SCULPTURE SAFETY GUIDE

• Plug in equipment.
• Turn on air hose lever.
• Turn on vent.
• Turn on air conditioner.
• Make sure pressure on gas is OUT.
• Turn on gases (Look at the gauge, one tells you the amount of gas you have, the other tells you the pressure) Set to at least 15-20 for pressure.
• Turn on welder (90 -120 amp) is a good start, and then you can add or subtract depending on thickness of material. The guide is inside the machine!!!
• Always keep welding tips on the guns CLEAN. Always lubricate them. If the wire feed gets welds onto its tip, file off the feed.
• If welder is spitting or welds show porosity, turn up the pressure.
• If plasma is spitting or halting check to see if the grounding clamp is placed properly and open up the gun to check if parts are burned out.
• If the plasma in the foundry room hits the breaker, reset the breaker. Repeat this step as necessary.
• NEVER use dirty metal in ANY bending device. Metal should be free of burr or rust.
• NEVER weld GALVANIZED, PAINTED, or CHEMICALLY treated steel.
• Grinding should be done outside using eye and ear protection.
• Do not use electrical equipment near water. Electrical cords and water can cause electrical shock.

AFTER WORKING

• Put materials away in lockers or designated areas.
• Turn off gases on welders.
• Bleed the gas lines. Press the welding gun button until all the gas is gone. Cut the excess wire off.
• Turn off welders
• Sharpen electrode on Tig.
• Close air line.
• Grind tables (Clean excess metal with designated grinder).
• Sweep off dirt from tables.
• Sweep floors.
• Put tools away (clean them if necessary).
• Turn off vents.
• Turn off air conditioner.
• Close outside gate (lock).
• Close all sliding glass doors and lock with pin.
• Close woodshop middle door.
• I lock all outside doors.

DURING MONITOR TIMES

• Follow monitor rules
• Monitors are allowed to ask students to leave if they refuse to follow rules.
• No pets, friends, or family are allowed in the studio. Visitors should wait in hallway.
• Food is not permitted. Always keep bottled drinks sealed and away from chemicals.
• Spray cans should be placed in designated trash bin when empty.
Gauge
Turning OFF the pressure saves the life of the regulator and it reduces the chances of it popping.

Weld Comparison
Normal weld (top)
Abnormal Porous Weld (bottom)
always lubricate. Use a file if filler metal gets stuck.

**WELDERS: Tig, Stick, Mig**

**TIG**

Usually used for aesthetic reasons. You can reach perfection with tig welding because you can control the welding rod feed. NOTE: You will need welding rods for this technique.

**SHIELDED METAL ARC WELDING (A.K.A. STICK WELDING)**

You will need consumable electrodes coated in flux to use the stick.
MIG
Most commonly used in the studio. Migs are used for internal constructions and their welds are known to be tough. This machine is usually not used for a minimal and clean finish.

MAINTANENCE FOR MIG:
Make sure that the MIG welding cords are straight and not coiled. This will help the welding wire push through the gun with more ease.

Make these cords straight
Drop a small amount of oil on the red cushion inside the machine for better flow.
OXY/ACETYLENE TORCH

What this tool is primarily used for:

Depending on the type of attachment, the Oxy/Acetylene torch can be used for heating and bending, welding, or cutting metal. The Plasma Cutter will also cut through metal, but only up to 3/8" thick.

