



# Manual Guide

## ARC 160 MICRO

### MMA STICK WELDER



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# Safety Info

## SAFETY INFO AND TIPS

# WARNING

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. IF WEARING A PACEMAKER KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

Welding products and welding processes can cause serious injury or death, damage to other equipment or property, if the operator does not observe all safety rules and take precautionary measures.

Safe practices are developed from past experience in the use of welding and cutting equipment. These practices must be learnt through study and training before using this equipment. Some of these practices apply to equipment connected to mains power; others apply to engine driven equipment. Anyone not having extensive training in the safe and proper usage of welding and cutting equipment, should not attempt to use this equipment without proper supervision.

Safe practices are outlined in the Australian Standard AS1674.2:2007 entitled: Safety in Welding and Allied processes Part 2: Electrical. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions. HAVE ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

## ARC WELDING HAZARDS

Touching live electrical parts or components can potentially cause fatal shocks or severe burns. The electrode and work circuit is a live electrical circuit when the output is connected and machine turned on. The input power circuit and machine internals are also live when power is connected and turned on.

In semi-automatic or automatic wire welding (eg MIG), the wire, wire reel, drive roll housing and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a potential hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers,
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owners Manual and national, state and local codes.
6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip the holder in water or any other liquid, to cool it or lay it down on the ground or on the work surface. Do not touch the holders connected to multiple welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (Earth) ground.
11. Do not touch electrode while in contact with the work (Ground) circuit.
12. Use only well maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with an AC output unless it is equipped with a voltage reduction device. Use equipment with a DC output.
14. Wear a safety harness to prevent falling if working above floor level.
15. Keep all panels and covers securely in place.

\*PLEASE NOTE THAT ANY MODIFICATION TO THE OPERATION OF THE MACHINE IN ANY PART SMALL OR LARGE MAY INCREASE THE RISK OF HARM OR SAFE OPERATION AND VOID WARRANTY.

## ARC RAYS

ARC RAYS can burn eyes and skin; NOISE can damage hearing. ARC RAYS from the welding process produce an intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

1. Use a Welding Helmet or Welding Face Shield fitted with proper shade or filter for the application, to protect your face and eyes when welding or watching someone else weld.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens and/or barriers, to protect others from flash and glare and warn others not to watch the arc.
4. Wear protective clothing made from durable, flame resistant material (eg: wool and leather) and appropriate foot protection.
5. Use approved ear plugs or ear muffs if the noise level is high.
6. Never wear contact lenses while welding.

## FUMES AND GASES

FUMES and GASES can be hazardous to your health and Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the path of fumes as best you can. Do not breathe the fumes if it can be avoided.
2. If inside, ventilate the area and/or use exhaust at or as close to the arc as possible to remove the welding fumes/gases.
3. If ventilation is poor, use an approved air supplied or filtered respirator.
4. Read the Material Safety Data Sheets (MSDS's) and the manufacturer's instruction for metals, consumables, coatings and cleaners.
5. Work in confined space only if it is well ventilated, or while wearing an air supplied or filtered respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near flammable liquids (eg. degreaser, paint, aerosol storage or cleaning chemicals), as the heat and rays of the arc could react with vapours to form highly toxic and irritating or flammable gases.
7. Do not weld on coated metals, such as galvanized, lead or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated and if necessary, while wearing an air supplied or filtered respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.
8. Protect yourself and others from flying sparks and hot metal.
9. Do not weld where flying sparks can strike flammable material.
10. Remove all flammables within a 35ft (10.7m) of the welding arc. If this is not possible, tightly cover them with an approved containment method.

## FIRE & EXPLOSIONS

The WELDING operation can potentially cause fire or an explosion as Sparks and spatter are emitted from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece and hot equipment have potential to cause fires and burns. Accidental contact of the wire or electrode to grounded metal objects may cause sparks, overheating or fire.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35ft (10.7m) of the welding arc. If this is not possible, tightly cover them with an approved containment method.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulk-head or partition can cause a fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect the work cable to the workpiece as close to the welding area as practical, to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use a welder to thaw frozen pipes.

