EVERLAST PRODUCTS

Owner's Manual

PLASMA-CUT D Series

40/50/60/100

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This welding equipment is for industrial and professional use in conformity with IEC 60974 International Safety Standard.

We offer a five-year warranty on our welders and cutters starting on the date of purchase.

Please read and understand the instruction manual carefully before the installation and operation of this product.

The contents of this manual may be revised without prior notice and without obligation. This instruction manual was issued July 2008.

INTRODUCTION

This manual contains descriptions, operating instructions and basic maintenance procedures for the Everlast Cut 40,50,60 D series machines. Read this manual thoroughly. A complete understanding of the characteristics and capabilities of this equipment will assure the safe and dependable operation for which it was designed.

Everlast Cut D series products use state of the art solid state Toshiba MOSFET drivers. This technology allows for more powerful cutters that are light weight and small compared to other brands.

WARNINGS

Warning: Protect yourself and others from injury — read and follow these precautions.

Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children and pets, away.

CUTTING can cause a fire or explosion. Hot metal and sparks blow from the cutting arc.

* The flying sparks, hot metal, hot work piece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any cutting.
* Remove all flammables within 35 ft (11m) of the cutting arc. If this is not possible, tightly cover them with approved covers. Do not cut where flying sparks can strike flammable material.
* Protect yourself and others from flying sparks and hot metal.
* Be aware that sparks and hot metals from cutting can easily go through small cracks and openings to adjacent areas.
* Watch for fire, and keep a fire extinguisher and trained operator nearby.
* Be aware that cutting on a ceiling, floor, bulkhead, or partition can cause fire on the backside side.
* Do not cut on closed containers such as tanks, drums or piping.
* Connect work cable to the work as close to the cutting area as practical allowing maximum current to the cut and eliminating electric shock in the path.
* Never cut containers with potentially flammable or combustible materials inside they must be emptied and properly cleaned first.
* Do not cut in areas containing explosive dust or vapors.
* Do not cut pressurized containers of any kind.
* Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless pants, high tight shoes, and a cap.
* Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B
* Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit are electrically live whenever the output is on. The input power circuit and machines internal circuits are also live when power is on. Plasma arc cutting requires higher voltages than welding to start and maintain the arc (200 to 400 volts dc are common), but also uses torches designed with safety interlock systems which turn off the machine when the shield cup is loosened or if tip touches electrode inside the nozzle. Incorrectly installed or improperly grounded equipment is a hazard.

ELECTRIC SHOCK can kill.

* Do not touch live electrical parts.
* Wear dry, hole-free insulating gloves and body protection.
* Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
* Do not touch torch parts if in contact with the work or ground.
* Turn off power before checking, cleaning, or changing torch parts.
* Disconnect input power before installing or servicing this equipment.

WARNINGS (continued)

* Lockout the input power according to OSHA CFR 1910.147 (see Safety Standards).
* Properly install and ground this equipment according to its Owner's
* Manual and national, state, and local codes.
* Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet − always verify the supply ground.
* Frequently inspect input power cord for damage or bare wiring − replace cord immediately if damaged − bare wiring can kill.
* Turn off all equipment when not in use.
* Inspect and replace any worn or damaged torch cable leads.
* Do not wrap torch cable around your body.
* Use only well-maintained equipment. Repair or replace damaged parts at once.
* Keep all panels and covers securely in place.
* Do not bypass or try to defeat the safety interlock systems.
* Use only a torch specified in Owner's Manual.
* Keep away from torch tip and pilot arc when trigger is pressed.
* Clamp work cable with good metal-to-metal contact to work piece (not the piece that will fall away) or worktable as near the cut as practical.
* Insulate work clamp when not connected to workpiece to prevent contact with any metal object.

SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER removing the input power.

If you open the unit for any reason, Turn Off unit, disconnect input power, check voltage on input capacitors, and be sure it is near zero (0) volts before touching any parts. Check capacitors according to instructions in Maintenance Section of Owner's Manual or Technical Manual before touching any parts.

