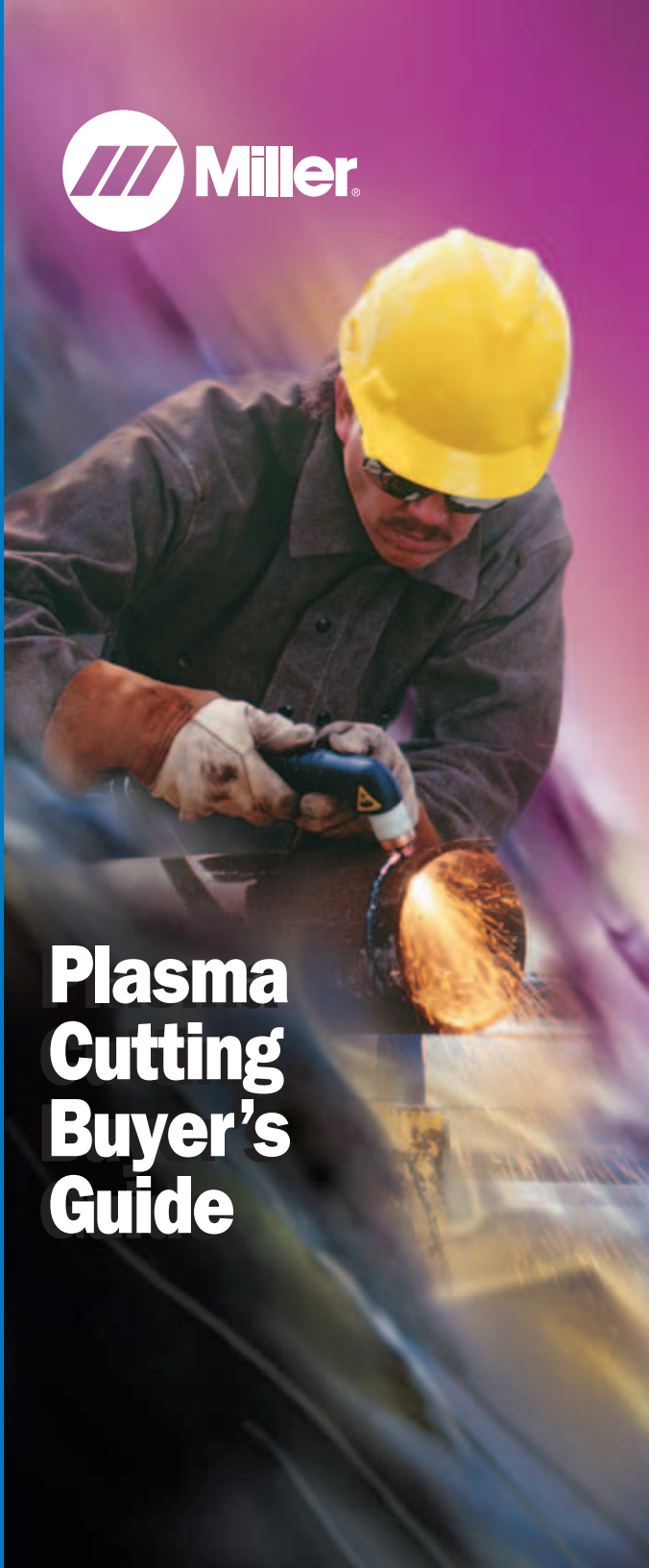

Plasma Cutting Buyer's Guide

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Your Personal Guide To Plasma Cutters

The air plasma arc process provides good quality cutting at very high speeds for a much lower cost than other cutting methods. Plasma arc also offers quality gouging and piercing capabilities. Miller Electric Mfg. Co., a leading worldwide manufacturer of welding and cutting power sources, has designed this handy reference guide to assist you in making an informed buying decision.

What Is Air Plasma?

Plasma arc cutting is a process where an open arc, much like in TIG welding, can be constricted by passing through a small nozzle, or orifice, from the electrode to the workpiece. The gas used, typically air, combines with an electrical current to create a high temperature plasma arc. When placed in contact with an electrically conductive material, the arc passes through the metal, melting a thin area. The force of the arc pushes the molten metal through the workpiece and severs the material.

Where Can I Use My Plasma Cutter?

Since the plasma process is capable of cutting metals ranging from thin gauge aluminum to 1-1/2 in stainless and carbon steel, it can be used in many applications, including stack cutting, beveling, shape cutting, gouging, and piercing. These processes are used in such industries as metal fabrication, construction, maintenance, automotive repair, and metal art and sculpting.

