Pads & Sheets, Steel Wool and Sandpaper Relationships

Fine, Extra Fine, Coarse, Medium-Coarse, Super Fine, Very Fine . . . the list of adjectives defining grit is a moveable feast. Nomenclature varies depending on product, manufacturer, medium, phase of the moon and chicken entrails. Enter into the fray differing measurement systems for grading and it becomes a real challenge to know exactly what you're getting. The "Rosetta Stone" in all of this is the micron; it deciphers the hieroglyphics of scotch-brite pads, steel wool, and sandpaper.

There are three measurements systems for grading:

1. CAMI: Coated Abrasives Manufacturers Institute (US)
2. FEPA: Federation of European Producers Association (European)—"P-Scale"
3. Micron: Based on the physical size of the grit measured in Microns, e.g. 25 Microns = 0.025mm

FEPA standards are preferred because the tolerances are more exact than CAMI. The steel wool/Micron grades came from the web site of Global Material Technologies makers of Rhodes American steel wool. The Scotch-Brite/steel wool equivalencies came from *Scotch-Brite Hand Finishing Systems* from 3M. The P-Scale/Micron equivalencies came from a Fine Woodworking article entitled *Making Sense of Sandpaper,* as well as from woodturners.org (I have a newer source). This is how it all works through.

TRUE GRIT!

Fine Woodworking

Rhodes American

3M

Scotch-Brite Pads & Sheets, Number and Colour			Steel Wool Grade & Description	Microns	Sandpaper FEPA P-Scale*
Light Duty Cleansing Pad	7445	White	Abrasive is talc	1	NA
Wood Finishing Roll	7745	Gold	0000 (super fine)	25	P600+
Multi-Flex Abrasive Sheet	A ULF	Gold	0000 (super fine)	25	P600+
Multi-Flex Abrasive Sheet	S ULF	Gray	000 (extra fine)	35	P400
Ultra-Fine Hand Pad	7448	Gray	00 (very fine)	40	P360+
Multi-Flex Abrasive Sheet	A VFN	Dark Maroon	0 (fine)	50	P280-320
General Purpose Hand Pad	7447	Maroon	1 (medium)	60	P220-240
Production Hand Pad	8447	Maroon	2 (medium/coarse)	75	P180+
Blending Hand Pad	7446	Gray	3 (coarse)	90	P150+
Heavy Duty Hand Pad	7440	Tan	4 (extra coarse)	100	P120-150
	**			197	P80
				326	P50

* The + means the pad and steel wool is slightly finer than the P number identified. The range of two grits means the Micron rating is about in the middle. The P80 & P50 sandpaper references are there simply for reference.
** The "A" is Aluminum Oxide; the "S" is Silicon Carbide.

So there we go. For you research buffs the supporting documents are attached. The Fine Woodworking article on selecting sandpaper is great and has a good section on abrasive types and their trade names. I have since found a good corroborating source for microns|sandpaper that I'll include later.

Scotch-Brite™

Hand Finishing Systems

Widest choice of hand pads for cleaning, scuffing, deburring, finishing, and other surface conditioning applications

3M *Innovation*

Scotch-Brite™ Light Duty Cleansing Pad 7445 (white)

- Very mild abrasive for gentle, yet thorough cleaning
- Commonly used with liquid detergent

Scotch-Brite™ Wood Finishing Roll 7745 (gold)

- Ideal for top coat rubbing, sealer sanding prior to lacquer, and defuzzing or denibbing wood
- Provides similar performance as steel wool grade 0000

Scotch-Brite™ Ultra-Fine Hand Pad 7448 (gray)

- Ultra-fine consistent finishes on metals, woods, plastics, and composites
- Provides similar performance as steel wool grade 00

Scotch-Brite™ General Purpose Hand Pad 7447 (maroon)

- Standard for surface conditioning worldwide
- Clean, blend, finish, and deburr faster, easier, and with better results than conventional abrasives
- Provides similar performance as steel wool grade 1

Scotch-Brite™ Production Hand Pad 8447 (maroon)

- High cut for paint preparation, blending, and scuffing
- Long life performance on aluminum, stainless steel, plastics, wood, and fiberglass
- Provides similar performance as steel wool grade 2

Scotch-Brite™ Blending Hand Pad 7446 (gray)

