

## Plasma Welding System Setup and Operation.

**Folks...Plasma Welding is not TIG! Do not treat the Plasma Welding Torch as a TIG Torch. The Geometry of the Plasma Welding Torch components are set to a very tight tolerance. Altering the Geometry in anyway will result in damage and/or failure of the torch and poor welds.**

### Do's & Don'ts!

**Torch Coolant** – Never use TIG Coolant or tap water. Always use Coolant intended for Plasma Welding or Plasma Cutting Water cooled systems. Resistivity of the coolant must be within the Acceptable Green range.

Comparison Chart Resistivity/Conductivity			
	Resistivity Ohms/cm @ 25°C (77°F)	Resistivity Megohms/cm @ 25°C (77°F)	Conductivity Micromhos/cm @ 25°C (77°F)
Acceptable ↑	3,000,000	3.0	.333
	1,000,000	1.0	1.00
	900,000	.90	1.11
	750,000	.75	1.35
	500,000	.50	2.00
	400,000	.40	2.75
	300,000	.30	3.33
Minimum	200,000	.20	5.00
Not Acceptable ↓	100,000	.10	10.0
	90,000	.090	11.1
	75,000	.075	15.0
	50,000	.050	20.0
	25,000	.025	42.5
	10,000	.010	100.0

Damage and failure of the torch will occur if Coolant is in the Not Acceptable range.

**Gases** – Always use two Supplies each with their own Pressure Regulator set to 40 psi. Never use Regulator/Flowmeters and never “Y” off one cylinder.

**Electrode** – Do not under any circumstances grind the Tungsten Electrode by hand on a bench grinder. Damage or failure of the torch will occur. The diameter and angle of the Tungsten Electrode point Geometry must match precisely the inside Geometry of the Welding TIP and be perfectly centered. Always use factory ground Tungsten Electrodes.

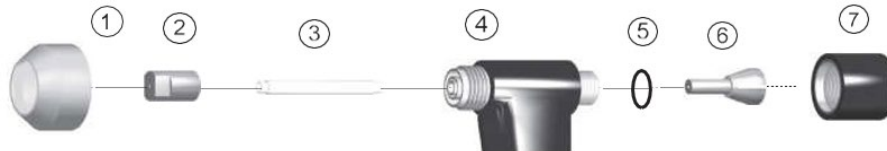
Not recommended, but if you must grind your own Tungsten Electrode a Precision dedicated Tungsten Grinder set to Sanrex Factory settings must be used. Electrode point sharpen to a 20 Degree included Angle, surface finish minimum 32 Microinch, remove sharp point (.015” - .025”) flat. Tungsten Electrode quality is paramount with the diameter tolerance less than +/- .005”. 2% Thoriated is preferred, Lanthanated, ceriated, Zirconiated, Rare Earth Mix are acceptable but may have reduced lifetime. Do not use Pure Tungsten!

**Welding TIP** – The orifice diameter designates the maximum current the tip can carry. The maximum current is the pilot current plus the welding current with electrode set flush with the end of the welding tip.

**Plasma Welding Torch Setup.**

See Torch Manual for detailed instructions.

**P75 Torch Assembly.**



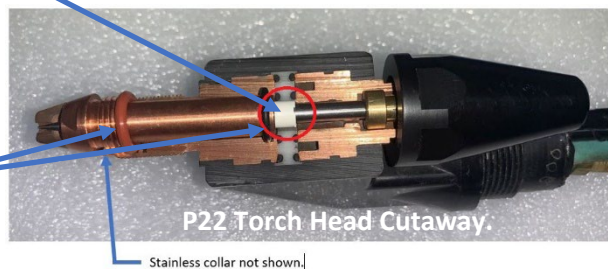
**P15 Torch Assembly.**



**P22 Torch Assembly.**



- 1. Cup
- 2. Standard Tip (Keyhole Process)
- 3. Extended Tip (Melt-in Process)
- 4. Electrode
- 5. Liner (Red and Black O-Ring inside of Note: NO liner in P75 or P15 Torch.
- 6. Gas Distributor
- 7. Collar
- 8. Shield Gas Diffuser
- 9. Cup Gasket
- 10. Torch Head
- 11. Collet
- 12. Back Cap

