

# tungstenselection



MAXIMIZE ARC STARTING AND IMPROVE ARC TIME  
WITH HIGH-QUALITY TUNGSTEN ELECTRODES

Selecting the proper tungsten electrodes will greatly improve weld quality and productivity while lowering costs for your Gas Tungsten Arc Welding (GTAW/TIG) and Plasma Arc Welding (PAW) operations.

## 1. CHOOSE ELECTRODES FROM A TRUSTED SOURCE.

Although tungsten electrodes may look the same from one company to another, high-quality tungsten has been manufactured to ensure a very small grain structure which allows for better migration of oxides to the tip of the electrode.

With high-quality tungsten, you'll also experience easier arc starting, improved arc time and better weld quality with minimized contamination.

Arc-Zone.com's ArcTime™ and Amplify™ brand electrodes are from the world's finest producers and meet or exceed ISO 6848 and AWS A5.12 standards. Arc-Zone.com® delivers the industry's most complete line of premier tungsten electrodes including ArcTime™, Amplify™, Multi-Strike™, SYLVANIA, and Weldcraft®.



## 2. DETERMINE THE BEST TUNGSTEN/TUNGSTEN ALLOY FOR YOUR APPLICATION

Since the development of the TIG welding process, many improvements have been made in the production of electrodes. Most significantly is the addition of oxides to pure tungsten, creating tungsten alloys that provide the same level of emission as pure tungsten at much lower temperatures, improving the arc time of the electrode, and improving arc stability.

Each oxide has a different physical characteristic affecting tungsten performance. Electrodes are color coded, indicating the type of oxide used in the mix. Note that color-coding is not standardized for all mixes and varies from the U.S. to Europe and Japan.

For most hand-held welding operations, Arc-Zone® recommends the ArcTime™ Hybrid Tungsten Electrode. For other applications, particularly automated welding, the best way to determine which tungsten alloy is best suited for your application is through testing. The following list is provided as a guide.

▶ **ArcTime™ ..Hybrid All Purpose Tungsten Electrodes**

This non-radioactive state-of-the-art formula combines rare earth materials with tungsten to produce the best all-purpose tungsten electrode on the market. Experience reliable arc starting even after numerous ignitions.

Color Code: Sky Blue™ (US) Not standardized.



▶ **1% Thoriated...Available in SYLVANIA Brand**

SYLVANIA offers this radioactive tungsten formula for easy arc starting, good arc stability and current capacity, and resistance to weld pool contamination. Not commonly used. Vapors, grinding dust and disposal of thorium dioxide raise health, safety and environmental concerns. Use only when contractually required by FAR specification.

Color Code: Yellow



▶ **2% Thoriated...Available in Amplify™, SYLVANIA, and Weldcraft® Brands**

This formula is a popular general purpose electrode due to the excellent arc behavior and good tip life. This is a radioactive formula, however. Vapors, grinding dust and disposal of thorium dioxide raise health, safety and environmental concerns. Use only when contractually required by FAR specification.

Color Code: Red (US, Europe and Japan)



▶ **2% Lanthanated...Available in Amplify™ Brand**

This formula is a good general purpose non-radioactive replacement for 2% Thoriated. It has excellent ignition performance, low-burn-off rate, excellent re-ignition, and good service life.

Color Code: Blue (US) Not standardized in Europe. Yellow-Green (Japan)



▶ **1.5% Lanthanated...Available in Amplify™, SYLVANIA, and Weldcraft® Brands**

Another good general-purpose non-radioactive replacement for 2% Thoriated, and similar in performance to 2% lanthanated. It features excellent ignition and re-ignition properties and good service life.

Color Code: Gold (US) Not standardized in Europe or Japan.



▶ **2% Ceriated...Available in Amplify™, SYLVANIA, and Weldcraft® Brands**

Good for low-amp, DC orbital tube, pipe, thin sheet, and small part applications, this formula offers low current capacity, low arc ignition, good arc stability and is non-radioactive.

Color Code: Orange (US) Gray (Europe and Japan)



▶ **1% Zirconiated...Available in Amplify™ and SYLVANIA Brands**

Used for radiographic-quality welding where tungsten contamination must be minimized. Balls-up easily in AC applications, good arc starting and current capacity. Non-Radioactive.

Color Code: Brown (US) White (Europe) Not standardized in Japan.



▶ **Pure Tungsten...Available in Amplify™, SYLVANIA, and Weldcraft® Brands**

Pure tungsten has a high work-function which makes it difficult to start and maintain a stable arc. High burn-off rate results in short service life.

Color Code: Green (US, Europe and Japan)



Other tungsten blends that are not common but you may see in the market place include: 4% Thoriated, 3% Thoriated, and 1% Lanthanated. Color codes are not standardized in the U.S. Again, purchasing from a trusted source is important as manufacturing methods can greatly affect tungsten electrode performance.

### 3. SELECT THE PROPER SIZE

Tungsten is generally sold in packages of 10 pieces in a variety of standard diameters from .020" (.5mm) to .250" (6.4mm), and in lengths of 3, 6, 7, 12, 18 and 24 inches. The most common length is 7.00" (175mm) in the U.S. and 6.00" (152mm) in Europe. The most common diameters are: .040" (1.0mm), 1/16" (1.6mm), 3/32" (2.4mm), 1/8" (3.2mm), 5/32" (4.0mm), and 3/16" (4.8mm).

Electrode diameter affects welding performance and weld bead shape. Again, the best way to determine which tungsten is best suited for your application is through testing, however, the following chart should serve as a general guide.