- Specially designed for hand blending and finishing stainless steel
- Mineral coarseness blends surface scratches on many metals, wood, and synthetic surfaces
- Provides similar performance as steel wool grade 3

Scotch-Brite™ Heavy Duty Hand Pad 7440 (tan)

- Most durable and aggressive pad for quick stock removal
- Cuts fast to remove contaminants and oxides in the most demanding cleaning and finishing applications
- Provides similar performance as steel wool grade 4

Less Aggressive = Finer Finish

More Aggressive = Coarser Finish

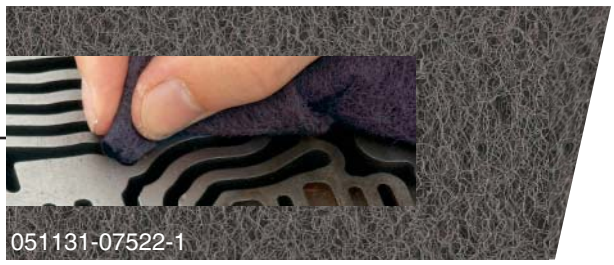
Multi-Flex Sheets — Highly Conformable Finishing

Scotch-Brite™ Multi-Flex Abrasive Sheet A ULF (gold)

- Ultra flexible and conformable abrasive for cleaning or fine finishing
- Provides similar performance as steel wool grade 0000

Scotch-Brite™ Multi-Flex Abrasive Sheet S ULF (gray)

- Highly conformable abrasive with silicon carbide mineral for exceptional finishes on wood and metal
- Provides similar performance as steel wool grade 000



Scotch-Brite™ Multi-Flex Abrasive Sheet A VFN (dark maroon)

- Highly conformable abrasive with high cut for paint preparation and wood finishes without dumping edges
- Provides similar performance as steel wool grade 0

Scotch-Brite™ Clean & Finish Rolls

- Flexible web for finishing, blending and polishing
- Conformable for access to hard-to-reach areas
- Can be cut to desired length for hand sanding or oscillating sanders

Scotch-Brite™ Scrubbing Sponge 74 (Green)

- Highly conformable web laminate to a sponge backing
- Ideal for general purpose cleaning

Multi-purpose Trial Pack

An easy, inexpensive way to see how the many Scotch-Brite™ Hand Pads outperform steel wool, wire brushes, and other non-woven hand pads. The trial pack includes one each of the following:

- Scrubbing Sponge 74
- Light Duty Pad 6448
- Heavy Duty Pad 7440
- Light Duty Cleansing Pad 7445
- Blending Pad 7446
- General Purpose Pad 7447
- Ultra-Fine Pad 7448
- Production Pad 8447
- Twist-Lok™ Pad Holder 961

Scotch-Brite™ Product Ordering Information

Description	UPC	Color	Grade	Inner Quantity	Case Quantity
Light Duty Cleansing Pad 7445	048011-16976-7	white	—	20/box	3 boxes/case
Ultra-Fine Hand Pad 7448	048011-04028-8	gray	S ULF	20/box	3 boxes/case
General Purpose Hand Pad 7447	048011-04029-5	maroon	A VFN	20/box	3 boxes/case
Production Hand Pad 8447	048011-24037-4	maroon	A VFN	20/box	3 boxes/case
Blending Hand Pad 7446	048011-04051-6	gray	S MED	10/box	4 boxes/case
Heavy Duty Hand Pad 7440	048011-04050-9	tan	A MED	10/box	4 boxes/case
Multi-Flex Abrasive Sheet	051131-07521-4	dark maroon	A VFN	60 sheets/roll	4 rolls/case
	051131-07522-1	gray	S ULF	60 sheets/roll	4 rolls/case
	051131-07523-8	gold	A ULF	60 sheets/roll	4 rolls/case
Wood Finishing Roll 7745	051131-07745-4	gold	—	4.75 in x 15 ft/roll	4 rolls/case
Clean & Finish Roll	048011-00264-4	maroon	A MED	4 in x 30 ft/roll	3 rolls/case
	048011-00265-1	maroon	A FIN	4 in x 30 ft/roll	3 rolls/case
	048011-00266-8	maroon	A VFN	4 in x 30 ft/roll	3 rolls/case
	048011-00270-5	gray	S VFN	4 in x 30 ft/roll	3 rolls/case
	048011-00274-3	maroon	A MED	6 in x 30 ft/roll	2 rolls/case
	048011-00275-0	maroon	A FIN	6 in x 30 ft/roll	2 rolls/case
	048011-00276-7	maroon	A VFN	6 in x 30 ft/roll	2 rolls/case
Scrubbing Sponge 74	048011-20688-7	green	—	—	20/case
Hand Pad Trial Pack 961S	048011-17144-9	—	—	—	5 packs
Twist-Lok™ Pad Holder 961	048011-09493-9	—	—	—	10/case

