

## (2) Grinding Wheel Specifications: Abrasive Grain Type

### Abrasive Grain Type

<b>Abrasive Grain Type:</b> <b>Aluminum Oxide</b>	<p>Aluminum oxide is the most common industrial mineral in use today. Fused aluminum oxide is produced synthetically by melting aluminum oxide ingots, which are later crushed and sized. Fused aluminum oxide is also produced synthetically by the sol gel process to create alumina that is sintered to produce with an extremely fine crystalline structure type. Aluminum oxide is available in several variations depending on composition and processing such as white (high purity). Titanium oxide additions can toughen the abrasive and enable heat treating process, which changes properties. Oxide abrasives are also produced with chemical precursors and precipitation, calcination and/or sintering processes for various applications. Sol-gel aluminum oxide is produced in using chemical ceramic technology, but this abrasive helps to distinguish the grain from lower performing fused aluminum oxide. Aluminum oxide occurs naturally in the form of corundum, a commercial abrasive except as a component of emery.</p>
<b>Ceramic (e.g., Norton SG®, Norton Quantum®)</b>	<p>Ceramic abrasives typically consist of aluminum oxide with or without additional modifiers produced using a sol-gel process to create alumina that is sintered to produce with an extremely fine crystalline structure type. This abrasive has a grain size and outstanding grinding performance on a variety of workpiece materials. The grain is manufactured by the Saint-Gobain Group. The patented alumina seeding process used in manufacturing contributes to superior performance.</p>
<b>Silicon Carbide</b>	<p>Silicon carbide is a synthetic abrasive first developed in the late 1800s. SiC is harder than aluminum oxide, making it suitable for nonferrous applications (brass, aluminum, titanium). The high solubility of carbon and silicon in iron workpiece materials reduces performance. Levels and types of impurities distinguish the green and black forms of silicon carbide. The black form is used for grinding glass, wood, and leather. SiC, like diamond, is susceptible to oxidation at higher temperatures.</p>
<b>Zirconia (e.g., Norzon®)</b>	<p>Alumina-zirconia abrasive grain consists of a fused alloy of aluminum oxide and zirconium oxide. NorZon® is a quenched eutectic mixture of aluminum oxide and zirconium oxide. The resulting fine structure and higher hardness make it suitable for grinding other exotic metals.</p>
<b>Superabrasive - Diamond</b>	<p>Synthetic diamond is produced synthetically in a high temperature, high pressure process anvil press. Diamond has a unique crystal structure. Diamond is used for grinding nonferrous metals, ceramics, glass, stone, and building materials. Diamond does not dissolve or react with iron. Diamond pastes are useful in ferrous polishing or lapping applications where high temperatures are involved.</p>
<b>Superabrasive - CBN</b>	<p>Cubic boron nitride (CBN) is superabrasive grain with hardness second to diamond and a cubic crystal structure. CBN is not useful in grinding steel or ferrous alloys because carbon or diamond readily dissolves or reacts with iron. CBN is produced by a process similar to synthetic diamond production.</p>
<b>Tungsten Carbide</b>	<p>Crushed tungsten carbide grit is utilized in metal bonded products for abrasion of tough materials such as cast iron.</p>
<b>Other</b>	<p>Other specialty, proprietary or patented abrasive grain, grit or abrasive material.</p>
<b>Metal Clad / Armored?</b>	<p>Abrasive grain with a metal layer or coating. Certain superabrasive products utilize metal clad grain to dissolve the abrasive grain during grinding.</p>