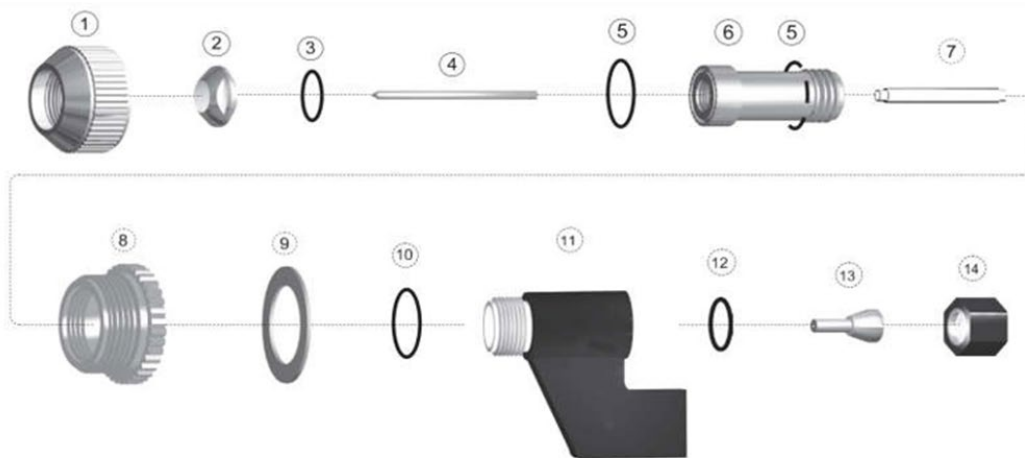


Torch).



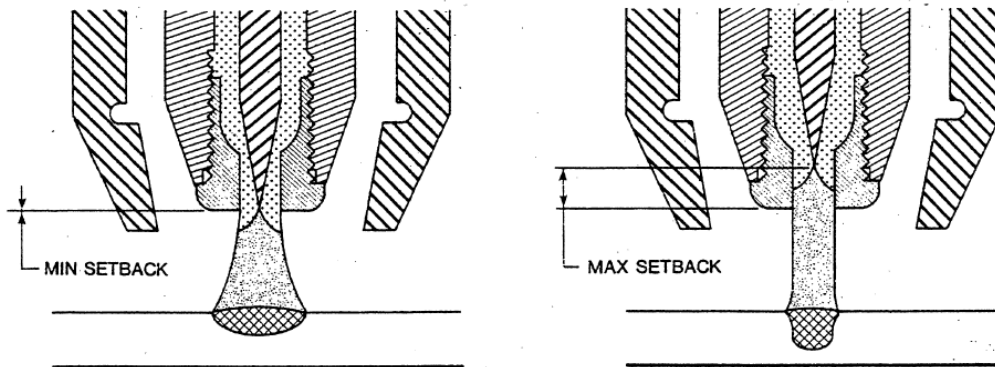
## P30 Torch Assembly.

Similar assembly of the Liner as the P22 Torch.



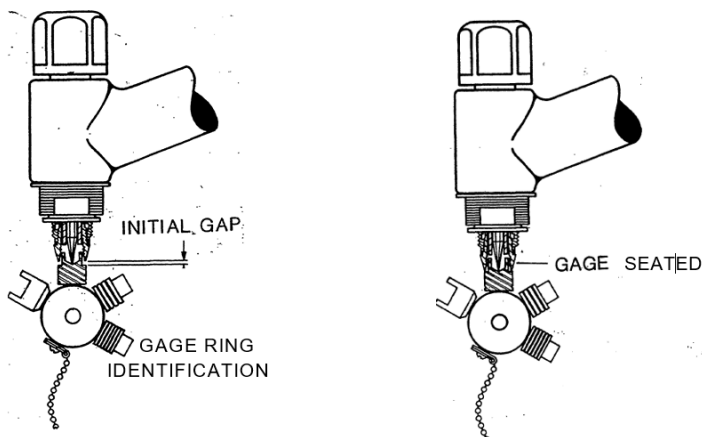
## Electrode Setback

Minimum setback is defined as the electrode set flush with the end of the Welding Tip. For any other setback use setback gauge. Minimum setback will give you a TIG like Arc.



If a stiff columnated arc is desired, insert the electrode gage into the front

of the torch and loosen the electrode cap slightly. Push back on the electrode with the gage until the shoulder of the gage seats against the front of the torch. Tighten the electrode cap while holding the gage in this position. Insert the proper tip into the liner assembly and tighten moderately.



If a soft arc is desired, insert the proper tip into the liner assembly. Loosen the back cap slightly, allowing the electrode point to protrude through the orifice opening. Using a flat surface push the electrode back until it is flush with the tip face. Tighten the back cap.