ELECTRIC SHOCK can kill.
On inverter power sources, failed parts can explode or cause other parts to explode when power is applied. Always wear a face shield and long sleeves when servicing inverters.
EXPLODING PARTS can injure you and others.
Sparks and hot metal blow out from the cutting arc.
Chipping and grinding cause flying metal.
FLYING SPARKS can cause injury.
Wear approved face shield or safety goggles with side shields.
Wear proper body protection to protect skin.
Wear flame-resistant ear plugs or ear muffs to prevent sparks from entering ears.
Arc rays from the cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.
ARC RAYS can burn eyes and skin.
Wear face protection (helmet or shield) with a proper shade of filter lenses to protect your face and eyes when cutting or watching. ANSI
Z49.1 (see Safety Standards) suggests a No. 9 shade (with No. 8 as minimum) for all cutting currents less than 300 amperes. Z49.1 adds that lighter filter shades may be used when the arc is hidden by the work piece. As this is normally the case with low current cutting, the shades suggested in Table 1 are provided for the operator's convenience.
Wear approved safety glasses with side shields under your helmet or shield.
Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.
NOISE can damage hearing.
Use approved ear plugs or ear muffs if noise level is high.

TECHNICAL DETAILS

Plasma Defined

Plasma cutters work by sending a pressurized gas, such as air, through a small channel. In the center of this channel, you'll find a negatively charged electrode. The electrode is at the center, and the nozzle is just below it. The swirl ring causes the plasma to turn rapidly as it passes. When you apply power to the negative electrode, and you touch the tip of the nozzle to the grounded work piece, the connection creates a circuit. A powerful spark is generated between the electrode and the metal. As the inert gas passes through the channel, the spark heats the gas until it reaches the fourth state of matter (plasma). This reaction creates a stream of directed plasma, approximately 30,000F (16,649C) or more and moving at 20,000 feet per second (6,096 per m/sec), that reduces metal to vapor and molten slag.

The plasma itself conducts electrical current. The cycle of creating the arc is continuous as long as power is supplied to the electrode and the plasma stays in contact with the metal that is being cut. The cutter nozzle has a second set of channels. These channels release a constant flow of shielding gas around the cutting area. The pressure of this gas flow effectively controls the radius of the plasma beam.

NOTE! This machine is designed to use only compressed air as the “gas”.

Voltage Regulation

The Automatic Voltage Compensation circuit prevents voltage loads from exceeding the maximum in accordance with the main technical data sheet to prevent against shorting the life of the machine.

Thermal Protection

The thermal protection circuits will engage if unit exceeds its maximum duty cycle. This will cause the machine to stop working. The indicator will be lit on the front of the machine. The fan will continue to run until unit cools down (if the fans stop check your circuit breaker). When it reaches an acceptable temperature, it will operate again.

Duty Cycle

Duty cycle is the percentage of on time (measured in minutes) in a 10-minute period in which the machine can be operated continually, in an environment of a specified temperature.

Exceeding duty cycle ratings will cause the thermal overload protection circuit to become energized and shut down output until the unit cools to normal operating temperature. Continual exceeding of duty cycle ratings can cause damage to the machine.

TECHNICAL DATA

DATA	CUT-40	CUT-50	CUT-60
	single phase220V	single phase 220V	single phase 220V
RATE INPUT POWER (KVA)	4.4	4.4	6.6
NO -LOAD VOLTAGE(V)	250	250	250
RATE OUTPUT CUR(A)	40	50	60
RATE OUTPUT VOLTAGE (V)	100	110	120
DUTY CYCLE (%)	30	30	30
CUT THICKNESS(MM)	13	14	15
WEIGHT(KG)	9	11	13
DIEMENSIONS(MM)	327*250*155	327*250*155	327*250*155

INSTALLATION

Unpacking

Unpack all items and verify that all items have been received according to the packing list enclosed. If there is any damage from shipping, report it to Everlast with 48 hours.

Operating Environment

Make sure working area is well ventilated. The unit is cooled by an axial-flow fan which provides airflow through the back panel over the electronics and out the machine cover vents. *(NOTE! The cover must be installed with the vents closest to the front of the machine).* Provide at least 6 inches in the rear and 6 inches on each side for air circulation. If unit is operated without sufficient cooling the duty cycle will be greatly reduced.