## SPARKS AND HOT METAL





Chipping and grinding can cause flying metal. As welds cool, they can throw off slag.

1. Wear an approved face shield, safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.

# Specifications

## MACHINE SPECS

This information can be found on top of the machine.

DC MMA WELDING MACHINE					
MODEL: ARC 160 MICRO					
<div>1~</div>					
		20A/21.2V ~ 160A/26.4V			
		X	35%	60%	100%
	U <sub>0</sub> V 70	I <sub>2</sub>	160A		102A
		U <sub>2</sub>	26.4V		24V
Cooling Mode: Fan Cooling		Insulation Grade: F			

## ARC 160 MICRO

Input Voltage (V) 240 A/C

Frequency (Hz) 50 Hz

Output Current Range (A) 20 - 160 A

Rated Duty Cycle (%) 35% @ 160A

Machine Weight 2 Kg

Machine Dimensions (mm) 205x90x140

Warranty 3 Years

# ARC Welding Technique

## FOR BEGINNERS

### A Word To Beginners

For those who have not yet done any welding, the simplest way to commence is to run beads on a piece of scrap plate. Use a mild steel plate, around 6mm thick and a 3.2mm electrode.

Clean any paint, loose scale or other contaminants from the plate, and set it firmly on the workbench so that welding can be carried out in the downhand position.

Make sure that the work clamp is making good electrical contact with the work piece, either directly or through the work table.

For light gauge material, always clamp the work lead directly to the job, otherwise a poor circuit may result.

### The Welder

Place yourself in a comfortable position before beginning to weld. Get a seat of suitable height and do as much work as possible sitting down comfortably. Don't hold your body tense. A taut attitude of mind and a tense body will soon make you feel tired.

Relax and you will find that the job becomes much easier. You can add much to your peace of mind by wearing a leather apron and gauntlets. You won't be worrying then about being burnt or sparks setting your clothes alight.

Place the work so that the direction of welding is across, rather than to or from your body. The electrode holder lead should be clear of any obstructions so that you can move your arm freely along as the electrode burns down. If the lead is slung over your shoulder, it allows greater freedom of movement and takes a lot of weight off your hand.

Be sure the insulation on your cable and electrode holder is not faulty, otherwise you are risking an electric shock.

### Rate of Travel

After the arc is struck, your next concern is to maintain it, and this requires moving the electrode tip towards the molten pool at the same rate as it is melting away. At the same time, the electrode has to move along the plate to form a bead. The electrode is directed at the pool at about 20° from the vertical plane.

The rate of travel has to be adjusted so that a well-formed bead is produced. If the travel is too fast, the bead will be narrow and strung out and may even be broken up into individual globules. If the travel is too slow, the weld metal piles up and the bead will be too large.

### Striking An Arc

Practice this on a piece of scrap plate before going on to more exacting work. You may at first experience difficulty due to the tip of the electrode "sticking" to the workpiece. This is caused by making too heavy a contact with the work and failing to withdraw the electrode quickly enough. A low amperage will accentuate this. The freezing-on of the tip may be overcome by scratching the electrode along the surface of the workpiece in the same way a match is struck.

As soon as the arc is established, maintain a 1.6mm to 3.2mm gap between the burning electrode end and the parent metal. Draw the electrode slowly along as it melts down.

Another difficulty you may encounter is the tendency that after the arc is "struck", to withdraw the electrode so far that the arc is broken again.

A little practice will remedy both the aforementioned faults.

### Arc Length

The securing of an arc length necessary to produce a neat weld, soon becomes almost automatic.

You will find that a long arc produces more heat. A very long arc produces a crackling or spluttering noise and the weld metal comes across in large, irregular blobs. The weld bead is flattened and spatter will increase.

