

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	Position 2 46 GRIT SIZE	Position 3 K GRADE	Position 4 8 STRUCTURE	Position 5 V BOND TYPE	Position 6 40 BOND MODIFICATION
AA - WHITE ALUMINUM OXIDE	46 - MEDIUM	K - SOFT	8 - DENSE	V - VITRIFIED	40 - P = Porous
AR - RUBY ALUMINUM OXIDE			TO	B - RESINOID	
AZ - ZA/AO BLEND			8	RR - RUBBER	
BA - ALUMINUM OXIDE			OPEN		
DA - GREY ALUMINUM OXIDE BLEND					
GA - ALUMINUM OXIDE					
GRA - GA/RA BLEND					
PA - PINK ALUMINUM OXIDE					
RA - PINK/PURPLE ALUMINUM OXIDE					
RG - ALUMINUM OXIDE					
C - BLACK SILICON CARBIDE					
CA - BLACK SILICON CARBIDE					
CGA - ALUMINUM OXIDE/SILICON CARBIDE BLEND					
DAC - ALUMINUM OXIDE/SILICON CARBIDE BLEND					
GC - GREEN SILICON CARBIDE					
Z - ZIRCONIA ALUMINA					
AZA - ZA/AO BLEND					
ZA - ZA/AO BLEND					
ZZA - ZA/GA BLEND					
ZZC - ZA/C BLEND					
3AZA - ZIRCONIA ALUMINA/ALUMINUM OXIDE BLEND					
3ZA - ZIRCONIA ALUMINA/ALUMINUM OXIDE BLEND					
PR - ZIRCONIA ALUMINA					



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.

WHEEL	SURFACE SPEED IN FEET PER MINUTE (SFPM)																WHEEL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1"	15,279	17,189	19,098	21,008	22,918	24,828	26,737	28,647	30,558	32,467	34,377	36,287	38,196	40,106	42,016	43,926	45,836	47,745	49,655	51,565	53,475	55,385	57,295	59,205	61,115	63,025	64,935	66,845	68,755	70,665	72,575	74,485	76,395	78,305	80,215	82,125	84,035	85,945	87,855	89,765	91,675	93,585	95,495	97,405	99,315	101,225	103,135	105,045	106,955	108,865	110,775	112,685	114,595	116,505	118,415	120,325	122,235	124,145	126,055	127,965	129,875	131,785	133,695	135,605	137,515	139,425	141,335	143,245	145,155	147,065	148,975	150,885	152,795	154,705	156,615	158,525	160,435	162,345	164,255	166,165	168,075	169,985	171,895	173,805	175,715	177,625	179,535	181,445	183,355	185,265	187,175	189,085	190,995	192,905	194,815	196,725	198,635	200,545	202,455	204,365	206,275	208,185	210,095	211,995	213,905	215,815	217,725	219,635	221,545	223,455	225,365	227,275	229,185	231,095	232,995	234,905	236,815	238,725	240,635	242,545	244,455	246,365	248,275	250,185	252,095	253,995	255,905	257,815	259,725	261,635	263,545	265,455	267,365	269,275	271,185	273,095	274,995	276,905	278,815	280,725	282,635	284,545	286,455	288,365	290,275	292,185	294,095	295,995	297,905	299,815	301,725	303,635	305,545	307,455	309,365	311,275	313,185	315,095	316,995	318,905	320,815	322,725	324,635	326,545	328,455	330,365	332,275	334,185	336,095	337,995	339,905	341,815	343,725	345,635	347,545	349,455	351,365	353,275	355,185	357,095	358,995	360,905	362,815	364,725	366,635	368,545	370,455	372,365	374,275	376,185	378,095	379,995	381,905	383,815	385,725	387,635	389,545	391,455	393,365	395,275	397,185	399,095	400,995	402,905	404,815	406,725	408,635	410,545	412,455	414,365	416,275	418,185	420,095	421,995	423,905	425,815	427,725	429,635	431,545	433,455	435,365	437,275	439,185	441,095	442,995	444,905	446,815	448,725	450,635	452,545	454,455	456,365	458,275	460,185	462,095	463,995	465,905	467,815	469,725	471,635	473,545	475,455	477,365	479,275	481,185	483,095	484,995	486,905	488,815	490,725	492,635	494,545	496,455	498,365	500,275	502,185	504,095	505,995	507,905	509,815	511,725	513,635	515,545	517,455	519,365	521,275	523,185	525,095	526,995	528,905	530,815	532,725	534,635	536,545	538,455	540,365	542,275	544,185	546,095	547,995	549,905	551,815	553,725	555,635	557,545	559,455	561,365	563,275	565,185	567,095	568,995	570,905	572,815	574,725	576,635	578,545	580,455	582,365	584,275	586,185	588,095	589,995	591,905	593,815	595,725	597,635	599,545	601,455	603,365	605,275	607,185	609,095	610,995	612,905	614,815	616,725	618,635	620,545	622,455	624,365	626,275	628,185	630,095	631,995	633,905	635,815	637,725	639,635	641,545	643,455	645,365	647,275	649,185	651,095	652,995	654,905	656,815	658,725	660,635	662,545	664,455	666,365	668,275	670,185	672,095	673,995	675,905	677,815	679,725	681,635	683,545	685,455	687,365	689,275	691,185	693,095	694,995	696,905	698,815	700,725	702,635	704,545	706,455	708,365	710,275	712,185	714,095	715,995	717,905	719,815	721,725	723,635	725,545	727,455	729,365	731,275	733,185	735,095	736,995	738,905	740,815	742,725	744,635	746,545	748,455	750,365	752,275	754,185	756,095	757,995	759,905	761,815	763,725	765,635	767,545	769,455	771,365	773,275	775,185	777,095	778,995	780,905	782,815	784,725	786,635	788,545	790,455	792,365	794,275	796,185	798,095	799,995	801,905	803,815	805,725	807,635	809,545	811,455	813,365	815,275	817,185	819,095	820,995	822,905	824,815	826,725	828,635	830,545	832,455	834,365	836,275	838,185	840,095	841,995	843,905	845,815	847,725	849,635	851,545	853,455	855,365	857,275	859,185	861,095	862,995	864,905	866,815	868,725	870,635	872,545	874,455	876,365	878,275	880,185	882,095	883,995	885,905	887,815	889,725	891,635	893,545	895,455	897,365	899,275	901,185	903,095	904,995	906,905	908,815	910,725	912,635	914,545	916,455	918,365	920,275	922,185	924,095	925,995	927,905	929,815	931,725	933,635	935,545	937,455	939,365	941,275	943,185	945,095	946,995	948,905	950,815	952,725	954,635	956,545	958,455	960,365	962,275	964,185	966,095	967,995	969,905	971,815	973,725	975,635	977,545	979,455	981,365	983,275	985,185	987,095	988,995	990,905	992,815	994,725	996,635	998,545	1000,455