Plasma — A Cut Above Oxyfuel

While oxyfuel has been the most common method of cutting carbon steel in the past, plasma cutting provides numerous advantages over oxyfuel. It cuts faster; does not require a pre-heat cycle; produces a small and more precise kerf width (the width of the cut); and has a smaller heat-affected zone, which prevents the surrounding area from warping or damaging paint.

In addition, the plasma process cuts any type of electrically conductive metal (the oxyfuel process cannot cut stainless steel or aluminum). Plasma cutting is a cleaner, less expensive and more convenient method of metal cutting because clean, dry air is used for most plasma cutting applications.

What To Look For In A Plasma Cutter

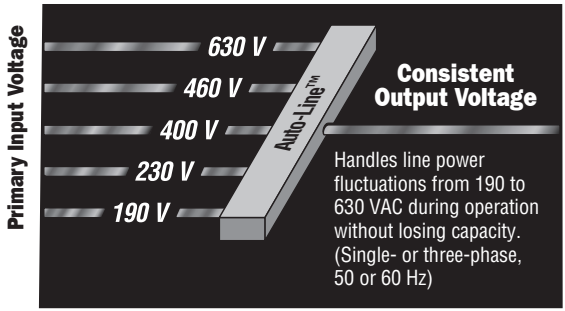
When purchasing a plasma cutting unit there are several features to consider before making your buying decision. However, the performance of the machine and its ease-of-use greatly outweigh any other factors.

A. True Blue® Warranty. For highly engineered plasma products, you need a manufacturer who will stand behind them. Miller backs all of its power sources with the most comprehensive coverage in the industry. The Spectrum Series has a three-year warranty on the power source, parts and labor. Original rectifier parts have a five-year warranty and the ICE torches supplied with each Spectrum have a one-year parts and labor warranty.

B. Input Power. When selecting a plasma cutter, it is important to note the input power available where the plasma cutting is going to take place. For an on-site solution, the Spectrum 2050 cuts up to 5/8 in. steel when powered by any Miller generator providing 8,000 watts or more auxiliary power.

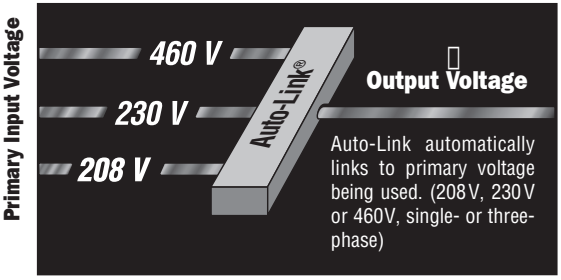
Miller also makes hooking up your plasma cutter easy with two innovative input power technologies:

Auto-Line™ featured exclusively in the Spectrum 2050, allows direct connection to ANY primary power level: 50 or 60 Hz, single- or three-phase, 208 through 575 VAC. Simply connect the power cord to the correct plug or junction box and start cutting. Auto-Line lets you plasma cut at any location, on any job site and in any country without worrying about opening and manually linking the machine or damaging the machine from incorrect hookup.



Auto-Line™

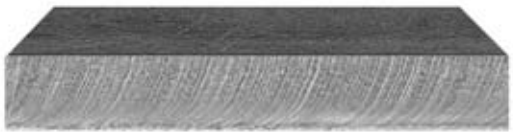
Auto-Link® is featured in the Spectrum 3080. With this technology, the machine's circuitry senses the type of incoming power (208 V, 230 V or 460 V) and automatically configures (or "links") to provide the correct output voltage. This is unlike many competitive systems, which can only operate at a single voltage level or require the operator to remove the cover of the machine and manually link wires to switch between voltages.



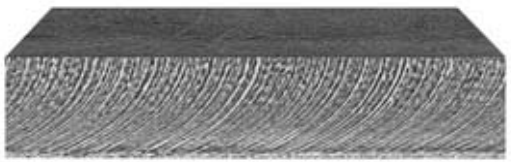
Auto-Link®

C. Cutting Capability and Speed. Determine the type and thickness of metal you are cutting and your desired cutting speed. Then compare your needs to the cutting capacity and cutting speed of the machine you are considering. While there is no standard for cutting speeds in the industry, Miller qualifies its cuts by three standards:

Rated Cutting Capacity
10 inches per minute (minimum speed at which an operator achieves a smooth, steady cut using a hand-held torch).



Maximum Quality Cutting Capacity
Good-quality cut achieved at lower speeds.



Sever Cut Capacity
Maximum cut achieved in ideal conditions.