A short arc is essential if a high quality weld is to be obtained although if it is too short, there is the danger of it being blanketed by slag and the electrode tip being solidified in.

If this should happen, give the electrode a quick twist back over the weld to detach it. Contact or "touch-weld" electrodes do not stick in this way, and make welding much easier.

# Installation

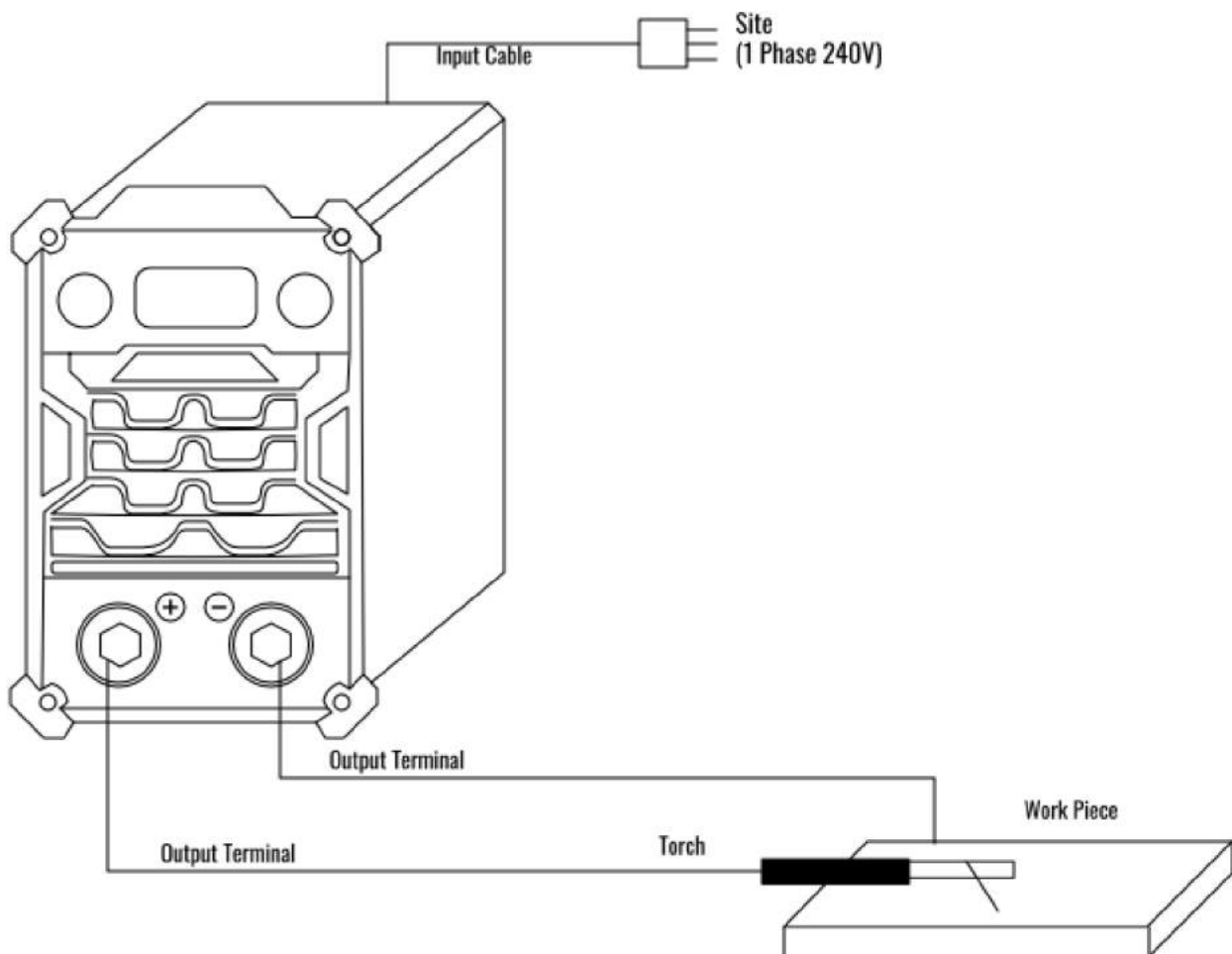
## AND OPERATION

Make sure that the supply voltage matches the voltage requirements indicated. (15% deviation is allowed)

If you increase the length of the leads, be aware that possible damage may occur with excessively long leads.

