parweld

WELDING THE FUTURE

INSTRUCTION MANUAL

TIG / GTAW INSTALLATION AND OPERATIONAL PROCEDURES MANUAL

SAFE HANDLING OF GAS CYLINDERS & REGULATORS

Compressed Gas cylinders should be handled carefully and should be secured when stored or in use. Knocks, falls or rough handling may damage cylinders and valves causing leakage and potential accidents.
The following should be observed when setting up and using cylinders of Gas:

1. Properly secure the cylinder.
2. Before connecting a regulator purge the valve of dust and debris.
3. When a regulator is attached to a cylinder it should be in a fully closed condition. Once the cylinder valve has been opened slowly, the adjusting screw on the regulator should be adjusted slowly until the correct pressure is obtained.
4. When not in use the cylinder valve should be shut off and the regulator closed down.

METAL FUMES

The welding fumes generated in the TIG / GTAW process can be controlled by general ventilation, localised exhaust or respiratory protective equipment. The method of ventilation required to keep the level of toxic substances in the breathing zone below acceptable occupational exposure levels depends on a number of factors. Among them, the material being welded, the type of gas and filler metal used, the size of the work area and the degree of normal air movement.
Each operation has to be evaluated on an individual basis to determine what will be required.
Further information and methods of sampling are available in "The facts about Fume" published by
The Welding Institute, Abingdon.
www.twi.co.uk.

GASES

The major toxic gases associated with the TIG welding process are ozone, nitrogen dioxide, carbon monoxide and phosgene gas.

Ozone

The ultraviolet light emitted by the welding arc reacts with the oxygen in the surrounding atmosphere to produce ozone. Present test results indicate the average concentration of ozone generated in the TIG process does not present a hazard under good ventilation conditions.

Nitrogen Dioxide

Test results show that high concentration of nitrogen dioxide are found only within 150mm of the welding arc. With natural ventilation these concentrations are quickly reduced to acceptable levels if the welders breathing zone is free of the fume plume.

Phosgene Gas

The dangers of phosgene gas are normally attributable to the presence of cleaning and degreasing agents in the welding zone.
Phosgene gas can be present as a thermal or ultraviolet decomposition of chlorinated hydrocarbon cleaning agents such as trichlorethylene and perchlorethylene.
Degreasing or other cleaning operations involving chlorinated hydrocarbons should be performed where vapours from these operations are not exposed to radiation from the welding arc.

RADIANT ENERGY

The levels of ultraviolet radiation produced by the TIG welding process generally increases with current. The highest intensities are produced with argon based gases and when welding aluminium and stainless steel.
Welders should be fully clothed with dark leather or woollen clothing. Dark clothing reduces reflection particularly underneath the welding helmet where reflected ultraviolet burns can occur to the face and neck.
Ultraviolet radiation can cause rapid disintegration of cotton-based clothing.
To provide adequate protection for the eyes filter lenses conforming to BS679 should be used.

Table 1

Recommended Lens Shades for Various TIG Current Ranges

Welding Current A	Recommended Shade No
Up to 75	8
75-200	10
200-400	12
Above 400	14

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ELECTRIC SHOCK

Input voltages to power supplies can vary from 24 volts to 415 volts. Welders and service personnel should exercise caution during maintenance and service procedures.

Note: Even mild shocks can cause voluntary muscular contraction which can lead to falls. The severity of the shock is determined by its path, duration and the amount of current flowing. Damp clothing from perspiration or wet conditions reduces the contact resistance and increases the likelihood of shock.

Particular care should be taken when using TIG torches in conjunction with high frequency. Never strike high frequency on your finger or clothing.

GENERAL

Keep the work area tidy and clean to prevent fire, slipping or tripping. When equipment is left unattended or is finished with disconnect all mains and gas supplies. Never service or clean equipment with the power connected.

INSTALLATION

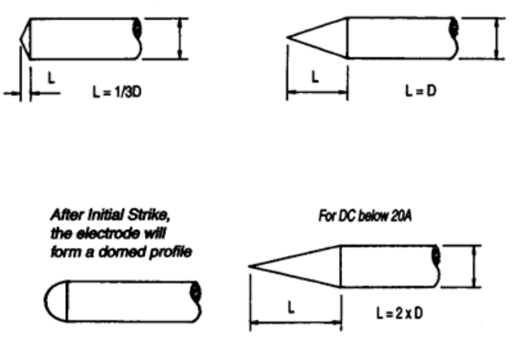
Your Parweld TIG torch will be have been delivered in accordance with your order specification.