Product Use: All statements, technical information and recommendations contained in this document are based upon tests or experience that 3M believes are reliable. However, many factors beyond 3M's control can affect the use and performance of a 3M product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

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3M

Industrial Business

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St. Paul, MN 55106

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Industrial Products

October 25, 2003
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Steel Wool

Pricing

Product Brochure

The term Metal Wool refers to a family of pro
careful shaving of wire into a mass of strands

The term Metal Wool refers to a family of pro
careful shaving of wire into a mass of strands
Metal wool shaved from plain steel wire is ca
varying the shaving process, the size or thick
strands can be varied. This allows for the sep
products by fiber thickness into eight categor

BENEFITS:
Steel wool possesses many properties that m
a wide range of different applications.

• Gentle Abrasiveness - Unlike sandpaper an
abrasives that scratch away material with sha
fibers perform like thousands of tiny planes o
a smoother surface after sanding and a bette

• High Aspect Ratio - The shaving of wire into
economical method to produce fine metal fibe
many chemical and physical properties that r
various applications including thermal manag
reactions, electrochemistry, and composite re

• Design Flexibility - Metal wool can be efficie
many forms that allow easy integration into fi
chopping into low aspect ratio fibers for frictio
textile-like metal fiber fabrics, metal wool is th
many OEM applications.

MATERIAL:
Steel wool is made from a low carbon steel a
formulated for steel wool manufacture. The c
available upon request.

FORMAT:
The standard format for steel wool in bulk is t
of metal wool approximately 1/2" thick by 4" v
3/8" ID fiber core to an outside diameter of ab
exactly 5 pounds net. The web is approximat
reels (30 pounds) net weight per case.

PRICING

AVERAGE FIBER WIDTH 5 POUND REELS

GRADE	DESCRIPTION	MILLIMETERS
0000	Super Fine	25 microns (0.025mm)
000	Extra Fine	35 microns (0.035mm)
00	Very Fine	40 microns (0.04mm
0	Fine	50 microns (0.05mm
1	Medium	60 microns (0.06mm
2	Medium Coarse	75 microns (0.075mm)
3	Coarse	90 microns (0.09mm
4	Extra Coarse	100 microns (0.10mm)

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From the pages of *Fine Woodworking* Magazine

Making Sense of Sandpaper

Knowing how it works is the first step in choosing the right abrasive

by Strother Purdy

Years ago at a garage sale, I bought a pile of no-name sandpaper for just pennies a sheet. I got it home. I sanded with it, but nothing came off the wood. Sanding harder, the grit came off the paper. It didn't even burn very well in my wood stove.

Sanding is necessary drudge work, improved only by spending less time doing it. As I learned, you can't go right buying cheap stuff, but it's still easy to go wrong with the best sandpaper that's available. Not long ago, for example, I tried to take the finish off some maple flooring. Even though I was armed with premium-grade, 50-grit aluminum-oxide belts, the work took far too long. It wasn't that the belts were bad. I was simply using the wrong abrasive for the job. A 36-grit ceramic belt would have cut my sanding time substantially.

The key to choosing the right sandpaper is knowing how the many different kinds of sandpaper work. Each component, not just the grit, contributes to the sandpaper's performance, determining how quickly it works, how long it lasts and how smooth the results will be. If you know how the components work together, you'll be able to choose your sandpaper wisely, and use it efficiently. Then you won't waste time sanding or end up burning the stuff in your wood stove.

Sandpaper is a cutting tool

What sandpaper does to wood is really no different from what a saw, a plane or a chisel does. They all have sharp points or edges that cut wood fibers. Sandpaper's cutting is simply on a much smaller scale. The only substantial difference between sandpaper and other cutting tools is that sandpaper can't be sharpened.

