

# Coated Abrasive Basics

## How to Read a Coated Abrasive Specification

A coated abrasive product is made up of three basic raw materials: an *abrasive mineral*, the *backing* onto which the abrasive is applied, and an *adhesive bond*. The Carborundum Abrasives coated abrasive marking system includes both a generic and a technical marking.

The generic markings identify the abrasive type, bond, backing, and any special features and/or tradenames. An example would be: *Premier Red Aluminum Oxide Dri-Lube Resin Paper Open*.

The technical markings identify the actual components which make up the product. Technical markings consists of up to 10 parts. An example would be: *P400 B 0912 DO*. The following terminology explains the technical marking system.

## Coated Abrasive Terminology Key

GRADING	GRIT SIZE	BACKING WEIGHT	CLOTH TYPE	BACKING FLEXIBILITY	MINERAL (ABRASIVE)	BACKING	BOND	PERFORMANCE	COATING
P FEPA _ ANSI/CAMI	16 ↕ 2000	PAPER: A B C D E F	B POLY/ COTTON BLEND  C COTTON  P POLY- ESTER	F FLEXIBLE _ STANDARD	01 CROCUS 02 EMERY 03 GARNET 04 S/C (SILICON CARBIDE) 07 LBA (LIGHT BROWN A/O) 08 A/O (ALUMINUM OXIDE) 09 HT A/O (HEAT-TREATED) 11 ZA (ZIRCONIA ALUMINA) 12 ZA (PREMIUM) 25 CERAMIC ALUMINA	0 MESH 1 PAPER 4 FIBER  CLOTH: 5 MOST FLEXIBLE ↕ 8 LEAST FLEXIBLE	0 GLUE 1 U/G 2 U/U  FULL RESIN: 4 LEAST DURABLE ↕ 7 MOST DURABLE	A ANTI-STATIC  D DRI-LUBE OVERSIZE (ANTI-LOADING)  R REACTIVE OVERSIZE (COOLING, GRINDING AID)  W WASHABLE OR WATERPROOF	O OPEN COAT  _ CLOSED COAT
	CRS MED FINE MICRON	CLOTH: J X Y							
		M MESH V FIBRE							

## Abrasive Types

### EMERY (02)

Emery is a dark gray, round-shaped grain which tends to polish rather than abrade a work surface.

- for polishing and cleaning metal only

### GARNET (03)

Garnet is reddish brown in color. This natural abrasive is medium hard and relatively sharp, but not as durable as synthetic abrasives.

- for use on wood only
- particularly good for soft woods such as pine
- produces an excellent finish

### SILICON CARBIDE (04)

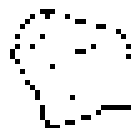
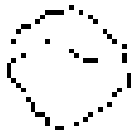
Silicon carbide is the hardest and sharpest of the manufactured abrasives. Because of its extreme sharpness, this bluish-black abrasive grain permits fast stock removal and cool cut.

- cast iron
- non-ferrous metals, i.e. brass, aluminum and bronze
- non-metallics, i.e. glass, rubber, plastic and stone
- final finish on wood and stainless steel
- abrasive planing particleboard

### LIGHT BROWN ALUMINUM OXIDE (07)

Light brown aluminum oxide is a tough, yet sharp, synthetic abrasive characterized by cool cut, long life and the ability to break down under pressure, producing new cutting edges.

- production wood sanding
- non-ferrous metal finishing



### BROWN ALUMINUM OXIDE (08)

Brown aluminum oxide is a tough, durable, synthetic abrasive characterized by the long life and wear resistance of its cutting edges. It offers enormous penetrating strength, even at high speeds.

- ferrous metals
- aluminum
- hardwood

### HEAT-TREATED ALUMINUM OXIDE (09)

Heat-treated aluminum oxide is a tough but cool cutting abrasive which gives both long life and freeness of cut on a wide range of materials.

- ferrous metals
- wood sanding

### ZIRCONIA ALUMINA (11, 12)

Zirconia alumina is an ultra-tough, synthetic abrasive which provides a free, cool cut for high stock removal applications. It is tougher and sharper than aluminum oxide. It has a micro-crystalline structure which allows for controlled breakdown and self-sharpening.

- heavy-duty snagging and grinding of all ferrous and non-ferrous metals
- abrasive planing of wood, plywood and particleboard
- grinding fiberglass, rubber and plastics

### CERAMIC ALUMINA (25)

The sub-micron structure of ceramic alumina allows each grain to continually expose sharp cutting points, resulting in a cooler cutting action and an extended life.