## TUNGSTEN ELECTRODES RATING FOR WELDING CURRENTS

| Electrode Diameter | Direct Current    |                  | Alternating Current |               |
|--------------------|-------------------|------------------|---------------------|---------------|
|                    | Straight Polarity | Reverse Polarity | Unbalanced Wave     | Balanced Wave |
|                    | DCEN              | DCEP             |                     |               |
| .020" (0.50 mm)    | 5-2               | n/a              | 5-15                | 10-20         |
| .040" (1.0 mm)     | 15-80             | n/a              | 10-60               | 20-30         |
| 1/16" (1.6 mm)     | 70-150            | 10-20            | 50-100              | 30-80         |
| 3/32" (2.4 mm)     | 150-250           | 15-30            | 100-160             | 60-130        |
| 1/8" (3.2 mm)      | 250-400           | 25-40            | 150-210             | 100-180       |
| 5/32" (4.0 mm)     | 400-500           | 40-55            | 200-275             | 160-240       |
| 3/16" (4.8 mm)     | 500-750           | 55-80            | 250-350             | 190-300       |
| 1/4" (6.4 mm)      | 750-1100          | 80-125           | 325-450             | 325-450       |

Different electrode materials will vary slightly from these guidelines. Use of other gases will also change the recommended currents. Use this chart as a general guide. Also keep in mind that for a given amount of amperage, larger diameter electrodes will last longer but will be harder to start. Excessive current will cause the electrode to melt and drop off. Insufficient current will lead to an unstable arc.

# tungstengrinders



## TUNGSTEN GRINDER SELECTOR GUIDE



| Tungsten Grinder                    | Cost    | Style   | Grind Angles            | Degree Scale for Taper   | Tip Flat Capable | Cut-Off Capable | Dust Collection             | Tungsten Diameters           |
|-------------------------------------|---------|---|-------------------------|--------------------------|------------------|-----------------|-----------------------------|------------------------------|
| Sharpie Standard Tungsten Grinder   | \$229   | Hand-Held                                     | 20° Fixed               | fixed grinding position  | ✓                | ✓               |                             | .040"-1/8"<br>(1.0mm-3.2mm)  |
| Sharpie Deluxe Tungsten Grinder     | \$279   | Hand-Held                                     | 5° - 45°                |                          | ✓                | ✓               |                             | .040"-1/8"<br>(1.0mm-3.2mm)  |
| Sharpie DXV Vacuum Tungsten Grinder | \$379   | Hand-Held                                     | 5° - 45°                |                          | ✓                | ✓               | vacuum                      | .040"-1/8"<br>(1.0mm-3.2mm)  |
| Turbosharp V                        | \$635   | Hand-Held w/<br>Bench Mounting Bracket        | 20° - 60°               | ✓                        | ✓                |                 | fully enclosed              | .040"-3/16"<br>(1.0mm-4.8mm) |
| Triad                               | \$835   | Hand-Held w/<br>Bench Mounting Bracket        | 15°, 18°,<br>22.5°, 30° | fixed grinding positions | ✓                | ✓               |                             | .040"-5/32"<br>(1.0mm-4.0mm) |
| Neutrix                             | \$990   | Hand-Held w/<br>Bench Mounting Bracket        | 15° -90°                | ✓                        | ✓                |                 | fully enclosed              | .040"-5/32"<br>(1.0mm-4.0mm) |
| Turbo 4                             | \$795   | Semi-Portable<br>Bench-Top                    | 5° - 60°                | ✓                        |                  | ✓               | semi-enclosed               | .040"-5/32"<br>(1.0mm-4.0mm) |
| Piranha 2                           | \$875   | Semi-Portable<br>Bench-Top                    | 10° - 60°               | ✓                        | ✓                | ✓               |                             | .040"-3/32"<br>(1.0mm-2.4mm) |
| TEG-3                               | \$1,550 | Semi-Portable<br>Bench-Top                    | 15° - 90°               | ✓                        | ✓                |                 | semi-enclosed               | 1/16"-5/32"<br>(1.0mm-4.0mm) |
| Piranha 3                           | \$1,562 | Bench-Top                                     | 10° - 60°               | ✓                        | ✓                | ✓               |                             | .040"-3/16"<br>(1.0mm-4.8mm) |
| Neutra LTG                          | \$1,560 | Bench Mounted                                 | 10° - 50°               | ✓                        | ✓                |                 | fully enclosed              | .040"-3/16"<br>(1.0mm-4.8mm) |
| Ultima LTG (EU Model Only)          | \$1,621 | Bench Mounted                                 | 10° - 50°               | ✓                        | ✓                |                 | fully enclosed              | .040"-3/16"<br>(1.0mm-4.8mm) |
| TIG 10/175                          | \$2,305 | Bench Mounted w/<br>optional grinding station | 0° - 90°                | ✓                        | ✓ +              | ✓               | optional vacuum             | .040"-3/16"<br>(1.0mm-4.8mm) |
| DGP-3-V2                            | \$3,356 | Complete<br>Grinding Station                  | 6° - 120°               | ✓                        | ✓                | ✓ +             | vacuum                      | .040"-3/16"<br>(1.0mm-4.8mm) |
| Sharp Shooter                       | \$3,995 | Complete<br>Grinding Station                  | 10° - 60°               | ✓                        | ✓                | ✓ +             | fully enclosed w/<br>vacuum | .040"-3/16"<br>(1.0mm-4.8mm) |

✓ + Tip Flat = Micrometer Tip Flat Gauge

✓ + Cut Off = Micrometer Cut Off Gauge