ALWAYS WEAR APPROPRIATE WHEN USING THIS MACHINE

SAFETY FOR THIS MACHINE:

• THERE ARE TWO SETS OF REGULATORS AND VALVES: ONE FOR OXYGEN (COLOR CODE - GREEN) AND ONE FOR THE ACETYLENE (COLOR CODE - RED)
• THERE ARE TWO GAUGES ON EACH REGULATOR. ONE ON THE RIGHT, INDICATES TANK PRESSURE, AND ONE ON THE LEFT INDICATES GAS PRESSURE IN THE LINE. (See photo below)
• CHECK ALL CONNECTIONS before lighting the torch
• NEVER stand directly in front of or behind a regulator when opening the cylinder valve
• TURN BOTH CYLINDERS OFF IMMEDIATELY when the torch flashes back, or is burning on the inside
  ☐ First oxygen and then acetylene
• NEVER open both fuel(acetylene) and oxygen valves before lighting the preheat flame
• ALWAYS turn the oxygen cylinder valve all the way open
• Open the acetylene cylinder valve not more than one turn. One-half turn is preferred
• ALWAYS place the welding tip so that it points to the side of the torch to which the acetylene hose is attached
• ALWAYS weld at least 5 feet from the cylinders
• DO NOT use any oil or grease on any oxygen or acetylene connections
• NEVER hammer on oxygen or acetylene regulators or stuck valves
• DO NOT light a torch with a match or open flame. Use a striker
• BEFORE LIGHTING TORCH, be positive that hose, tanks, or any inflammable material will not be exposed to heat, flame, or sparks
• BEWARE OF HIGH ACETYLENE PRESSURE. NEVER USE ACETYLENE GAS WHEN THE PRESSURE IS GREATER THAN 15 POUNDS PER SQ. IN. (acetylene gas when compressed to more than 15 pounds per sq. in. becomes a very high explosive.)
• DO NOT hold welding or cutting tip too close to your work
• NEVER USE a tip that gets too hot
• NEVER USE a torch that leaks
• NEVER LEAVE TORCH BURNING AND GO AWAY FROM IT
• NEVER leave torch valves open
• DO NOT adjust, alter, change, build, or do any experimental work on cylinders, regulators, torches, or any other gas equipment.
• DO NOT LIFT cylinders by the caps or valves
• DO NOT TRANSPORT the cylinders without the caps in place
• CYLINDERS MUST BE STORED IN UPRIGHT POSITION AND CHAINED TO THE WALL
• KEEP VALVES CLOSED on empty cylinders
• NEVER WELD A CLOSED OR JACKETED VESSEL WITHOUT AN AIR VENT
• NEVER WELD A VESSEL THAT HAS CONTAINED ANY EXPLOSIVE OR FLAMMABLE MATERIAL UNTIL YOU ARE POSITIVE THAT IT HAS BEEN THOROUGHLY EMPTIED AND PURGED, AND THEN USE EXTREME CARE
• REFER to instruction manual for further information (see Studio Technician)
## Personal Protection Equipment while working with the Oxy/Acetylene Torch

<table>
<thead>
<tr>
<th>Head/Face or Eye</th>
<th>Clothing</th>
<th>Hands</th>
<th>Feet</th>
<th>Ear</th>
<th>Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>REQUIRED</td>
<td>REQUIRED</td>
<td>REQUIRED</td>
<td>REQUIRED</td>
<td>REQUIRED</td>
<td>RECOMMENDED</td>
</tr>
<tr>
<td>shade 5 goggles</td>
<td>leather welding jacket and leather welding gloves</td>
<td>leather top shoes or boots</td>
<td>ear plugs or ear muffs</td>
<td>N95</td>
<td></td>
</tr>
</tbody>
</table>

- **NO** tennis shoes, open toed shoes, or shoes with nylon recommended if using cutting torch required if forging metal

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![Diagram of Oxygen and Acetylene Tanks](image)

**Operating Pressure Dial** (use PSI scale)

**Regulator Adjusting Screw** To close, turn CCW

**Tank Pressure Dial** (read PSI)

**Cylinder Valve** To close, turn CW

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Initial lighting of the acetylene gas produces large amounts of soot.
OTHER THINGS TO REMEMBER WHEN USING THIS MACHINE:

- Extra tips should be put away when not in use
- Follow the cutting chart for proper cutting speeds (similar to the plasma cutter) if using the cutting head
- Cutting/Welding tips will still be hot after use; be careful where you put the torch handle
- Always use the right size tip for cutting and welding
- The rosebud torch is best for heating metal for bending
## Lens Shade Selector Guide