The output power needed from a plasma cutting machine depends primarily on the thickness and type of material you need to cut. Cutting speed makes a significant difference in production time and operator comfort. For example, Miller's Spectrum® 375 CutMate™ provides 27 amps of output power and cuts metal up to 3/8 in. thick at approximately 8 inches per minute while drag cutting. If a more powerful machine is necessary, the Spectrum 1250 provides 100 amps of cutting output and can cut metal up to 1-1/2 in. thick at approximately 8 inches per minute.

D. Air Requirement. All Miller air plasma cutting machines require a clean, dry air supply. Check the required PSI needed for each machine. A filter and dryer are recommended for all applications.

The Spectrum Thunder (see page 10) comes complete with a built-in piston-driven compressor which provides the exact amount of air needed for cutting. No external air hook-up is needed.

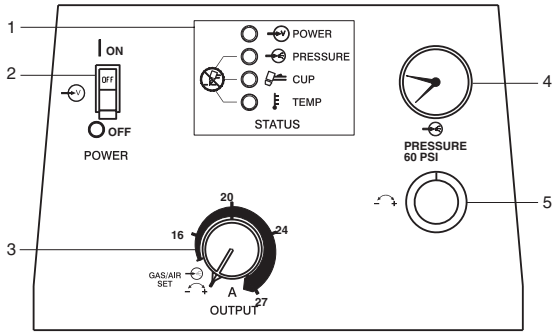
E. Durable Torch. While the type of torch depends on the application, it is always best to purchase a heavy-duty torch. With each Spectrum unit, Miller supplies a rugged ICE torch with an epoxy cup that outlives typical ceramic parts and is virtually unbreakable. There are two different types of torches available: hand-held or machine-held. Miller's machine-held torches are designed with a 1-3/8 in. diameter fitting that is perfect for an automation or clamp-type setup.

The Miller ICE torch also provides a drag shield that attaches to the cup and holds the tip 1/16 to 1/8 in. off of the workpiece. This permits the operator to drag the torch on the workpiece while cutting at full output, which increases operator comfort and makes template cutting easier. Drag shields work with the flow dynamics of the torch to provide better cooling of the consumable parts for longer parts life.

F. High-Frequency Starts. High frequency (HF) can interfere with controls or computers, so look for a plasma cutting unit that starts without high frequency if the plasma cutter is placed near equipment with computer controls. To avoid this problem, Miller provides contact start without high frequency in most of its torches.

G. Postflow Cooling Circuit. To extend the life of consumables and reduce the cost of replacing them, the postflow circuit cools the consumables and torch with postflow air after you release the trigger. Miller units are available with postflow cooling circuits.

H. User-friendly Front Panel. Look for a machine with easy-to-use and easy-to-understand controls, including troubleshooting diagnostic lights. In addition, some machines provide a built-in consumable compartment conveniently mounted on the front panel to make consumables readily available for replacing while cutting.



1. Status and Troubleshooting Lights
2. Power Switch
3. Output Control
4. Gas/Air Pressure Gauge
5. Gas/Air Pressure Adjustment Control

I. Portability. Weight and size are important if there is a need for portability. There are many hand-portable units available that weigh less than 75 lb., including the Spectrum Thunder, the Spectrum 375 CutMate, the Spectrum 625, the Spectrum 2050, and the Spectrum 3080. Miller also offers compatible running gears for some larger, heavier machines.

J. Built-in Gas/Air Filter/Regulator. A regulator positioned on the outside of the unit is vulnerable to damage during transportation, but the Spectrum Series' regulators are protected inside the power sources. The Spectrum Series also has a standard air connection on the back panel for easy gas or air hook-up.

Operating A Plasma Arc For Cutting

Begin cutting by placing the torch as close as possible to the edge of the base metal. Pull the trigger to initiate the preflow air; the pilot arc will then light, followed by the cutting arc. Wait for the arc to penetrate through the bottom of the workpiece. Start moving the torch slowly forward, perpendicular to the workpiece. Watch sparks leaving the bottom of the workpiece to judge speed. If the sparks are not visible at the bottom of the plate, you have not penetrated the metal. This is because your travel speed is too fast or you have insufficient output amperage.

At the end of a cut, angle the torch slightly or pause briefly to completely finish the cut. If the system provides a postflow circuit, the postflow air will continue for a short period of time after the trigger is released to cool the torch and consumable parts, however, cutting can be resumed immediately.

To maximize cutting speeds, it is recommended to turn your power source to full output for all material thicknesses.

Proper Safety Procedures

Safety procedures must be closely followed in any application of the plasma cutting machine. Be aware of potential hazards involved with the process including, high voltages, noise, temperatures, flammable materials, fumes, ultraviolet radiation and molten metal. Proper welding clothing should be worn, as well as shaded eye protection, as specified by the manufacturer. As with all industrial products, read the owner's manual for proper safety procedures.

