The FLAME TECH® EM (External Mix) torches and tips are of a completely new design to increase productivity. The External Mix type tip assures safety, high quality cutting, long life, ease of operation and economy. For use with propane or natural gas, cutting materials up to 22+ inches thick.

OUTSTANDING FEATURES

- **Safe – No Flash Back**  
  External mixing eliminates any possibility of flash-back

- **Cool Running – No Overheating**  
  External mixing is engineered to run cool when cutting.

- **Extra Stand-Off Distance**  
  Conventional stand-off is less then 2” With EM (External Mix). 3” to 6” is common.

- **High Quality Cutting Surface**  
  Minimal slag – straight cut – square top.

- **Highly Energy Efficient**  
  Oxygen shielding of the fuel gas reduces consumption

- **Available With Protective Replaceable Nozzle Shroud**  
  Protective shroud for cooler, enhanced operation

- **Available In Air-Cooled and Water-Cooled Models**
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FLAME TECH® EM (External Mix) MACHINE TORCHES

EM 300-1
High volume, air-cooled, machine torch for use with the EM tips - with metric gear rack.

EM 300-2
Same as EM 300-1, but with a decimal gear rack (1/4 x 1/4 x 32 pitch), for use with most domestic torch holders.

EM 300-3
Same as EM 300-1, but without gear rack - for most steel mill, hot billet, cutting, applications.

EM 600-3
Water cooled, without gear rack.

EM 2600
High volume, water-cooled, machine torch 2" (50mm) Barrel for use with the EM tips.

EM-XXX
Two (2) piece natural gas - propane tip with External Mixing design for thick plate and hot billet Cutting sizes 100, 200, 300, 600, and 800.

ES-2
Snap-on Shroud for EM nozzles

EXTERIOR MIX OPERATIONAL DATA AND INSTRUCTIONS FOR USE

The EM cutting torch is a external mixing design permitting the fuel gas and oxygen to be mixed externally at the exit end of the torch and tip. No internal mixing of fuel gas or oxygen occurs in the torch or tip. External mixing occurs due to the distribution of preheat gases and shielding gases around the cutting oxygen stream. Thus the cutting oxygen stream must be turned on for the proper mixing of gases and preheating to occur. This type of process produces an extremely long preheating zone, allowing high standoff of torch and tip to steel. The EM torch was designed for automatic cut-off operations, such as hot and cold sitting, continuous casting, billets, slab cuts, and end cropping.

The following are general instructions for use on typical conditions for cutting steel at temperatures of 1400 degrees Fahrenheit. Cold steel and non-typical conditions will require some adjustment to the procedures. Cut quality can vary depending on temperature and carbon content of steel, casting speed, steel quality, pressures, cutting speed, purity of oxygen, etc. Specific information for any cutting application should be obtained directly from Flame Technologies, Inc.*

1. After connecting torch to machine and securing fuel and oxygen lines, screw the EM nozzle and shroud into torch and adjust to a height of 5-6 inches from steel. Open all valves and check the tip and all connections for fuel and oxygen leaks.

2. Adjust the automatic torch holder and travel mechanism to allow for a slight pause (2-5 seconds) at the billet edge and travel time in accordance with the chart above.

3. Set preheat oxygen and fuel gas with the chart above. Open preheat oxygen and fuel gas valves and light the gas at about 2 inches below the tip end. The preheat flame should be blue in color by the tip end, and yellow in color as it gets further away. The whole preheat flame will be large, very soft and lazy when compared to the harsh, sharp cone preheats of conventional cutting torches. Adjust pressure at the regulator if necessary. The pressures given in the EM performance chart may be used as a starting point. Depending on conditions, small adjustments may be necessary for best performance.

4. Set cutting oxygen pressure with the EM performance chart. Set the timer to allow the cutting oxygen to come on 2 seconds before the pause at the edge of the billet. The cutting oxygen will cause the preheat flame to sharpen and is vital to successful performance. Adjust cutting oxygen to the pressure which will yield the most slag free cut.
## External Mix Nozzle Operational and Performance Data

<table>
<thead>
<tr>
<th>Metal Thickness (Inches) Cold Steel</th>
<th>Metal Thickness (Inches) Hot Steel</th>
<th>Nozzle Size</th>
<th>Cutting Oxygen</th>
<th>Pre-Heat Oxygen</th>
<th>Natural Gas</th>
<th>Speed (in/min)</th>
<th>Kerf Width *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSI CFH</td>
<td>PSI CFH</td>
<td>PSI CFH</td>
<td>COLD HOT</td>
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<tr>
<td>2 - 4</td>
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<td>100</td>
<td>700</td>
<td></td>
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<tr>
<td>4 - 6</td>
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<td>90</td>
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<td>100</td>
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<td>6</td>
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<tr>
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<td>250</td>
<td>600</td>
<td>260</td>
<td>4</td>
</tr>
</tbody>
</table>

* - NOTES: Kerf width measured when used with ES-2 converging shroud

Bottom surface of ES-2 Shroud should be 5 - 6 inches above top surface of billet