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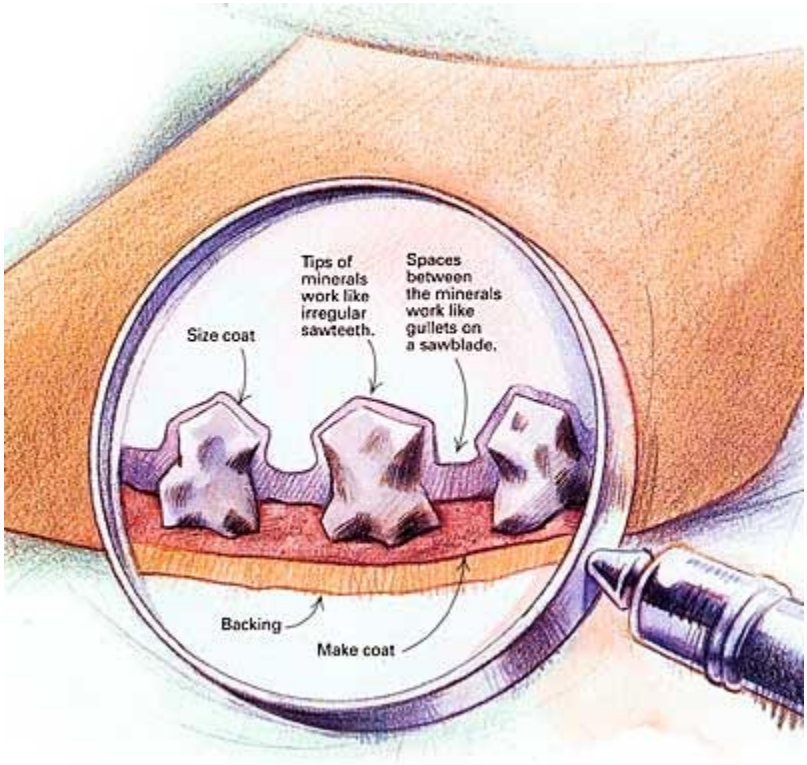
Clubs
Knots Discussion
Events



Sandpaper is made of abrasive minerals, adhesive and a cloth, paper or polyester backing. The abrasive minerals are bonded to the backing by two coats of adhesive; first the make coat bonds them to the backing; then the size coat locks them in position.

Look at sandpaper up close, and you'll see that the sharp tips of the abrasive grains look like small, irregularly shaped sawteeth . The grains are supported by a cloth or paper backing and two adhesive bonds, much the way that sawteeth are supported by the sawblade. As sandpaper is pushed across wood, the abrasive grains dig into the surface and cut out minute shavings, which are called swarf in industry jargon. To the naked eye, these shavings look like fine dust. Magnified, they look like the shavings produced by saws or other cutting tools.

Even the spaces between the abrasive grains serve an important role. They work the way gullets on sawblades do, giving the shavings a place to go. This is why sandpaper designed for wood has what's called an open coat, where only 40% to 70% of the backing is covered with abrasive. The spaces in an open coat are hard to see in fine grits but are very obvious in coarse grades.

Closed-coat sandpaper, where the backing is entirely covered with abrasive, is not appropriate for sanding wood because the swarf has no place to go and quickly clogs the paper. Closed-coat sandpaper is more appropriate on other materials such as steel and glass because the particles of swarf are much smaller.

Some sandpaper is advertised as non-loading, or stearated. These papers are covered with a substance called zinc stearate -- soap, really -- which helps keep the sandpaper from clogging with swarf. Stearated papers are only useful for sanding finishes and resinous woods. Wood resin and most finishes will become molten from the heat generated by sanding, even hand-sanding. In this state, these

substances are very sticky, and given the chance, they will firmly glue themselves to the sandpaper. Stearates work by attaching to the molten swarf, making it slippery, not sticky, and preventing it from bonding to the sandpaper.