It may or may not be fitted with a switch and consumable parts.

Depending on the application, the correct collet, collet body, gas cup, electrode and electrode tip configuration should be fitted see **Table 2**

Electrode Grinding

Figure 1



Further advice on recommended electrode types, tip configuration and process variations are available in the Parweld TIG / GTAW process synopsis on www.parweld.com.

You are now ready to connect the torch to the power source and gas supply.

Once connected check you have adequate gas flow.

An inexpensive flow meter is available from Parweld, Reference 806001.

If the torch being set is water-cooled ensure you have the recommended water flow rate.

Note. It is essential to ensure adequate flow of clean, cool water to prevent irreparable torch failure, a minimum of 1.2 l/m is recommended.

Parweld recommend the use of its XTS water recirculation system designed specifically for use with all water cooled Mig, Tig and Plasma torches.

The Parweld XTS water recirculation equipment can be fitted with a fail-safe flow protection device to prevent expensive torch overheating or meltdown.

Note: Water flows into the torch through the blue (cold) hose or the hose marked W (water). This delivers the coolest water to the prime source of heat, the torch body and consumables. The recirculated water is then passed through the torch power cable to cool the power cable as it is returned to the recirculating device.

Ensure you have all air removed from the water-cooling circuit before welding.

OPERATION

Once the installation guidelines have been followed you are ready to weld.

When using the torch do not exceed its published current carrying capacity and duty cycle rating.

DUTY CYCLE

The duty cycle of a torch expresses the maximum time a torch can deliver its rates output during a test period without exceeding the temperature limits of its components.

European ratings are generally based on a 5-minute cycle. Therefore a 60% duty cycle implies a 3-minute weld period followed by a 2-minute break. A 100% duty cycle is equal to continuous welding.

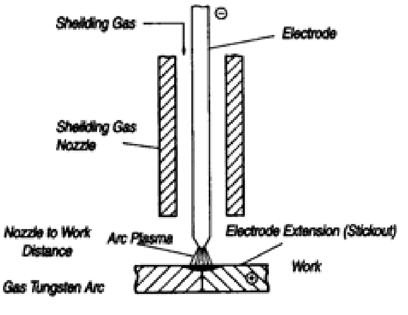
Table 2

	DC								AC							
Electrode Diameter (mm)	0.5	1.0	1.6	2.4	3.2	4.0	4.8	6.4	0.5	1.0	1.6	2.4	3.2	4.0	4.8	6.4
Maximum Welding Current (Amps)																
Thoriated Electrode	20	60	70	120	200	300	370	500	15	25	50	80	120	160	200	320
Zirconiated Electrode									15	25	50	80	120	160	200	320
Ceriated/Lanthanum Electrode		60	70	120	200	300	370	500		25	50	80	120	160	200	320
Ceramic Nozzle Bore Size (mm)																
Thoriated Electrode	6	6	6	101	11	13	13	18	6	6	6	10	131	13	113	18
Zirconiated Electrode	8	8	8	11	13	18	18		8	8	8	11	13	18	18	
Ceriated/Lanthanum Electrode			10	13	18							10		18		

ELECTRODE STICK OUT

Generally the electrode should not 'stick out' more than 10mm from the welding nozzle.

Figure 2



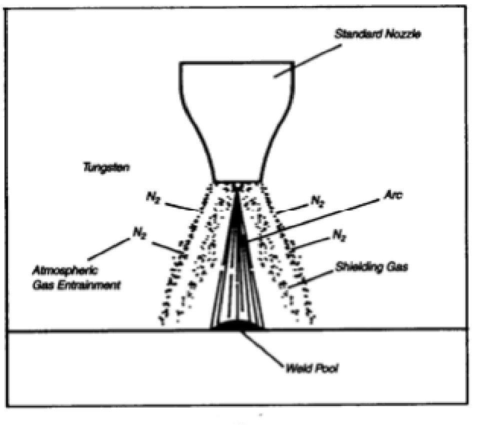
When an extended arc length is required or to reduce the risk of atmospheric weld defects due to poor shielding, a gas lens collet body should be used.