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)

Bonded Abrasive Basics

Abrasive Grains

The abrasive grains (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 Haspally, 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, snagging 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 grinding or cutting 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) range from open to dense and vary with different grinding operations, depending upon the area of contact and type of material being ground, rate of stock removal and finish required. Carborundum 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

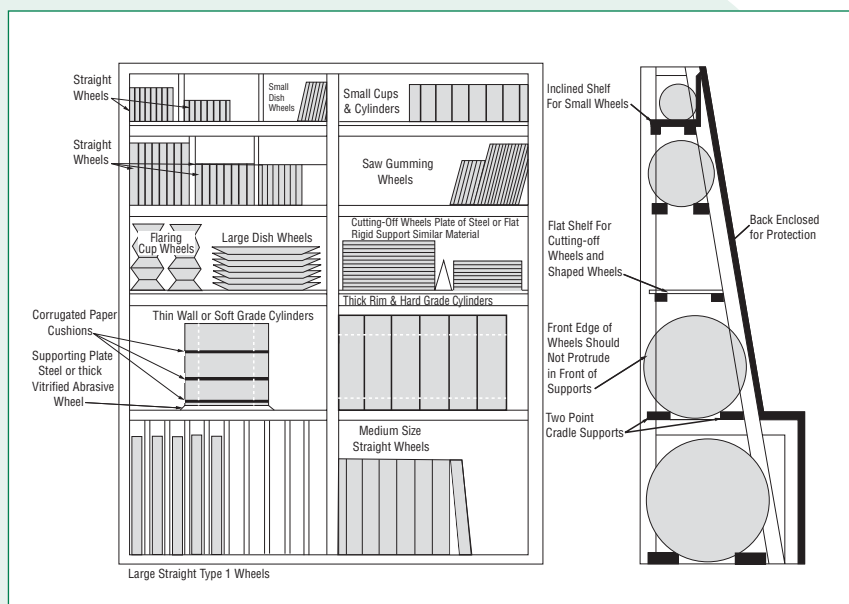
Suitable racks, cradles and drawers should be provided to store the various types of wheels used.

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.