How to Read a Bonded Abrasive Specification

Wheel Symbols and Markings

Carborundum abrasive wheels are marked according to the system which is standard throughout the industry. This standard marking system consists of six positions. The characters in each position denote a specific characteristic of the wheel.

Bonded Abrasive Terminology Key

Position 1 — AA — ABRASIVE

- **MEDALIST** - BLUE CERAMIC ALUMINA
- **MEDALIST R** - PURPLE CERAMIC ALUMINA
- **MZ** - CERAMIC ALUMINA/ZA BLEND
- **32AR** - GREY/PURPLE ALUMINUM OXIDE
- **A** - ALUMINUM OXIDE
- **AA** - WHITE ALUMINUM OXIDE
- **AR** - RUBY ALUMINUM OXIDE
- **AZ** - ZA/AO BLEND
- **BA** - ALUMINUM OXIDE
- **DA** - ALUMINUM OXIDE
- **GA** - ALUMINUM OXIDE
- **GRA** - GA/RA BLEND
- **PA** - PINK ALUMINUM OXIDE
- **RA** - PINK/PURPLE ALUMINUM OXIDE
- **C** - BLACK SILICON CARBIDE
- **CA** - BLACK SILICON CARBIDE
- **CGA** - ALUMINUM OXIDE/SILICON CARBIDE BLEND
- **GC** - GREEN SILICON CARBIDE
- **Z** - ZIRCONIA ALUMINA
- **ZA** - ZA/AO BLEND
- **2ZA** - ZA/GA BLEND
- **2ZC** - ZA/C BLEND
- **3AZA** - ZIRCONIA ALUMINA/ ALUMINUM OXIDE BLEND
- **3ZA** - ZIRCONIA ALUMINA/ALUMINUM OXIDE BLEND

Position 2 — 46 — GRIT SIZE

COARSE	MEDIUM	FINE
14	46	220
16	54	240
20	60	280
24	70	320
30	80	400
36	100	600
	120	800
	150	900

Position 3 — K — GRADE

E SOFT
F
G
H
I
J
K
L
M
N TO
O
P
Q
R
S
T
U
V
X
Y HARD

Position 4 — 8 — STRUCTURE

1 DENSE
2
3
4
5
6 TO
8
9
10
11
12 OPEN

Position 5 — V — BOND TYPE

- **V** - VITRIFIED
- B - RESINOID

Position 6 — 40 — BOND MODIFICATION

40
P = Porous

Wheel Speeds - Conversion Table

Example: Find the machine RPMs. This should be written on the machine itself. For this example, assume that the machine RPM is 1,773 and that the wheel diameter is 14".

- Find the diameter of 14" in either the left-most or right-most column of the chart.
- Follow the row horizontally to RPM of 1,773 as this is the spindle speed of the machine.
- Follow column directly upwards to find SFPM of 6,500.