Input Power Cord Connection

Every machine includes a primary power cord capable of handling the input voltage and current for this unit. If the unit is connected to power that exceeds the required voltage, or is of the incorrect phase, serious damage will be incurred and warranty will become void.

This machine may operate on either 220 or 110/220 volts single phase 50/60hz depending upon which version you have. Proper input voltage can be determined by observing the labels next to the power cord strain relief and will be labeled 220 V or 110/220 volts for the dual-voltage machines.

Service must be fused for at least 40amps.

The Ground wire is yellow with a green stripe or solid green. This wire must be connected to the “ground” terminal of the power plug you use. The other two wires are to be connect to two hot 110volt legs for 220 volt operation. If you have the 110/220 volt unit, you can connect 110 or 220 to the unit and it will automatically detect the power internally and operate. Make sure you have the dual unit before hooking 110 volts to your unit as this could damage the unit.

If using an extension cord, make sure that it meets or exceeds the following recommendations: For 220 VAC Service Up to 50 ft. 14 AWG Up to 100 ft 12 AWG

Note: The input current required to produce the same output power is inversely proportional to the input voltage. Example: If the machine draws 22 amps @ 220 volts it will draw 44 amps @ 110 volts to produce the same power output. This is a law of electronics theory… Power = Volts * Amps

INSTALLATION *(continued)*

CONNECTIONS

Torch Connection

Connect the Torch to the inverter by screwing the air line fitting on the end of the torch to the torch connector fitting on the front of the machine.

Secure by tightening with wrench slightly. DO NOT OVER TIGHTEN!

Air Connection

Connect the supplied are hose and regulator to the air nipple located on the back of the unit. Using the supplied host clamps

TORCH ASSEMBLY

Torch Assembly Procedure

Position the torch with the shield cup facing upward and unscrew and remove the shield cup from the torch head assembly.

Unscrew the electrode.

Install the new electrode, and tip. Replace worn parts, as necessary.

Install and hand tighten the shield cup until it is seated on the torch head. If resistance is felt when installing the cup, check the threads and parts before proceeding.

Note: On torches that do not have reversible electrodes it will be necessary to secure the electrode by slightly tightening it with pliers to assure reliable electrical connection.

OPERATION

To Begin

Turn the Power Switch to the ON position.

Position yourself to where you can read the air pressure. Press the torch switch (air will exhaust from torch, adjust the air regulator to read approximately 60 to 70 pounds (PSI) and release torch switch.

Note: The Air pressure has a generally acceptable range of 50 to 80 PSI. You may experiment as desired, but be careful not to lower the pressure too much as consumable damage will occur.

Secure ground clamp to work piece. Connect clamp to main part of your work piece, and not the part being removed (the part that might fall to the floor.

Cutting

Drag Cutting

Position torch tip slightly above work piece, press torch switch and lower torch tip toward work piece until contact is made and a cutting arc is established. After the cutting arc is established, move the torch in the desired direction keeping the torch tip slightly angled, maintaining contact with the work piece.

This methodology is called Drag-Cutting. Avoid moving too fast as would be indicated by sparks radiating from the top side of work piece. Move the torch just fast enough to maintain sparks concentration at the underside of the work piece and making sure the material is completely cut through before moving on. Adjust drag speed as desired/required.

Stand-off Cutting

In some cases, it may be beneficial to cut with the torch tip raised above the workpiece approximately 1/16" to 1/8” to reduce material blow-back into the tip and to maximize penetration of thick material cuts. An example of "stand-off cutting" would be used when penetration cutting or gouging operation is being performed. You can also use “stand-off” technique when cutting sheet metal to reduce the chance of splatter-back tip damage.

Piercing

For piercing, position the tip approximately 1/8" (3.2 mm) above the work piece. Angle the torch slightly to direct sparks away from the torch tip and operator.

Initiate the pilot arc and lower the tip of the torch until the main cutting arc transfers, sparks start.

Start the pierce off the cutting line on the scrap piece or template and then continue the cut onto the cutting line.