Methods for sanding efficiently

Sanding a rough surface smooth in preparation for a finish seems a pretty straightforward proposition. For a board fresh out of the planer, woodworkers know to start with a coarse paper, perhaps 80-grit or 100-grit, and progress incrementally without skipping a grade up to the finer grits. At each step, you simply erase the scratches you made previously with finer and smaller scratches until, at 180-grit or 220-grit, the scratches are too small to see or feel. But there are a fair number of opinions on how to do this most efficiently.

Don't skip grits, usually -- Skipping a grit to save time and sandpaper is a common temptation, but not a good idea when working with hardwoods. You can remove the scratches left by 120-grit sandpaper with 180-grit, but it will take you far more work than if you use 150-grit first. You will also wear out more 180-grit sandpaper, so you don't really save any materials. When sanding maple, for instance, skipping two grits between 80 and 180 will probably double the total sanding time. This, however, is not as true with woods such as pine. Soft woods take much less work overall to sand smooth. Skipping a grit will increase the work negligibly and may save you some materials.

Sand bare wood to 180- or 220-grit -- For sanding bare wood, 180-grit will generally give you a surface that looks and feels perfectly smooth and is ready for a finish of some kind. Sanding the surface with a finer grit is only necessary if you're going to use a water-based finish. These finishes will pick up and telegraph the smallest scratches. Sanding the wood to 220-grit or finer will prepare the surface better. However, it's not always wise to sand to a finer grit. You will waste your time if you can't tell the difference, and you may create problems in finishing. Maple sanded to 400-grit will not take a pigmented stain, for example. Pigments work by lodging themselves into nooks and crannies on the surface; without them, they will have no place to stick.

Sand faster across the grain -- How many times have you been told never to sand across the grain? True enough. The scratches are much more obvious, look terrible and are hard to remove with the next finer grit. But what holds true for planing wood is also true for sanding. You will plane and sand faster and more easily when the direction of your cuts is between 45° and 60° to the grain, because the wood-fiber bundles offer the least resistance to the cutting edges. Cross-grain scratches are harder to remove simply because they are deeper.

Use a combination of cross-grain and with-grain sanding to get the smoothest surface in the fastest manner. First make passes at 45° to 60° to both the left and the right, making an X-pattern on the workpiece. Then, with the same grit, sand with the grain to remove the cross-grain scratches. Do this with each grit when belt-sanding and hand-sanding. The non-linear sanding action of random-orbit and orbital sanders can't take advantage of the wood's grain properties. When I use my orbital, I just sand with the grain.

Choosing from the four abrasive minerals

Four common abrasive minerals are aluminum oxide, silicon carbide, ceramics and garnet (see Four abrasive minerals). Except for garnet, they are all manufactured, designed if you will, for different cutting properties. Harder and sharper minerals cut deeper scratches and, consequently, sand the wood faster. But these deep scratches leave a coarse finish, whether you sand with or across the grain.

Softer minerals within the same grit size will cut far more slowly but leave a smoother finish. For example, if you sand a board on one side with a 120-grit ceramic, the hardest abrasive mineral, and the other side with 120-grit garnet, the softest, you will be able to feel a distinct difference between the surfaces. It will seem as if you sanded the two sides with different grit sizes.

It's easy to rate each mineral's hardness and sharpness, but it's not as simple to prescribe specific uses beyond generalizations. There are many other factors that influence the appropriateness of a sandpaper for a job.

Some fine points about grading scales

If you don't mind that we have two measurement systems, the U.S. Customary (foot, gallon) and the International (meter, liter), then you won't mind that we have three major abrasive grit-grading systems. In North America, the Coated Abrasives Manufacturers Institute (CAMI) regulates the U.S. Standard Scale. CAMI-graded sandpapers simply have numbers, such as 320, printed on them. The Europeans have the P-scale, regulated by the Federation of European Producers Association (FEPA). These abrasives are identifiable by the letter P in front of the grit size, such as P320. Finally, to make sure everyone is really confused, there is a totally different micron grading system. This system is identified by the Greek letter mu, as in 30µ.

The three systems grade particle size to different tolerances but by the same methods. From the coarsest grits up to about 220, particles are graded through a series of wire mesh screens. The smaller grit sizes are graded through an air- or water-flotation process that separates particles by weight.