Spectrum® Series Air Plasma Cutting Systems

When you need rugged cutting systems, look to the Spectrum Series, which is ideal for cutting mild steel, stainless steel and aluminum from gauge thickness to 1-1/4 in. Portable and industrial models are available to fit the demands of your cutting application. In addition, many of the Miller Spectrum products provide air plasma arc gouging and excellent piercing capabilities.

Spectrum® Thunder™

The Spectrum Thunder boasts a *built-in piston-driven air compressor* giving it an "out of the box, ready to cut" attitude. This economical unit is capable of a maximum cut up to 1/4 in. steel. At about 43 lb., its portability makes it an appealing option for HVAC, sheet metal applications, auto body repair, and the home hobbyist.

Spectrum® 375 CutMate™

The Spectrum 375 CutMate is an economical plasma cutting system for work on all conductive metals including mild steel up to 3/8 in (9.5 mm), aluminum to 1/4 in (6.4 mm), and stainless steel to 5/16 in (8 mm) while drag cutting. Stand-off cutting allows you to cut 1/2 in (13 mm) mild steel. Solid-state design and Miller's reliable technology packs a lot of performance into a very portable, 49 lb (22 kg) package. This versatile power source adapts to your shop or work site by operating from either 115 or 230 volt AC power. The CutMate is ideal for maintenance, light construction, prototyping, body shops, fabrication and HVAC ductwork.

NEW! Spectrum® 625

The Spectrum 625 is a dependable plasma cutting system for applications from maintenance to construction. The Spectrum 625 provides up to a ½" rated cut on mild steel and up to 3/8" on aluminum. It is equipped with two exclusive Miller features: Wind Tunnel Technology™ which prevents abrasive

dust and particles from damaging internal components and Fan-on-Demand™, a cooling systems that only operates when needed. It can also be powered by any Miller generator with generator power output of 8 kW or more providing up to a 5/8" cut. The Spectrum 625 packs a lot of performance into a portable, 57lb unit to handle your plasma cutting needs.

Spectrum® 2050

The Spectrum 2050 is a portable cutting and gouging system with Auto-Line™, a Miller feature that accepts any type of input power from 208 to 575 VAC. It can also be powered by any Miller welding generator with generator power output of 8 KW or more—such as the Bobcat™ 225 NT, and the Trailblazer® 280 NT (as well as equivalent competitive equipment). The Spectrum 2050 weighs 70 lb., provides a cutting range of 20 to 55 amps and makes a quality cut on mild or stainless steel up to 7/8 in. It is equipped with two exclusive Miller features: Wind Tunnel Technology™ which prevents abrasive dust and particles from damaging internal components, and Fan-on-Demand™, a cooling system that only operates when needed. Both features increase productivity and energy efficiency, but more importantly decrease service required for maintenance.

Spectrum® 3080

The portable 74 lb. Spectrum 3080 is equipped with Auto-Link®, a Miller technology that senses the type of incoming power (208 V, 230 V or 460 V) and provides correct output voltage automatically. The Spectrum 3080, featuring Wind Tunnel Technology™ and Fan-on-Demand™, provides 80 amps of power to cut mild steel and stainless steel from gauge thickness up to 1-1/4 in. and aluminum up to 7/8 in. Providing optimum peak power, the Spectrum 3080 power source gives high quality cutting performance and excellent gouging characteristics.

Spectrum® 1250

Miller's highest powered plasma cutter, the Spectrum 1250, is a heavy-duty industrial air plasma cutting and gouging system. It also operates on three-phase power at 80 percent duty cycle and has a rated cutting capacity of 1-1/4 in. on mild or stainless steel and 1 in. on aluminum.

Accessories

Cutting Guide Suction/Magnetic Base with Extension Arm

Add this to your Cutting Guide for a convenient attachment to all flat surfaces. The extended arm accommodates holes up to 30 inches in diameter.

Part #195 979

Circle Cutting Guides

Cuts straight lines or circles up to 12 inches in diameter with ease. Fits ICE-12C, 25C, 27C, 50C, 55C and 80C torches.

Part #195 981

Standoff Roller Guide

Helps maintain recommended standoff distance when using extended consumables.

Part #194 883

Plastic Consumables Box

Compartments for storing additional parts and accessories.

Part #127 493

#30 A Economy Running Gear and Cord Wrap

Economical running gear with angle for easy front panel access provides storage for gloves and tools. (Fits Spectrum® Thunder, 375 CutMate, 2050 and 3080, XMT® 304, Maxstar®, and Dynasty™).