Hold the torch perpendicular to the work piece after the pierce is complete and continue cutting as desired.

Clean spatter and scale from the shield cup and the tip as soon as possible.

OPERATION *(continued)*

Quality Cuts

Dross (slag) is the excess material that spatters and builds up on the underside of the work-piece as you cut.

Dross occurs when the operating procedure and technique is less than optimal. It will require practice and experience to obtain cuts without dross. Although less than optimal cuts will contain dross, it is relatively easy to remove by breaking it off using pliers or chipping off with a chisel or scraping or grinding the finished cut as needed and is generally only a minor inconvenience.

A combination of factors contribute to the buildup of dross. They include material type, material thickness, amperage used for the cut, speed of the torch across the work-piece, condition of the torch tip, input line voltage, air pressure, etc. Generally there is an inversely proportional relationship between output current and speed of cut. Do not use more output current than is necessary and adjust speed of cut toward minimizing dross buildup on underside of cut. Experiment with adjusting current and speed to minimize dross.

For more specific issues regarding quality of cuts and general operation, go to the Troubleshooting section of this manual.

MAINTENANCE

Each Use

Each time you use the plasma cutter; check the Torch, Tip/Nozzle, Electrode and Shield Cup.

Inspect Torch for any wearing, cracks or exposed wires. Replace or repair before use.

A worn Torch Tip/Nozzle contributes to reduced speed, voltage drop and crooked cuts.

A worn Tip/Nozzle is indicated by an elongated or oversized orifice.

The face of the electrode should not be recessed more than 1/8". Replace if worn beyond this point.

If the Shield Cup does not go on easily, check the threads.

Check for proper fan operation.

Weekly

Blow or vacuum any dust and dirt from of the entire machine.

Check your air and moisture filter/seperator.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Torch will not come on	Power Switch Off	Turn Power Switch to the On Position
	Air supply is compromised	Another indication of this is a more green flame Check air supply.
	Work piece Ground Clamp not attached.	Attach to work piece or to steel table with work piece securely clamped to table.
Sparks are shooting upward Instead of down through the Material.	Plasma Torch is not piercing the material.	Increase current.
	Torch may too far away from stock	Decrease the distance of your torch to stock
	Material may not be grounded properly	Check connections for proper ground.
	Travel speed too fast	Reduce speed
Beginning of cut not completely pierced	Possible connection problem	Check all connections
Dross build-up on parts of cuts	Tool/Material building up heat	Allow material to cool then continue cut.
	Cutting speed too slow or Current to high.	Increase speed and/or reduce current until dross is reduced to minimum.
	Worn torch parts	Inspect and repair or replace worn parts.
Arc stops while cutting	Cutting speed too slow	Increase speed until problem solved
	Torch is too high, away from material	Lower torch to recommended height
	Worn torch parts	Inspect and repair or replace worn parts
	Work piece ground cable disconnected	Connect Work piece Ground Clamp to work-piece or steel table.
Insufficient penetration	Cutting speed too fast	Slow travel speed
	Torch tilted too much	Adjust tilt.
	Metal too thick	Several passes may be necessary
	Worn torch parts	Inspect and repair or replace worn parts
Consumables wear quickly	Exceeding unit capability	Material too thick, increase angle to prevent blow back into torch tip.
	Excessive Pilot arc time	Do not pilot for more than 5 seconds. You can also start with torch in contact with metal or within 1/16” of metal.
	Improperly assembled torch	See section titled “Torch Assembly”
	Inadequate air supply, pressure too low.	Check air filter, increase air pressure.
	Faulty air compressor	Check air compressor operation and make sure input air pressure is at least 100 PSI

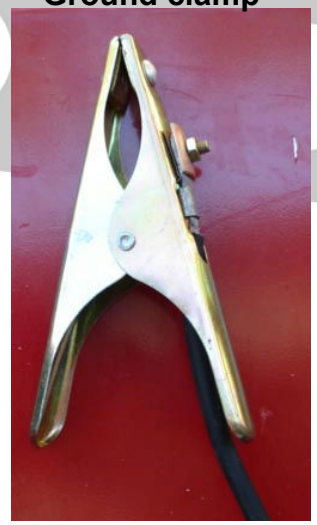
PACKING LIST

NAME	QUANTITY	REMARK
Inverter	1	Main unit
Cutting Torch	1	
Air Regulator/Filter	1	part
Ground Clamp	1	
Air Tube Fitting	2	For Regulator connection
Shield Cup	2	part
Electrode	5	part
Tip nozzle	5	part

Front of Everlast Cut50D

Torch

Ground clamp



Fan

Power Switch | Power cord | Air inlet

Back

FAQ (frequently asked questions)

(Q) How do I wire my units power cord and plug?

