

Selecting a Diamond Wheel



Consumables

1.0: Diamond Wheel Selection

In general, the low concentration wheels are used for sectioning ceramic type materials. Ceramics cut via brittle chip formation and require higher loads per diamond, necessitating the use of low concentration wheels. Materials such as glasses, silicon, carbides, sapphire, and other related semiconductor and optical materials are typically cut using these types of wheels. High concentration wheels are primarily used for sectioning metals such as stainless steel, aluminum, and titanium.

Diamond particle size primarily determines the surface finish, edge quality, and damage depth produced. Fine sized wheels work well for sectioning thin materials or brittle materials such as LiNbO_3 , YVO_4 , and GaAs. Coarse diamond wheels are ideal for sectioning silicon carbide, zirconia, Al_2O_3 , stainless steels, and other hard materials which do not require a fine surface finish following sectioning. In certain applications, cross section electron microscopy for example, cutting the small samples using the fine diamond particle size, high concentration wheels is best due to the low subsurface damage these produce.

MATERIAL	DIAMOND WHEEL CHARACTERISTICS		DIAMOND WHEEL
	DIAMOND SIZE	DIAMOND CONCENTRATION	
ELECTRO-OPTICS (YVO_4 , LiNbO_3)	FINE	LOW OR HIGH	LDWH4123
SEMICONDUCTORS (GaAs, SILICON)	FINE OR MEDIUM	LOW OR HIGH	LDWH 4122
CRYSTALLINE QUARTZ	FINE	LOW	LDWL 3063
SILICON	MEDIUM	LOW OR HIGH	LDWL 3062 OR LDWH 4122
GLASS	MEDIUM	HIGH	LDWH 4122
SILICON CARBIDE	COARSE	LOW	LDWL 4121
HARD METALS (TITANIUM, STAINLESS STEEL)	COARSE	LOW OR HIGH	LDWL 4121 OR LDWH 4121
SOFT METALS (COPPER, ZINC, TUNGSTEN)	COARSE	HIGH	LDWH 4121
CERAMICS (ZNO, GARNET)	MEDIUM OR COARSE	LOW OR HIGH	LDWH4122, LDWL4121, LDWH4122

TABLE 4: Basic guideline to the selection of diamond wheels for cutting specific material types.

The chart below shows the correlation of particle size in relation to the type of diamond wheels available for use with the Model 650. The chart shows the difference in particle size shown in microns, mesh size, and grit size. Discrepancy between units of measure for particle sizes as they relate to abrasives is commonplace due to the many different types of grading and measuring techniques.

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