- Ground the unit with a minimum of 6mm<sup>2</sup> (10 gauge) wire to the earth ground as the drawing.
- Connect the earth lead connector to the negative (-) quick-connection terminal, and turn clockwise to tighten.
- Connect the electrode clamp holder to the positive (+) quick-connection terminal and turn clockwise to tighten.

**CAUTION:** Make sure the above connection for direct polarity welding; for inverse/reverse polarity, invert the connection: earth lead CONNECTOR to the quick-connection positive (+) terminal and the electrode holder clamp connector to the negative (-) terminal.





# Fixes and Faults

## TROUBLESHOOTING

Fault	Resolution
Power indicator lit Fan not running and no Welding input	<p>A. Ensure power is turned off.</p> <p>B. Ensure power is connected properly.</p> <p>C. Heat sensor resistance incorrect or faulty. (24V relay has a fault)</p> <p>D. Power source board (Board has problem, no DC537V output voltage.)</p> <ol style="list-style-type: none"> <li>Silicon bridge circuit faulty or cable is loose.</li> <li>Part of the circuit board burnt.</li> <li>Check cable between switch and power source board. Power board between MOS board.</li> <li>Sub power source on control board faulty. Contact distributor or manufacturer.</li> </ol>
Fan running and Fault indicator lit. No output power.	<p>A. Check all components are correctly connected.</p> <p>B. Check if the output terminal has a broken circuit and poor connection.</p> <p>C. Inverter circuit faulty;</p> <ol style="list-style-type: none"> <li>If Fault indicator lit: MOS board faulty, check and replace.</li> <li>If Fault indicator not lit: <ol style="list-style-type: none"> <li>Transformer on Middle Board faulty, measure primary inductance volume and Q volume of main transformer by inductance bridge. Primary volume of parallel circuit, <math>L=1.2-2.0\text{MH}</math>, <math>Q&gt;40</math> if inductance volume and Q volume is low, replace it.</li> <li>Check the secondary rectifier tube on the transformer. If faulty replace.</li> <li>Feedback circuit in fault.</li> </ol> </li> </ol>
Power indicator not lit, fan not running and no welding output.	<p>A.) Make sure the power switch is turned off.</p> <p>B.) Make sure power supply and all cables are securely connected and power supply is working.</p>
Power indicator lit, fan not running and no weld- ing output.	<p>A. Connected to incorrect power source has enabled machine protection circuit, connect to correct power supply and check machine for operation.</p> <p>B. Input power not stable (input cable too small) or input cable incorrectly connected to power supply has caused protective circuit to be enabled. Check connections and turn off the machine for 5-10minutes. Turn the machine on and check for operation.</p> <p>C. Turning the machine power switch ON and OFF too quickly has enabled the protection circuit. Turn the machine off for 5-10 minutes. Turn on and check for operation.</p> <p>D. Power supply cables/plugs are loose. Turn Machine off and Check for proper connection of all power supply cables/plugs and check for operation.</p>