- all ferrous/non-ferrous metals, carbon steel and exotic alloys



## Grit Comparison Chart

AVERAGE PARTICLE SIZE IN MICRONS	GRADING SYSTEMS (OTHER THAN EMERY)			EMERY PRODUCTS
	CAMI	FEPA	JIS	
5.0	-	-	-	-
6.0	-	-	3000	-
6.5	1200	-	2500	4/0
8.4	-	P2500	-	-
8.5	-	-	2000	-
9.2	1000	-	-	3/0
10.3	-	P2000	-	-
10.5	-	-	1500	-
12.2	800	-	1200	-
12.6	-	P1500	-	-
15.0	-	-	-	-
15.3	-	P1200	1000	-
16.0	600	-	-	2/0
18.3	-	P1000	800	-
19.7	500	-	-	0
20.0	-	-	-	-
21.8	-	P800	-	-
23.6	400	-	600	-
25.0	-	-	-	-
25.75	-	P600	-	-
28.8	360	-	500	-
30.0	-	P500	-	-
35.0	-	P400	400	-
36.0	320	-	-	-
40.0	-	-	360	-
40.5	-	P360	-	-
44.0	280	-	-	1
45.0	-	-	-	-
46.2	-	P320	320	-
50.0	-	-	-	-
52.5	-	P280	280	-
53.5	240	-	-	-
55.0	-	-	-	-
58.5	-	P240	-	-
60.0	-	-	240	-
64.0	-	-	-	2
65.0	-	P220	220	-
66.0	220	-	-	-
78.0	180	P180	180	-
79.0	-	-	-	3
93.0	150	-	150	-
95.0	-	-	-	FINE
97.0	-	P150	-	-
116.0	120	-	120	-
127.0	-	P120	100	-
136.0	-	-	-	MEDIUM
141.0	100	-	-	-
156.0	-	P100	-	-
189.0	-	-	-	COARSE
192.0	80	-	80	-
197.0	-	P80	-	-
260.0	-	P60	-	-
268.0	60	-	60	-
326.0	-	P50	50	-
341.0	-	-	-	EX. COARSE
351.0	50	-	-	-
412.0	-	P40	40	-
428.0	40	-	-	-
524.0	-	P36	-	-
535.0	36	-	36	-
622.0	-	P30	-	-
638.0	30	-	30	-
715.0	24	-	-	-
740.0	-	P24	24	-
905.0	20	-	-	-
984.0	-	P20	20	-
1320.0	16	-	16	-
1324.0	-	P16	-	-
1764.0	-	P12	-	-
1842.0	12	-	-	-

## Backing Types

Backings are the base for the abrasive minerals and, combined with the adhesive bond, support and anchor the abrasive mineral. The backings used in the manufacture of coated abrasives are:

### PAPER

Paper is used for a variety of operations from hand sanding to mechanical sanding. It is the least expensive backing. Due to the fine surface of paper, a consistent finish is produced. Paper weights include *A, B, C, D, E* and *F* weights with *A* being the lightest and most flexible and *F* being the heaviest and least flexible. *A, B, C* and *D* weight papers are used for hand sanding and light mechanical operations in the form of sheets, *Grip-On* and *Stick-On* discs and *Stick-On* rolls. *E* and *F* weight papers are primarily used for more aggressive mechanical operations in the form of belts and discs.

### CLOTH

Cloth backings used for coated abrasives are identified by weight. Cloth backings are filled or "finished" with a variety of materials, glues or resins, to create various backing characteristics, most notably flexibility.

There are three basic weights of cloth: *J-weight* or "jeans" is the lightest and most flexible. *X-weight* or "drills" is a heavier cloth that ranges in flexibility, strength and durability and is used on the broadest range of applications. *Y-weight* is a heavyweight drills cloth used on heavy-duty, high stock removal operations. Several cloth types are used: cotton, polyester, and polyester/cotton blends.

### FIBER

Vulcanized fiber (cotton fibers which are chemically treated and then pressed under temperature and pressure to form a very durable backing) is used exclusively as the backing for resin fiber discs.

## Bond Types

An adhesive bond system is required to secure the abrasive mineral to the backing. All coated abrasive products are made with a two stage bonding process. The first layer of bond applied to the backing is called the *make coat*. The make coat provides the adhesive base between the abrasive mineral and the backing.

The second coat is the *size coat*, which is applied over the abrasive mineral and make coat to anchor the abrasive mineral and provide the desired physical strength of the finished product.

*Glue, urea resin, and phenolic resin* are the three basic bonding agents most commonly used. There are many size coat and make coat combinations, such as *glue over glue, urea over glue, and resin over resin*. *Glue over glue* is the most flexible bond while *resin over resin bond* is moisture-resistant, harder, less flexible, heat-resistant and has superior grain retention.

## Coating Types

There are two types of abrasive coatings used in the manufacturing of coated abrasives: *open coat* and *closed coat*.

### OPEN COAT

With an open coat, 50% to 75% of the coated abrasive surface is covered by abrasive grain. There are evenly spaced voids between the particles of grain, helping reduce the effect of loading caused by wood dust or metal particles.



OPEN COAT  
(1/3 LESS GRAIN THAN CLOSED COAT)

### CLOSED COAT

With a closed coat, the entire coated abrasive surface is covered with abrasive grain, with no voids between the particles. This is the most typical coating, permitting the greatest degree of stock removal and longest product life.



CLOSED COAT