	SURFACE SPEED IN FEET PER MINUTE (SFPM)																
	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500	9,000	9,500	10,000	12,000	12,500	14,200	16,000	
WHEEL	REVOLUTIONS PER MINUTE (RPM)																	WHEEL
1"	15,279	17,189	19,098	21,008	22,918	28,647	24,828	26,737	30,558	32,467	34,377	36,287	38,196	45,836	47,745	54,240	61,116	1"
2"	7,639	8,594	9,549	10,504	11,459	14,328	12,414	13,368	15,278	16,238	17,188	18,143	19,098	22,918	23,875	27,120	30,558	2"
3"	5,093	5,729	6,366	7,003	7,639	9,549	8,276	8,913	10,186	10,822	11,459	12,096	12,732	15,278	15,915	18,080	20,372	3"
4"	3,820	4,297	4,775	5,252	5,729	6,207	6,685	7,162	7,640	8,116	8,595	9,072	9,549	11,459	11,940	13,560	15,278	4"
5"	3,056	3,438	3,820	4,202	4,584	4,966	5,348	5,720	6,112	6,494	6,876	7,258	7,640	9,168	9,550	10,850	12,224	5"
6"	2,546	2,865	3,183	3,501	3,820	4,138	4,456	4,775	5,092	5,411	5,729	6,048	6,366	7,639	7,960	9,040	10,186	6"
7"	2,183	2,455	2,728	3,001	3,274	3,547	3,820	4,092	4,366	4,638	4,911	5,183	5,456	6,548	6,820	7,750	8,732	7"
8"	1,910	2,148	2,387	2,626	2,865	3,103	3,342	3,580	3,820	4,058	4,297	4,535	4,775	5,729	5,970	6,780	7,640	8"
9"	1,698	1,910	2,122	2,334	2,546	2,758	2,970	3,182	3,396	3,606	3,820	4,032	4,244	5,092	5,305	6,030	6,792	9"
10"	1,528	1,719	1,910	2,101	2,292	2,483	2,674	2,865	3,056	3,247	3,438	3,629	3,820	4,584	4,775	5,425	6,112	10"
12"	1,273	1,432	1,591	1,751	1,910	2,069	2,228	2,386	2,546	2,705	2,864	3,023	3,183	3,820	3,980	4,520	5,092	12"
14"	1,091	1,228	1,364	1,500	1,637	1,773	1,910	2,046	2,182	2,319	2,455	2,592	2,728	3,274	3,410	3,875	4,366	14"
16"	955	1,074	1,194	1,313	1,432	1,552	1,672	1,791	1,910	2,029	2,149	2,268	2,387	2,865	2,985	3,390	3,820	16"
18"	849	955	1,061	1,167	1,273	1,379	1,485	1,591	1,698	1,803	1,910	2,016	2,120	2,546	2,655	3,015	3,396	18"
20"	764	859	955	1,050	1,146	1,241	1,337	1,432	1,528	1,623	1,719	1,814	1,910	2,292	2,390	2,715	3,056	20"
22"	694	781	868	955	1,042	1,128	1,215	1,303	1,388	1,476	1,562	1,649	1,736	2,084	2,170	2,465	2,776	22"
24"	637	716	796	875	955	1,034	1,115	1,194	1,274	1,353	1,433	1,512	1,591	1,910	1,990	2,260	2,546	24"
26"	588	661	734	808	881	955	1,028	1,101	1,176	1,248	1,322	1,395	1,468	1,762	1,840	2,090	2,352	26"
28"	546	614	682	750	818	887	955	1,023	1,092	1,159	1,228	1,296	1,364	1,637	1,705	1,940	2,182	28"
30"	509	573	637	700	764	828	891	955	1,018	1,082	1,146	1,210	1,274	1,528	1,595	1,810	2,056	30"

Note: The calculated RPM figures listed above are rounded off to the next higher 5 for wheel marking purposes.
For intermediate diameters not listed use the formula listed in Section 1,2,10 of ANSI B7.1 (SFPM = .262 x wheel diameter in inches x RPM) Note: SFPM ÷ 196.85 = M/S (meters per second)

Abrasive Grains

The abrasive materials, ceramic alumina, zirconia alumina, aluminum oxide and silicon carbide, perform the cutting action. An ideal grinding abrasive has the ability to fracture before serious dulling occurs and offers maximum resistance to point wear. Each abrasive has special crystal structure and fracture characteristics, making it suitable for grinding operations on specific materials.

Medalist - Ceramic Alumina

A superior performing grain for high temperature alloys such as Inconel, Waspalloy and Haspalloy, hardened tool steels, spray metal or Stellite and other hardened steels.

Zirconia Alumina

A tough, sharp abrasive designed for optimum performance in cut-off wheels, portable wheels and depressed center wheels for grinding or cutting cast steel, alloy steel, and malleable and ductile iron.

Aluminum Oxide

A tough, sharp grain produced under controlled conditions and especially adapted to the grinding or cutting of materials of high tensile strength, such as alloy steel, high speed steel, annealed, malleable iron, and tough bronze.

Silicon Carbide

This is a very hard, sharp abrasive grain used in the grinding of tungsten carbide and low tensile strength materials such as cast iron, bronze, aluminum, copper, and non-metallic materials such as plastics, glass, marble, granite and stone.