Fault	Resolution
Fan running, welding current not stable or out of control, current varying between high and low amperage.	<p>A. 1K potentiometer is faulty, replace</p> <p>B. Output terminal is faulty or poorly connected.</p>
Fan is running and Fault indicator is lit but there is no welding current.	<p>A. Check if components have poor contact.</p> <p>B. Check connection of output terminal and check for broken circuit or poor connection.</p> <p>C. Check voltage between PCB and MOS boards(VH-07) (approx 380V DC)</p> <p>D. If the green indicator light is not lit on MOS board, return to the distributor or agent.</p> <p>E. If the Control circuit faulty, please contact the distributor or agent.</p>
Fan running and Fault indicator is lit but no output current.	<p>A. Over current protection circuit enabled. Turn off the machine and wait 5-10 minutes. Once the Fault indicator is not lit, Inspect machine internally.</p> <p>B. Overheat protection circuit is enabled. Wait 2-3 minutes.</p> <p>C. Inverter circuit in fault.</p> <p>1.) If the fault indicator is still lit, MOS damaged, check and replace.</p> <p>2.) If Fault indicator not lit;</p> <p>i. Middle board transformer potentially faulty. Measure primary inductance volume and Q volume of main transformer by inductance bridge.</p> <p>ii. Primary volume is parallel circuit, L=1.2-2.0Mh. Q&gt;40 if inductance and Q volume is low, Replace it.</p> <p>iii. Secondary rectifier tube of the transformer is faulty. Check for faults and replace the rectifier tube.</p> <p>D. Feedback circuit is faulty.</p>

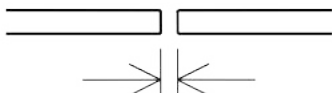
## Joint Preparation

In many cases, it will be possible to weld steel sections without any special preparation. For heavier sections and for repair work on castings, etc, it will be necessary to cut or grind an angle between the pieces being joined to ensure proper penetration of the weld metal and to produce structurally sound joints.

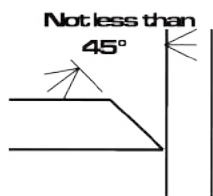
In general, surfaces being welded should be clean and free of rust, scale, dirt, grease, etc. Slag should be removed from oxy-cut surfaces. Typical joint designs are shown in Figure 6-10.

### Open Square Butt Joint

Gap varies from 1.6mm (1/16") to 4.8mm (3/16") depending on plate thickness



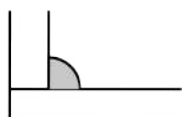
### Single Vee Butt Joint



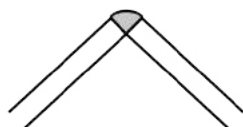
### Lap Joint



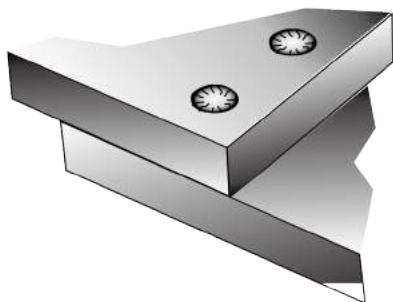
### Fillet Joint



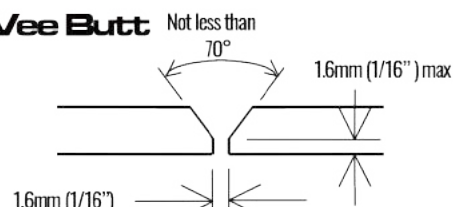
### Corner Weld



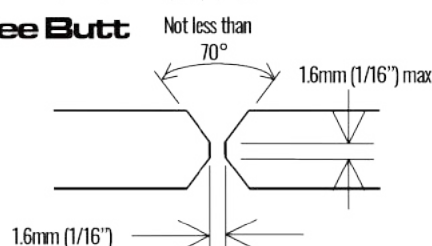
### Plug Weld



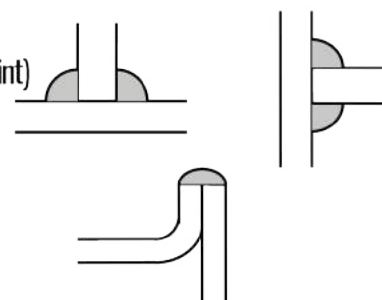
### Single Vee Butt Joint



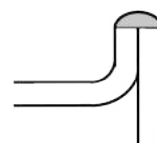
### Double Vee Butt Joint



### Tee Joints (Fillet both sides of the joint)



### Edge Joint



### Plug Weld



## Welding Position

The electrodes dealt with in this publication can be used in most positions, i.e. they are suitable for welding in flat, horizontal, vertical and overhead positions. Numerous applications call for welds to be made in positions intermediate between these.