<table>
<thead>
<tr>
<th>Operation/Process</th>
<th>Electrode Size in. (mm)</th>
<th>Arc Current (Ampere)</th>
<th>Minimum Protective Shade</th>
<th>Suggested Shade No. (Comfort)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shielded metal arc welding (SMAW)</td>
<td>Less than 302 (2.5)</td>
<td>Less than 60</td>
<td>7</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>302-502 (2.5-4)</td>
<td>60-160</td>
<td>8</td>
<td>10</td>
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<tr>
<td></td>
<td>502-14 (4-6)</td>
<td>160-250</td>
<td>10</td>
<td>12</td>
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<tr>
<td></td>
<td>More than 14 (6.4)</td>
<td>250-500</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Gas metal arc welding (SMAW) and</td>
<td>Less than 60</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>flux cored arc welding (FCAW)</td>
<td>60-160</td>
<td></td>
<td>10</td>
<td>11</td>
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<tr>
<td></td>
<td>160-250</td>
<td>10</td>
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<td></td>
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<tr>
<td></td>
<td>250-500</td>
<td>10</td>
<td>14</td>
<td></td>
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<tr>
<td>Gas tungsten arc welding (GTAW)</td>
<td>Less than 50</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td></td>
<td>50-150</td>
<td></td>
<td>8</td>
<td>10</td>
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<tr>
<td></td>
<td>150-500</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Air carbon arc cutting (CAC-A)</td>
<td>(Light)</td>
<td>Less than 500</td>
<td>10</td>
<td>12</td>
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<tr>
<td></td>
<td>(Heavy)</td>
<td>500-1000</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Plasma arc welding (PAW)</td>
<td>Less than 20</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td></td>
<td>20-100</td>
<td></td>
<td>6</td>
<td>6 to 8</td>
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<tr>
<td></td>
<td>100-400</td>
<td>8</td>
<td>10</td>
<td></td>
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<tr>
<td></td>
<td>400-800</td>
<td>10</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Plasma arc cutting (PAC)</td>
<td>Less than 30</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td></td>
<td>20-40</td>
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<td>4</td>
<td>4</td>
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<td></td>
<td>40-60</td>
<td>5</td>
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<td>60-80</td>
<td>6</td>
<td>6</td>
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<td></td>
<td>80-300</td>
<td>8</td>
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<tr>
<td></td>
<td>300-600</td>
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<td></td>
<td>400-800</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Torch brazing (TB)</td>
<td>—</td>
<td>—</td>
<td>3 or 4</td>
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<tr>
<td>Torch soldering (TS)</td>
<td>—</td>
<td>—</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Carbon arc welding (CAW)</td>
<td>—</td>
<td>—</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

### Plate Thickness

<table>
<thead>
<tr>
<th>in.</th>
<th>mm</th>
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</thead>
<tbody>
<tr>
<td>Under 1/8</td>
<td>Under 3.2</td>
</tr>
<tr>
<td>1/8 to 1/2</td>
<td>3.2 to 12.7</td>
</tr>
<tr>
<td>Over 1/2</td>
<td>Over 12.7</td>
</tr>
<tr>
<td>Under 1</td>
<td>Under 25</td>
</tr>
<tr>
<td>1 to 6</td>
<td>25 to 150</td>
</tr>
<tr>
<td>Over 6</td>
<td>Over 150</td>
</tr>
</tbody>
</table>

* As a rule of thumb, start with a shade that is too dark to see the weld or cut zone. Then go to a lighter shade which gives sufficient view of the weld or cut zone without going below the minimum. In oxyfuel gas welding, cutting, or brazing where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

Guide adapted from ANSI Z49.1, 1999.

Low Current Plasma arc cutting data (0-80 Ampere) supplied by Miller Electric Mfg. Co.