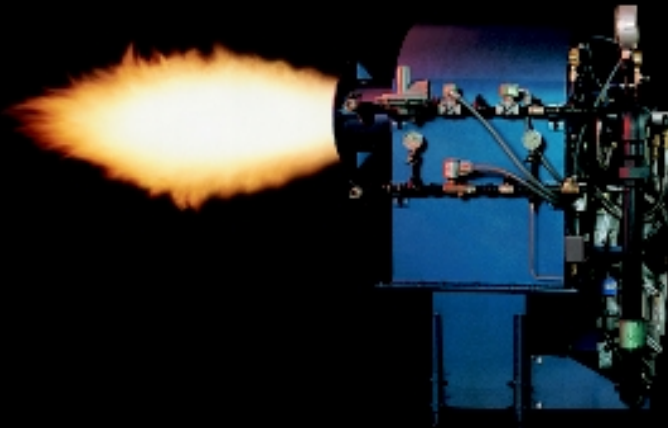


VECTOR  
FORCED DRAFT  
BURNERS

GAS  
LIGHT OIL  
HEAVY OIL

16,800,000 -  
63,000,000  
BTU/HR.

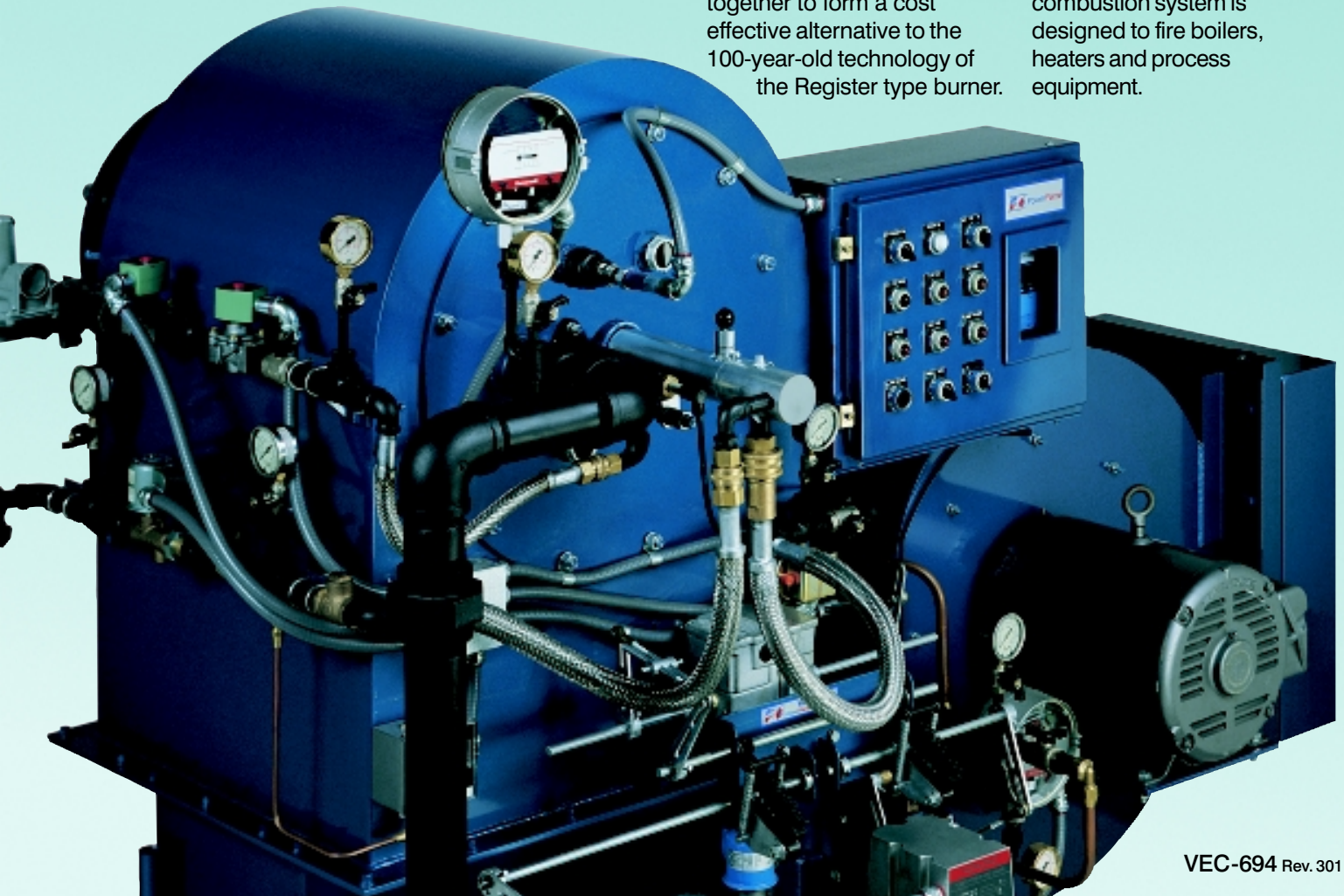
# Power Flame Vector™

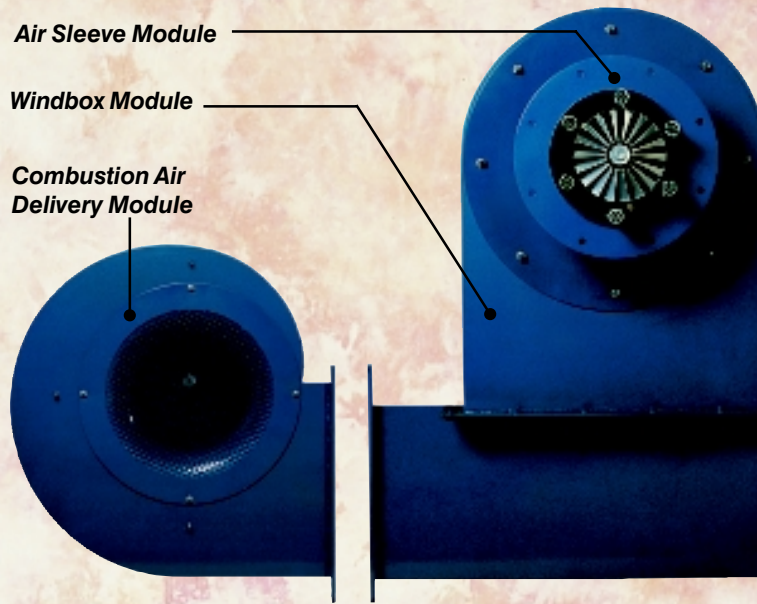


- High Efficiency
- Low Excess Air
- High Turndown
- Low NO<sub>x</sub>
- Parallel Flow
- Modular Construction

The Power Flame Vector™ Industrial Burner offers a unique combination of operating and design advantages never before seen in medium to high input combustion systems. The Vector brings state-of-the-art design and manufacturing techniques together to form a cost effective alternative to the 100-year-old technology of the Register type burner.

Parallel flow, low excess air design provides high efficiency, high turndown and low NO<sub>x</sub> operation. Modular construction brings manufacturing lead times down while providing a wide range of application flexibility. The Vector factory packaged combustion system is designed to fire boilers, heaters and process equipment.





The Vector system has been uniquely designed for maximum application flexibility. The Modular construction concept employs three basic modules:

1. Windbox Module
2. Air Sleeve Module
3. Combustion Air Delivery Module

Each Module is constructed with flanged bolt-on connections. Quantity production results in significant savings and quick turnaround between design and shipment. Specific job applications are designed

## Combustion Air Distribution

### Windbox

Splitter Vanes and Baffles, strategically located using hydro analog simulation methods, provide even flow distribution to the Air Sleeve.

### Air Sleeve

Parallel, turbulent free, combustion air flow is produced in the Vector Air Sleeve. Even distribution assures a uniform flow pattern and proper mixing at near stoichiometric conditions. Introduction of this parallel flow combustion air stream into the Swirler produces Staged Air Combustion.

### Swirler

A rotational effect on the primary portion of the combustion air creates a Primary Combustion Zone downstream of the Swirler. The Primary Combustion Zone produces a vortex that provides flame stability and thorough mixing of the fuel and air to achieve complete combustion at up to 10:1 turndown when firing gas and up to 8:1 when firing liquid fuels. The Vector Burner can effectively operate with Excess Air Levels at or below 5.0% (1.0% O<sub>2</sub>). When compared with the traditional

Register Burner, operating at 15% to 30% Excess Air, the result is higher efficiency and cost saving operation.