## Arc Welding Practice

The techniques used for arc welding are almost identical regardless of what types of metals are being joined. Naturally enough, different types of electrodes would be used for different metals as described in the preceding section.

# Accessories and Consumables

## PARTS AND SPARES

### HAND PIECE

Earth Clamps	300 Amp 400 Amp 500 Amp	ACCLP300 ACCLP400 ACCLP500
Magnetic Earth Clamps	300 Amp 800 Amp	MAWEC300 MAWEC800
Electrode Holders - Twist Lock	200 Amp 300 Amp 400 Amp	ACEHTL200 ACEHTL300 ACEHTL400
Electrode Holders - Tong Type	200 Amp 300 Amp 400 Amp 500 Amp	ACEHTT200 ACEHTT300 ACEHTT400 ACEHTT500

### ELECTRODES

6013 General Purpose	2.5mm 0.5kg pack 3.2mm 0.5kg pack	CETG6013GP0525 CETG6013GP0532
316L-16 Stainless Steel	2.5mm 0.5kg pack 3.2mm 0.5kg pack	CETG316L160525 CETG316L160532
312-16 Dissimilar Metals	2.5mm 0.5kg pack 3.2mm 0.5kg pack	CETG312160525 CETG312160532
7016 Low Hydrogen	2.5mm 0.5kg pack 3.2mm 0.5kg pack	CETG70160525 CETG70160532
Hard Facing	3.2mm 0.5kg pack	CETGHF0532
Cast Iron	Combo pack Contains: 5 x 2.4MM 5 x 3.2mm 10 x 4.0mm	CETGNIFECOMBO

### ACCESSORIES

Chipping Hammer	Rubber Handle Spring Handle	ACMCH1 ACMCH2
Welding Pliers	8" Welding Pliers	TGACPLIER
Wire Brush	3 Row Steel 4 Row Steel 3 Row Stainless 4 Row Stainless	ACB3 ACB4 ACB421 ACB420

# HELMETS



Model	Part No.
Topgun Warrior Series Auto Darkening Welding Helmet	Gloss Black - TGHWARGBLK Blue Inferno - TGHWARBLUINF Red Inferno - TGHWARINFerno Carbon Fibre - TGHWARCFIBRE
Warrior Helmet Harness	TGTHH
Warrior Helmet Inner Lens Pk5	TGHLWI
Warrior Helmet Outer Lens Pk5	TGHLWO



Model	Part No.
Topgun TITAN Series Auto Darkening Welding Helmet	Shadow - TGHTSHAD Cold Carbon - TGHTCCARB Bionix - TGHTBION Envious - TGHTENVI Robot - TGHTROBO Rich Smoke - TGHTRICH
TITAN Helmet Harness	TGTHH
TITAN Helmet Inner Lens Pk5	TGHLTI
TITAN Helmet Outer Lens Pk5	TGHLTO

# APPAREL

Welding Jackets	Hi-Vis Welding Jacket	TGACWJHVL TGACWJHVXL TGACWJHVXXL TGACWJHVXXXL
	Professional Leather Welding Jacket	TGACWJRBL TGACWJRBXL TGACWJRBXXL TGACWJRBXXXL
Gloves	Blue/Yellow Welding Gloves	TGACGBY
	Gold/Red Welding Gloves	TGACGRG
	Premium Black/White	TGACGBWP
	Premium Black/Red	TGACGBRP
	Alumized	TGACGAL
Welding Sleeves		TGACSL1
Welding Apron		TGACAP1
Welding Spats		TGACSP1
Welding Hoods	Leather	TGACLHOOD
	Fire retardant cotton	TGACPBHOOD







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