



Grinding Tungsten Electrodes with Diamond Wheels

Arc-Zone.com® Technical-Focus Sheet

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Introduction

We began supplying tungsten electrode grinders when we discovered our customers were frustrated by the industry-wide lack of quality machines, technical information, and technical support. We found the market had many companies offering electrode grinders—each selling its own machine with little regard for specific customer needs. To redress that, we offer the industry's widest range of tungsten grinding machines along with unparalleled instructional data and technical support. View our complete line on www.arc-zone.com.

For TIG/GTAW (Tungsten Inert Gas arc welding/Gas Tungsten Arc Welding) and PAW (Plasma Arc Welding), there is no better way to prepare a tungsten electrode than with a diamond grinding wheel. A diamond-ground tungsten electrode delivers a cleaner, more precise, and consistent weld than the same electrode ground with a bench grinder, belt sander, side grinder, or any other non-diamond wheel.

Dry or Wet Grinding

You can diamond grind electrodes either wet or dry. Both have benefits and drawbacks.

Dry Grinding

Dry tungsten is the most common type of grinder—the machines are simple to build and deliver a consistent finish. You can change wheel grits to achieve a specific grinding rate—the

(Continued on page 2)

Inside

- Dry grinding
- Wet grinding
- Types of wheels
- Wheel grits
- Maximizing life
- Wheel Core Exchange



coarser the diamond grit, the faster the grind. For a smooth finish, grind with a 300-grit wheel, the standard on most dry grinders. For small-diameter tungsten grinding, 1/16" (1.6 mm) or below, use a finer grit wheel for that critical smooth-ground finish.

Wet Grinding

Wet or liquid tungsten grinders are more specialized and technically advanced machines. Wet grinding delivers a near polished tungsten finish—the most desirable finish in terms of arc starting and electrode life. Additionally, wet grinders don't allow the tungsten material to overheat during grinding—a common problem for dry grinders that can change the oxide structure of the tungsten. Fully enclosed, wet grinders are by far the best solution for operator safety and dust management.

Types of Diamond Wheels

Diamond grinding wheels come in a variety of shapes and sizes. Their surface binding process depends on their intended host grinder. Electroplated and resin-bonded wheels are the most common.

Resin-Bonded

Resin bonded wheels are designed for cutting or grinding tungsten on the rim or top (narrow side) of the grinding wheel. The resin bonding process offers good longevity because it produces a thick rim, though

its sides have low lateral strength.

The resin bonding process starts with a core or wheel blank. From there, the wheel's bonding is cleaned. The diamond grinding media is then mixed with the resin and coated onto the wheel blank. The wheel is then inserted into a heated mold under tons of hydraulic pressure. That pressure removes bubbles or gaps in the diamond grinding media and bonds it to the wheel.

Electroplated

Electroplated diamond grinding wheels are best for tungsten grinders using the front or face (wide side) of the grinding wheel to prepare electrodes. Rather than using a glue to bond the grinding media to a wheel, this process uses metal plating. Typically, the wheel core is plated with a nickel base in a plating tank. During that process, the nickel captures suspended grinding material, bringing it along when it plates the wheel.

Diamond Wheel Finishes

Nickel Plate

Nickel plated wheels appear shiny, sometimes with a yellowish chrome-like finish. They are commonly used throughout the industry.

(Continued on page 3)

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Corrosion Resistant Paint

Some wheels, especially wet grinding wheels, are painted to resist corrosion. Generally, they are resin bonded with a wheel made of aluminum. They are either green or black.

Wheel Media Grits

Grit is the actual composition of the diamond grinding surface—the diamond media that removes the material from the tungsten electrode.

100—Heavy Coarse Grit

Grinds large-diameter, 3/16" (4.8mm) or larger, tungsten electrodes. This grit quickly removes material.

150—Coarse Grit

Grinds large-diameter, 1/8" (3.2mm) or larger, tungsten electrodes. This grit removes material quickly, but not as quick as heavy coarse grit. It is often used to dress an electrode for a subsequent grinding with a finer grit wheel.

300—Medium Grit

Grinds nearly all tungsten electrodes using an all-purpose wheel, which is why this grit is often the default on wheels that come with the grinder. It provides a smooth finish and moderately quick material removal.

400—Fine Grit

Grinds small diameter tungsten electrodes—1/16" (1.6mm), .040" (1.0mm), and .020" (0.5mm). This specialized grit provides a smooth finish and usually isn't used for other purposes.

600—Super Fine Grit

Grinds small diameter tungsten electrodes—1/16" (1.6mm), .040" (1.0mm), and .020" (0.5mm). This specialized grit provides a very smooth near-polished finish.

Maximizing Wheel Life

Diamond-ground tungsten electrodes are widely used in TIG/GTAW and PAW. To get the best performance from a tungsten grinder—lowering operating costs, improving productivity, and maximizing weld quality—we recommend that you follow these simple steps:

1. Remove contaminated sections from the tungsten electrodes before grinding. Cut the electrode off just beyond the contaminated area. The tungsten should be clear of any discoloration or foreign materials.
2. Grind tungsten slowly and consistently, smoothly rotating the electrode as it contacts the wheel.
3. Don't overheat the electrode. If the electrode becomes red hot, it can cause the added dopants (helpful added chemicals) to migrate to the tip and evaporate, leaving you with a pure tungsten electrode.
4. Don't jam the electrode into the wheel. Instead, apply slight, consistent pressure.
5. Start grinding on the outermost edge of the diamond grinding wheel. As the

(Continued on page 4)

wheel wears, grinding time increases and grind quality deteriorates. To minimize this, change the electrode's contact point on the wheel to use a new spot with unused diamond media.

6. If your wheels are double sided, for added life, be sure to reverse the wheel and repeat the process.
7. Contact the Tungsten Grinding Experts™ at Arc-Zone.com for tips on which diamond grinding wheel is best for your machine and application.

No matter what type of grinder you choose, consider the replacement cost of the diamond wheels, which can be expensive—sometimes \$300 or more (depending on the machine). Based on the size and volume of tungsten you intend to grind, the replacement wheel cost can become a major operating expense.

Wheel Core Exchange™

Arc-Zone.com now offers a Wheel Core Exchange program for your spent diamond grinding wheels! Return your worn-out diamond grinding wheels to Arc-Zone.com, and we'll give you a \$25 check or store credit. By turning in your used wheels, you'll reduce the environmental impact of discarded diamond grinding wheels. Better still, you'll reduce the impact on your wallet!

About Arc-Zone.com

Jim Watson

Jim is CEO and founder of Arc-Zone.com.

He is a master fabricator with years of hands-on experience in his own shop and also as a winning motorcycle racer, car builder, and chief mechanic for a top motorsports team. He also has extensive experience in manufacturing, technical sales, and product development. Before launching Arc-Zone.com, he held leadership positions in some of the most respected companies in the welding industry.

Arc-Zone.com

Under Jim's direction, Arc-Zone.com has led the industry in product innovation and online sales and service, becoming the world's leading supplier of high-quality, high-performance welding and metal working tools and accessories.

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