Grade

The grade is the strength of bonding of a grinding wheel, and is frequently referred to as its hardness. The higher the letter designation, the stronger the bond.

Wheel Structures

Wheel structures(the spacing between grain particles) ranging from open to dense are used on various grinding operations, depending upon the area of contact, type of material being ground, rate of stock removal and finish required. Carborundum Abrasives offers standard structure wheels that will perform well on a wide range of materials.

Bonds

The purpose of the bonding material is to hold the abrasive grain particles together.

Vitrified Bonds

Vitrified wheels have a glass bond composition. Vitrified wheels hold form extremely well and produce a high ratio of stock removal to wheel use. Vitrified wheels are commonly used for precision grinding in the tool and die market.

Porosity

Vitrified wheels can be manufactured with induced porosity. All vitrified bonds that end in P (VLP, V40P, VPP) indicate induced porosity. This porosity allows excellent coolant flow and chip clearance. For materials that load or for wide surface area contact, this provides a cooler cutting action, less loading and less chance of burn on the workpiece.

Resinoid Bonds

Resinoid, or organic compound, bonds are more shock resistant than vitrified bonds and are generally operated at higher peripheral speeds. Most resinoid bond wheels are used for fast stock removal in the metal fabrication and foundry markets.

Procedures for Proper Handling and Storage of Bonded Abrasive Products

Handling

All grinding wheels are relatively fragile and must be handled with care. This applies to all types of bonds: vitrified,resinoid and rubber.

Do:

- Inspect all wheels upon receipt.
- Use pallets or trucks to transport.
- Support firmly at all times.
- Place wheels carefully in racks.

Do Not:

- Leave wheels packed in absorbent material.
- Roll wheels on floor.
- Lean wheel against equipment.
- Place tools or parts on top of wheels.

Storage

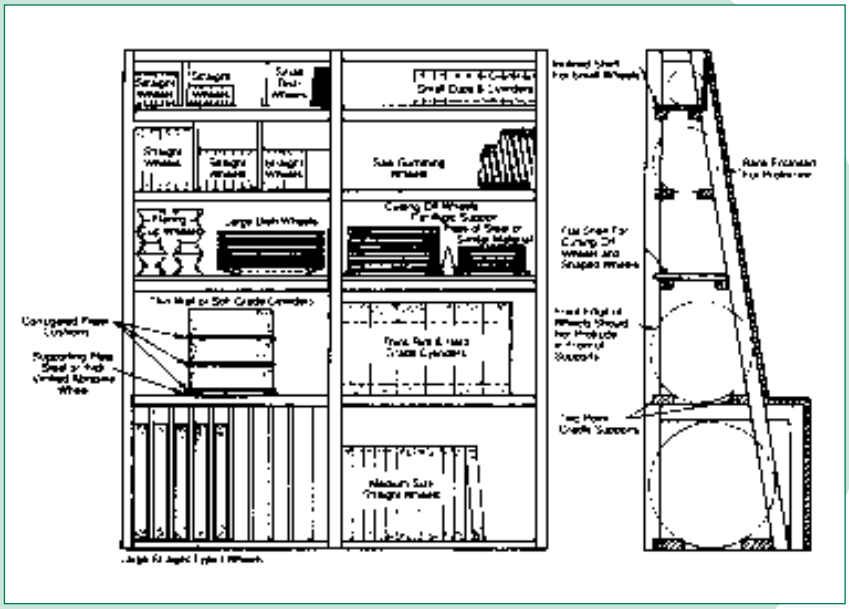
Suitable racks, cradles and drawers should be provided to store the various types of wheels used.

Do:

- Store wheels correctly supported.
- Stack thin wheels flat.
- Ensure storage in dry conditions.

Do Not:

- Store in damp or humid conditions.
- Subject wheels to dramatic change in temperature.
- Subject wheels to temperatures at or approaching freezing.



THIS DRAWING ILLUSTRATES A RACK DESIGN WHICH IS SUITABLE FOR SAFELY STORING A WIDE VARIETY OF ABRASIVE WHEELS.