## Pre-weld

- Always purge Plasma Gas for at least 2 minutes prior to turning on the Pilot arc. Pilot arc must start in an inert atmosphere.
- Once pilot arc is on, best to leave on even when not welding.
- The pilot may dance around a little like a flame on a candle pending air currents around the application. This is OK and is expected.
- Use Argon for Plasma and Shield gas.
  - Welding SS can use 95/5 Argon/Hydrogen for Shield gas.
  - This will brighten the weld color and remove any surface tension.
- Use pressure regulators set at 40 psi.
- Always use separate Gas supplies.
- Do not use Regulator/Flowmeters.
- Shield gas set at 15 –25 scfh.
- Use Figure 3-D as a guide to set Plasma Gas flow.
- Use Figure 3-C as a guide to set welding Current Levels for Melt In Fusion mode with Electrode set to Minimum Setback.

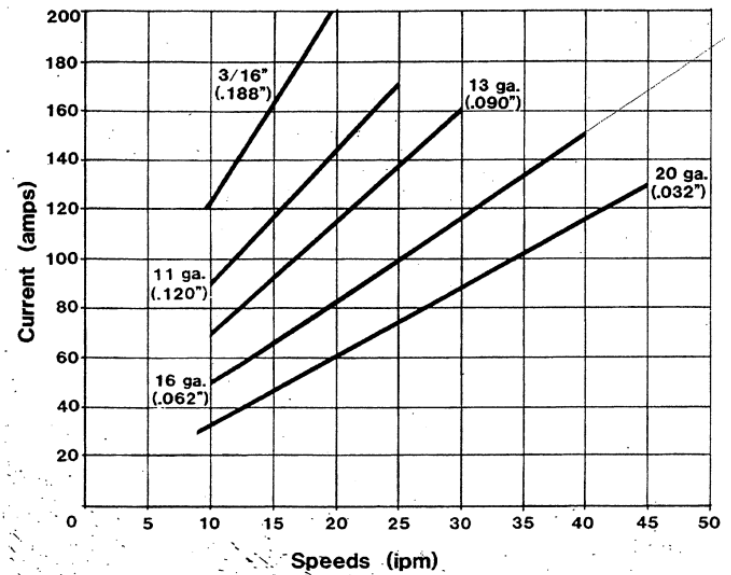


Figure 3-C Current Levels

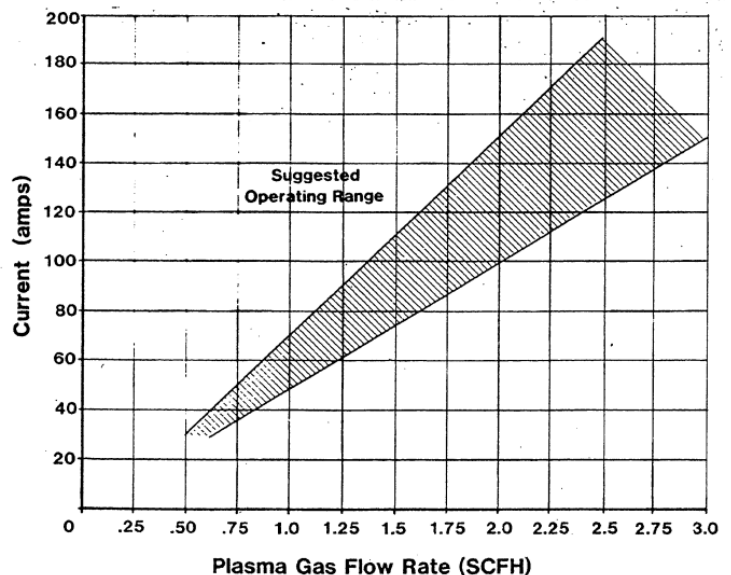


Figure 3-D Plasma Gas Flow Rates

See Torch Owner's Manual for detailed instructions and settings.

## Troubleshooting

Common causes of Poor Pilot, poor Tip life, poor Welding Arc ignition.

- Improper grinding of electrode.
  - Follow proper electrode sharpening instructions.
- Electrode discolored, Bluing in color, blue-black appearance.
  - Cause - atmosphere in contact with the electrode when hot. This can be lack of preflow and postflow gas flow and/or aspirating atmosphere into plasma stream.
- Black residue on electrode and other consumables.
  - This is caused by coolant entering the plasma stream. Most likely an internal coolant leak. The black residue is carbon build up.
- Coolant conductive. Resistivity of the coolant must be within the Acceptable Green range. Damage and failure of the torch will occur if Coolant is in the Not Acceptable range.

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# SanRex

50 Seaview Blvd.

Port Washington, NY. 11050

516-625-1313

[www.sanrexwelding.com](http://www.sanrexwelding.com)