#30 Economy Running Gear
Part #195 093

Spectrum® Product Specifications

Plasma Cutting Product	Rated Output	Input Power	Cutting Capacity				Product Weight
			Rated	Max. Quality	Sever	Piercing	
Spectrum® Thunder	12 amps at 110 volts DC	120 V, 1-phase, 60 Hz	1/8 in. (3.2 mm)	3/16 in. (4.2 mm)	1/4 in. (6.4 mm)	12 ga. (2.6 mm)	43 lb. (18 kg)
Spectrum® 375 CutMate™	27 amps at 90 volts DC, 35% duty cycle	115 or 230 VAC, 1-phase, 60 Hz	5/16 in.(8 mm) 3/8 in. (9.5 mm)*	3/8 in. (9.5 mm) 1/2 in.(13 mm)*	1/2 in.(13 mm) 5/8 in. (16 mm)*	3/16 in. (5 mm)	49 lb. (22 kg)
Spectrum® 625	40 amps at 140 volts DC, 50% duty cycle	208/230 VAC, 1-phase, 50/60 Hz	1/2 in.(13 mm)	5/8 in. (16 mm)	7/8 in.(22 mm)	1/4 in. (6.4 mm)	57 lb. (26 kg)
Spectrum® 2050	55 amps at 140 volts DC, 60% duty cycle for 3-phase, 50% duty cycle for 1-phase	Auto-Line accepts input voltage from 208 to 575 VAC, 1- and 3-phase capacities, 50/60 Hz	7/8 in. (22 mm)**	1 in. (25.4 mm)**	1-1/4 in. (32 mm)**	3/8 in. (9.5 mm)	70 lb. (32 kg)
Spectrum® 3080	80 amps at 140 volts DC, 60% duty cycle for 3-phase, 40% duty cycle for 1-phase	Auto-Link 230 or 460 1- and 3-phase capacities, 50/60 Hz	7/8 in. (22 mm)	1-1/4 in. (32 mm)	1-1/2 in. (38 mm)	1/2 in. (13 mm)	74 lb. (33.5 kg)
Spectrum® 701	50 amps at 110 volts DC, 60% duty cycle	200/230/460 or 230/460/575 VAC, 1- or 3-phase, 50 or 60 Hz models available	5/8 in. (16 mm)	3/4 in. (19 mm)	1 in. (25 mm)	3/8 in. (9.5 mm)	147 lb. (67 kg)
Spectrum® 1250	100 amps at 120 volts DC, 80% duty cycle	200/230/460 or 230/460/575 VAC, 220/380/415 VAC, 3-phase, 50/60 Hz	1-1/4 in. (32 mm)	1-1/2 in. (38 mm)	1-3/4 in. (44 mm)	1 in. (25 mm)	410 lb. (186 kg)

*1/16 in standoff cutting.
**Using non-shielded consumables.

Rated Cutting Capacity: 10 inches per minute (minimum speed at which an operator achieves a smooth, steady cut using a hand-held torch)
Maximum Quality Cutting Capacity: good quality cut achieved at lower speeds
Sever Cut Capacity: maximum cut achieved in ideal conditions

Cutting Guide Spectrum Cutting on Engine Driven Welders

Engine Driven Welders	Generator Power	CutMate™ 375		625		2050*/2050 (55A)	
		Steel Quality Cut	Spectrum Output Amp Setting	Steel Quality Cut	Spectrum Output Amp Setting	Steel Quality Cut	Spectrum Output Amp Setting
Legend NT	5 kW	3/8"	27 A (240 V, full KVA plug)	3/8" while not welding	30 A (240V)	1/2"	35A
Bobcat® 225 NT	8 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	5/8"	45 A
Trailblazer® 280 NT	8 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	5/8"	45 A
Bobcat® 250 NT	10 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	3/4"	50A
Trailblazer® 301 G	10 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	3/4"	50 A
Trailblazer® DC	10 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	3/4"	50 A
Trailblazer®Pro 350	12 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	3/4"	50 A
PipePro™ CC/CV	12 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	3/4"	55 A
Big 40® CAT CC/CV	15 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	3/4"	55 A
Big Blue® 402 CC/CV	20 kW	3/8"	27 A (240 V, full KVA plug)	5/8"	40 A (240V)	5/8"	55 A

*Models manufactured after (and including) serial number KJ283702.
Note: LP powered machines need to be derated 15%.

For detailed literature, a full-line catalog or to locate your nearest distributor, call 1-800-4-A-MILLER (1-800-426-4553)

For detailed specification sheets or to locate your nearest Miller distributor, call:

1-800-4-A-Miller
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