TEMPEST® 4442 BURNER
Bulletin 4442
August 2006

The Hallmark of High Velocity Burners

- Wide range of applications; from 600 F to 3000 F operating temperatures
- Inherently low emissions
- 70,000 to 2,000,000 Btu/hr capacity range
- 600 F preheated air; up to 800 F with -H model
- Durable construction, unique mounting and tile assembly
- Available with refractory and metal tiles
- Wide air/fuel ratio flexibility

Applications
Ceramic Tunnel and Periodic Kilns
Heat Treat Furnaces
Car Bottom Furnaces
Scrap Preheaters
Galvanizing Tanks
Crucible Furnaces
Air Heating and Drying

In most industrial furnaces, recirculation of products of combustion (poc) can contribute significantly to speed of heating and temperature uniformity. A fan usually provides recirculation in low temperature ovens and dryers. But fans are not practical for higher temperature furnaces and kilns.

Excess air systems can accomplish recirculation, but they are fuel wasteful; e.g., 30% excess air in a 2000 F furnace requires 24% more fuel than stoichiometric firing.

True high velocity gases entrain and recirculate seven or more times their own volume, eliminating need for fans or excess air.

Tempest burners achieve superior uniformity by increasing penetration into the center of multi-piece loads.

<table>
<thead>
<tr>
<th>Burner designation</th>
<th>Btu/hr (divide by 100 for scfh air)</th>
<th>flame length (inches)</th>
<th>16 osi, not burning (use to size blower) scfh air</th>
</tr>
</thead>
<tbody>
<tr>
<td>4442-0</td>
<td>71 600</td>
<td>6</td>
<td>1 000</td>
</tr>
<tr>
<td>4442-1</td>
<td>131 400</td>
<td>9</td>
<td>1 800</td>
</tr>
<tr>
<td>4442-2</td>
<td>230 000</td>
<td>10</td>
<td>2 800</td>
</tr>
<tr>
<td>4442-3</td>
<td>325 000</td>
<td>20</td>
<td>3 760</td>
</tr>
<tr>
<td>4442-4</td>
<td>540 000</td>
<td>20</td>
<td>6 200</td>
</tr>
<tr>
<td>4442-4-S</td>
<td>890 000</td>
<td>25</td>
<td>11 000</td>
</tr>
<tr>
<td>4442-5</td>
<td>960 000</td>
<td>30</td>
<td>11 600</td>
</tr>
<tr>
<td>4442-6</td>
<td>1 500 000</td>
<td>36</td>
<td>19 200</td>
</tr>
<tr>
<td>4442-7</td>
<td>2 175 000</td>
<td>42</td>
<td>25 000</td>
</tr>
</tbody>
</table>

IMPORTANT: Correct tile selection and burner installation are extremely important for maximum burner life. Please refer to Supplement 4442, Tempest Burner Installation, before making your final burner selection, or consult your nearest Fives North American Sales Office.
Combustion air: 20 osi maximum pressure.

Gas: Natural or LP or LP-air mix. Pressure must be 65% of air pressure at burner. Low Btu gases (under 600 Btu/cf) may require special internals. (For light oil, use 6435 Tempest® III Dual-Fuel™ Burner.)

Flame supervision: Required for any batch operation, and for continuous applications that are below 1400 F at any time.

UV detectors are preferred. Flame rod performance on other sizes is inconsistent, and while they can be made to work with trial and error, are not generally recommended. Flame rods should not be used on -0, and -4-S sizes

Use a half-wave ignition transformer to avoid UV sensing of spark during trial for ignition.

If a pilot is used, it must be interrupted within 10 seconds after main burner ignition.

Consult National Safety standards and insurance underwriters for specific requirements for flame controls.

Stability limits: 300% XSAir for -0, 1000% for -1, 250% for -4-S, 2000% or better for all other sizes.

Control: Most preferred are individual cross-connected or bled-impulse ratio regulators, which give maximum turndown flexibility and control.

A good alternative is individual 7216 Adjustable Ratio Regulators which offer a fuel efficiency compromise: stoichiometric at high fire, excess air on turndown.

Take maximum advantage of high velocity by keeping the burner on high fire most of the time. Use StepFire™ or high-low (two-position) firing control systems.

For best performance, a limiting orifice (LOV) gas valve should always be installed close to the burner (within 10" of gas inlet).

See Supplement 4442 for other control recommendations, particularly for high turndowns (up to 20:1).

Ignition: Direct spark ignition is normally supplied with a 10mm spark plug, which is furnished with the burner. 4051 and 4055 Direct Spark Igniters are also available. 4011 Premix or 4020 Nozzle-Mix Pilots can also be used.

However, both the pilot gas and pilot air must be shut off after lighting the burner. Leaving the pilot air on may reduce the operating and turndown limits of the burner.

Torch lighting of Tempest Burners is not recommended due to the high tile pressures, and will neither light nor relight from hot furnace refractory.

Aardvark model: Bulletin 4442A describes an all metal version of the Tempest. It is used as a stand-alone air heater. Its threaded metal snout can be installed in the end of a manifold to feed hot air to a number of heating, warming, or drying stations.

4442H model: For preheated air up to 800 F, built with flanged mounting only. Not available with the standard 'eared' mounting.

Installation Instructions and Ordering Information: See Supplement 4442.