### Burner Throat

The Burner Throat exit shape is specifically matched with the Air Sleeve and Swirler to produce an aerodynamically stabilized flame. The Refractory Throat can be factory installed as part of the packaged system, or field installed using the factory-supplied Refractory Former assembly.

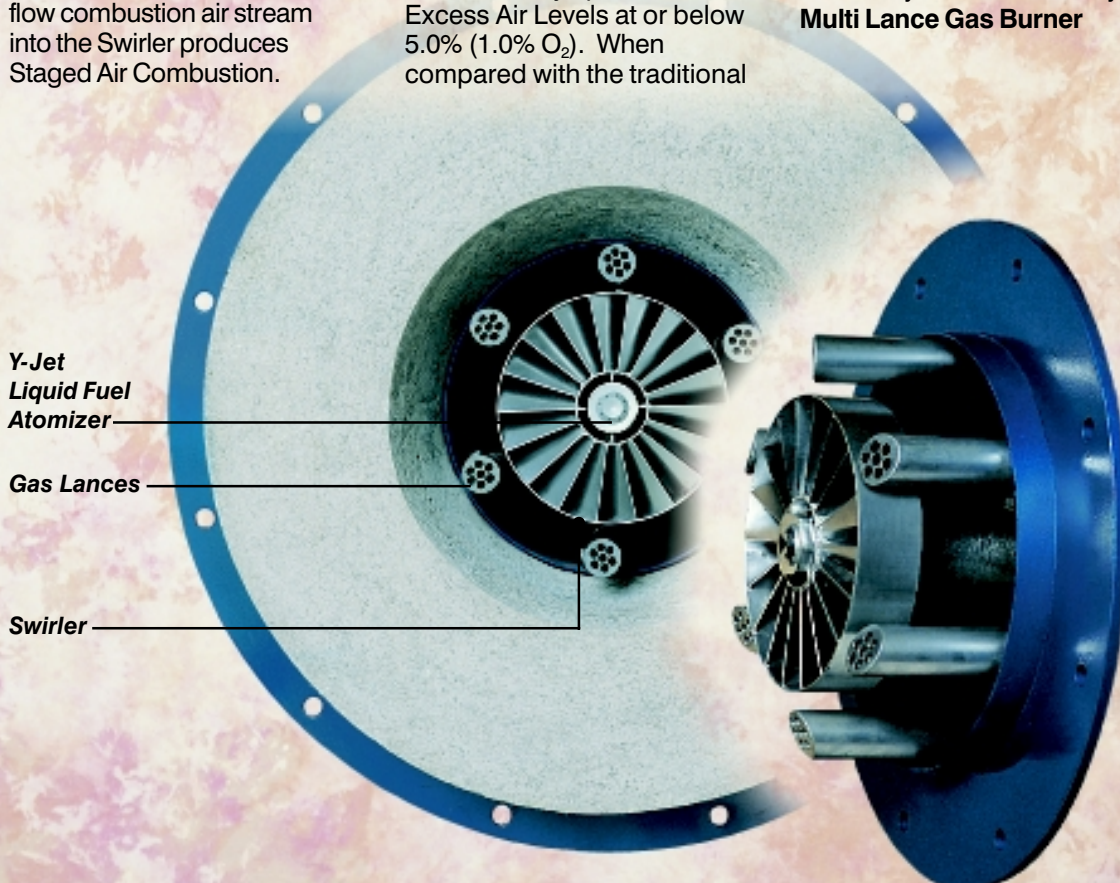
### Multi Lance Gas Burner

Six (6) gas lances are attached to the gas manifold located within the burner. Multi-port stainless steel gas spuds, attached to the lances, are factory set and field adjustable to provide optimum fuel staging. The fuel is properly proportioned to the most turbulent Primary Combustion Zone, as well as to the laminar Secondary Combustion Zone.

**Fuel Staging** is accomplished by directing the relative Vector orientation of the gas spuds to create fuel rich and fuel lean zones within the combustion envelope. The result is high efficiency combustion and low NO<sub>x</sub>.

### Y Jet Liquid Fuel Atomizer

The Vector's Y-Jet atomizer incorporates multiple mixing chambers to produce a finely atomized spray with economical use of either steam or air. Steam (air) consumption at maximum capacity can be as low as 0.020 pounds of steam (air) per pound of oil. Atomized fuel is injected into the Primary Combustion Zone where the turbulent action intimately mixes fuel and air to produce efficient low excess air combustion.