The chart is helpful in comparing grits of the three grading systems, but it doesn't tell the whole story. Abrasives on the P-scale are graded to tighter tolerances than CAMI-graded abrasives. This means that the CAMI-scale tolerates a wider range of grain sizes within the definition of 180-grit than the P-scale. Tolerances are even tighter for micron grading. P-graded and micron-graded abrasives give more consistent cuts with fewer stray scratches from outsized minerals.

Micron-graded abrasives on polyester films are about three times as expensive as paper products and probably not worth it for sanding wood. I have a hard time telling the difference between wood sanded with a 100µ finishing film abrasive and standard 120-grit sandpaper. But for polishing a high-gloss finish, I find micron-graded abrasives make a substantial difference.

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.

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

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. 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.

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 adhesive and backing on a random-orbit sanding pad can crack if the disc is folded like ordinary sandpaper.

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. 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.

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.

When this article was written, Strother Purdy was an assistant editor of *Fine Woodworking.*

CLOSE WINDOW

Four abrasive minerals

Aluminum oxide, silicon carbide, ceramics, and garnet are the four major types of sandpaper on the market. Each has a different use in the shop and it's useful to know how these abrasives work.

Aluminum oxide

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

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.

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 sand- papers. 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

Silicon carbide is black and iridescent, and the grains are shard-shaped. 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.

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

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.

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.

Ceramics

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

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

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.

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.

CLOSE WINDOW

CLOSE WINDOW

Abrasive grading systems compared

The most common grading systems used in North America are CAMI, FEPA and micron grading. CAMI and FEPA are similar in grades up to about 220. Beyond that, they diverge greatly.

	CAMI (U.S. Std.)	**FEPA** (P-scale)	**Micron** (µ)
Finishing	1,200		5
	1,000		9
	800		
	600	1,200	15
	500	1,000	
	400	800	20
	360	600	
	320	500 400	30
	280	360	40
	240	320 280 240	45 50
Smoothing	220	220	60
	180	180	
	150		80
	120	150	100
	100	120	
			150

	80	100	180
Shaping		80 60	60
	50	50	
	40	40	
	36	36	
	30	30	
	24		
	20	24	
	16	20	

CLOSE WINDOW

Abrasive Grading Scales for Sandpaper

	CAMI (U.S. Std) (See Note 1)	FEPA (P-Scale) (See Note 2)	Finishing Scale	Average Grit Particle Size	
				Microns	Inches
FINISHING	1200				
	1000	P2000		9.6	0.00042
	800	P1500		12.3	0.00051
		P1200	A16	15.8	0.00060
	600			16.0	0.00062
		P1000		18.3	0.00071
	500			19.7	0.00077
		P800	A25	21.8	0.00085
	400		A30	23.6	0.00092
		P600	A35	25.8	0.00100
	360			28.8	0.00112
		P500		30.2	0.00018
		P400	A45	35.0	0.00137
	320			36.0	0.00140
		P360		40.5	0.00158
	280			44.0	0.00172
		P320	A60	46.2	0.00180
		P280		52.5	0.00204
SMOOTHING	240		A65	53.5	0.00209
		P240	A75	58.6	0.00228
		P220	A90	65.0	0.00254
	220			66.0	0.00257
	180	P180	A110	78.0	0.00304
	150		A130	93.0	0.00363
		P150		97.0	0.00378
	120			116.0	0.00452
		P120	A160	127.0	0.00495
	100			141.0	0.00550
		P100	A200	156.0	0.00608
	80			192.0	0.00749
		P80		197.0	0.00768
		P60		260.0	0.01014
ROUGHING	60			268.0	0.01045
		P50		326.0	0.01271
	50			351.0	0.01369
		P40		412.0	0.01601
	40			428.0	0.01669
		P36		524.0	0.02044
	36			535.0	0.02087
		P30		622.0	0.02426
	30			638.0	0.02488
	24			715.0	0.02789
		P24		740.0	0.02886

Notes:

1. CAMI = Coated Abrasives Manufacturers Institute (North America)
   (Allows a wide tolerance range of particle sizes within the definition of a particular grit)

2. FEPA = Federation of European Producers Association
   (More consistent sized grit particles than CAMI)

Sandpaper Backing Scale

Grade	Material	Weight
A	Paper	Lightest
C	Paper	
D	Paper	
E	Paper	
F	Paper	
J	Cloth	
X	Cloth	Heaviest