Gas Lens bodies offer advantages of;

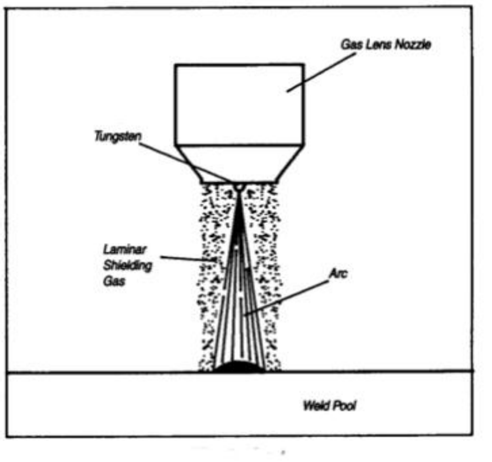
- smooth columnar gas flow reducing the risk of atmospheric gas entrainment
- reduced risk of weld defects in drafty conditions
- longer arc lengths to improve visibility
- slightly increased levels of performance and reduced gas consumption

Figure 3

Laminar flow with Normal and Gas Lens Consumables



Normal



With Gas Lens

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If any operational problems occur consult the trouble-shooting guide at the rear of this guide.
Full specification and parts identification numbers are available in the individual product brochures or direct on www.parweld.com

MAINTENANCE, SERVICE TIPS AND ADVICE
Periodically remove the nozzle, head insulators, collet and collet body and inspect for wear and damage. Any worn or damaged parts should be changed immediately.
Care should be taken not to let torch leads contact any hot surfaces. When the torch is not in use for prolonged periods ensure the high frequency switch is off.
It the torch has not been used for 15 minutes or more purge the gas line.
Always ensure adequate gas and water flow prior to welding.

To prevent electrode oxidisation and aid electrode cooling an adequate post flow is recommended.
The inclusion of a torch coolant containing corrosive retardants in the water supply is strongly recommended.

Cleanliness of both the weld joining areas and filler metals are an important consideration in the TIG process. Oil, grease, dust, paint or marking crayon and corrosion deposits must be removed from the immediate joint area.
The chief causes of arc instability and contaminated welds are;

- Contact of electrode tip with molten weld pool
- Contamination of electrode tip by weld pool spatter
- Contact of filler metal with electrode tip
- Exceeding the current carrying capacity of a given electrode size
- The extension of an electrode beyond the recommended distance from the collet
- Inadequate tightening of collets and back caps
- Inadequate shielding flow or excessive drafts
- Electrode arc wander or defect in the electrode surface
- The use of improper shielding gas

Trouble Shooting Guide for Gas Tungsten Arc Welding

Problem	Cause	Remedy
Excessive Electrode Consumption	1. Inadequate gas flow 2. Operating on reverse polarity 3. Improper size electrode for current required 4. Excessive heating in holder 5. Contaminated electrode 6. Electrode oxidation during cooling 7. Using gas containing oxygen or CO^2	1. Increase gas glow 2. Use large electrode or change to straight polarity 3. Use larger electrodes 4. Check for proper collet contact 5. Remove contaminated portion. Erratic results will continue as long as contamination exists 6. Keep gas flowing after stopping arc for at least 10 – 15 seconds 7. Change to proper gas
Erratic arc	1. Base metal is dirty or greasy 2. Joint too narrow 3. Electrode is contaminated 4. Arc too long	1. Use appropriate chemical cleaners, wire brush or abrasives 2. Open joint groove, bring electrode closer to work, decrease voltage 3. Remove contaminated portion of electrode 4. Bring holder closer to work to shorten arc
Porosity	1. Entrapped gas impurities (hydrogen, nitrogen, air, water, vapour) 2. Defective gas hose or loose hose connections 3. Oil film on base metal	1. Blow out air from all lines before striking arc. Use welding grade (99.99%) inert gas 2. Check hose and connections for leaks 3. Clean with chemical cleaner not prone to break up in arc. Do not weld when wet

Problem	Cause	Remedy
Tungsten contamination of work piece	1. Contact starting with electrode 2. Electrode melting and alloying with base metal 3. Touching tungsten metal pool	1. Using high frequency start or using copper striker plate 2. Use less current or larger electrode 3. Keep tungsten out of molten pool
Excessive ceramic cup usage	1. Excess duty of cycle torch 2. Too small a nozzle bore for size of tungsten 3. Thermal shock	1. Change torch 2. Increase bore of nozzle 3. Increase bore of nozzle or warm ceramic cup slowly from cold

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