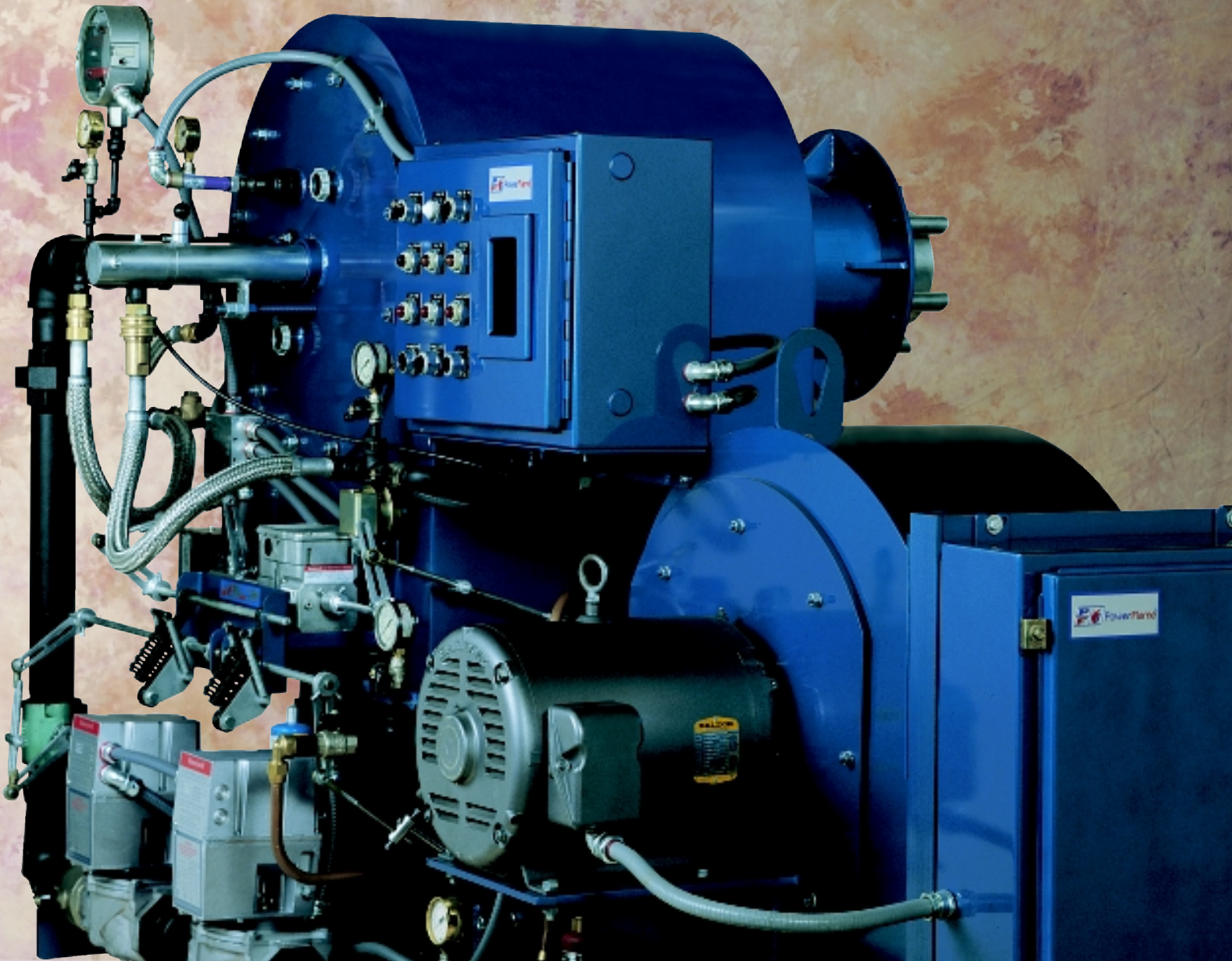
by selecting the appropriate modules required to produce the complete, factory-assembled Combustion System Package.

# Power Flame **Vector**<sup>TM</sup>

## **Oil Assembly Manifold Block**

The Oil Assembly Manifold Block provides accessible connections for both fuel and atomizing medium. The entire oil assembly can be easily

removed from the burner by using the Snap Lock and Quick Disconnect assemblies.



# AIR STAGING

The **Primary Combustion Zone** is created by the aerodynamically designed Swirler that converts the parallel air flow into rotational flow.