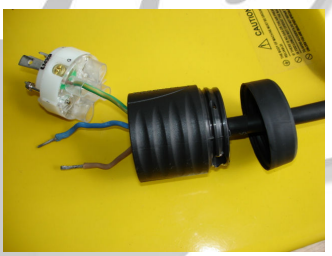
(A) All EVERLAST units work with 220volts AC (it's always recommend using 220VAC), *some* units will work with 110VAC. Make sure you have a 110VAC unit before trying to run your unit on 110VAC. It's VERY HARD to miss-wire your unit as long as you hook the **green or green/yellow GROUND** wire to the **ground terminal** on your power plug **first.** *See the diagram that came with your power plug and* ***PLEASE make sure the power its OFF.*** After you connect the **GROUND** wire to the **ground terminal**, connect the two remaining hot wires to the two remaining terminals, one wire to one terminal, the other wire to the other terminal. *Note: Be sure to checked the unit specs for power and amperage of your power plug, outlet and circuit breaker size. If you use a 4 terminal 200VAC plug (for generator compatibility), NEUTRAL is NEVER used on 220VAC plugs and operation.*

If you're not qualified to wire the unit, please hire an professional electrician.

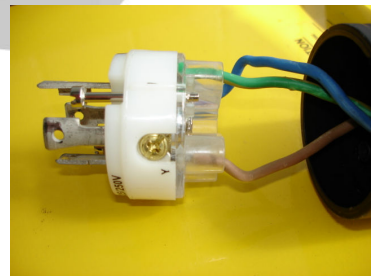
When wiring for 220VAC, first connect the ground wire to the ground terminal (see the diagram that came with your plug), then connect the two hot wires to the other two remaining terminals (you can connect either wire to either terminal).

When wiring a 110VAC unit for 110VAC operation, wire the ground first (as with the 220VAC), then the other two wires to the remaining two terminals on the 110VAC plug. The unit will automatically adjust for neutral as there is a neutral prong on a 110VAC plug.

An example of a 4 prong 220VAC/30AMP twist lock plug wired for 220VAC (we will **not** use neutral; 4th prong (W)). Only the X and Y (hot mains) and GROUND (GREEN). If you use a three prong 220VAC plug, a neutral will not be present or needed. Start by wiring GREEN GROUND wire to the ground terminal after sliding on your cap and seal (see below right).
Make sure there are no frayed wires and the plug terminals are tight.



Above left is a 4 prong male plug (250VAC/30AMP), plug cap, rubber cap seal and the cord from the welder. Use this same procedure on 3 prong (250VAC) plugs (there's no neutral on the 250VAC "three" prong plugs). The above right picture shows the seal and cap on the cord and the ground wire connected to the ground terminal, note the green on the ground terminal (green wire goes there).



Above left, is ground connected and one hot leg (X). Above right is the other hot leg connected (Y). There is no neutral wire on the 220VAC welder, so the (W) neutral terminal is not used. At this point screw on the cap, push on the rubber seal and back to reading the manual. This connector was picked as it will hook to most generators and twist locks in the socket so the cord will not fall out.

A note from Everlast Products.

This is a new manual for the Cut40//50/60/100D products. It can be used for all the Cut sizes.

We hope you like the new version. We will be adding to the FAQ as more questions come into our technical support group. We will make updates to it on an on going bases. Updates will be available on the everlastgenerators.com website via a link.

Please send any recommendations or corrections (as we know some professionals use our units).

Thank you for your purchase, and spread the word about Everlast products.

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