The **Secondary Combustion Zone** is created between the outer circumference of the Swirler and the inner circumference of the Air Sleeve.

This parallel laminar flow, and inherent pressure drop, produces flame shaping characteristics capable of meeting a wide range of combustion chamber configurations. The Primary/Secondary air ratio is factory set and field adjustable.

# LOW NO<sub>x</sub>

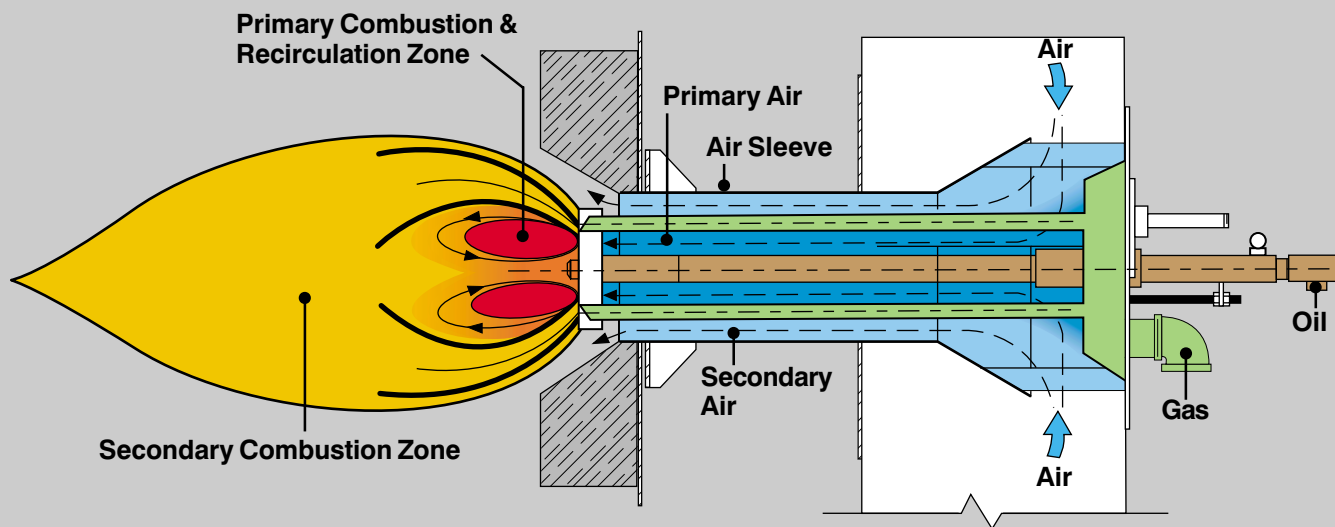
The Vector produces low NO<sub>x</sub> results without Flue Gas Recirculation (FGR). The turbulence created in the Primary Combustion Zone produces a reverse flow in the form of a self-generating annular vortex.

This **Internal Recirculation**, coupled with combustion staging at low excess air

levels, produces significant NO<sub>x</sub> reductions.

Added NO<sub>x</sub> reduction can be accomplished using the Vector Induced FGR Air Inlet assembly. This method produces a pre-mix of flue gas and combustion air, resulting in further reductions in both thermal and prompt NO<sub>x</sub> formation.

## VECTOR BURNER AIR SLEEVE WITH OIL GUN & GAS MANIFOLD



## RATINGS & SPECIFICATIONS

Burner Model	Maximum MBH	Nominal BHP	CAPACITY		MOTOR HP				NOMINAL PIPE SIZE (Inches)				
			GPH #2 Oil	GPH #6 Oil	Blower Motor		#2 Oil Pumpset	Compressor Set	Gas Train		Atomizing Media Train		Oil Train
					Std.	Low NO <sub>x</sub>			5 PSIG*	12 PSIG*	Steam	Air	
V168	16800	400	120	112	10	15	3/4	5	3"	2 1/2"	1/2"	3/4"	1/2"
V210	21000	500	150	140	15	20	1	5	4"	3"	1/2"	3/4"	1/2"
V252	25200	600	180	168	20	25	1	5	4"	4"	1/2"	3/4"	1/2"
V294	29400	700	210	196	20	25	1 1/2	5	3"	4"	3/4"	1"	1/2"
V315	31500	750	225	210	25	30	1 1/2	5	3"	3"	3/4"	1"	1/2"
V336	33600	800	240	224	25	30	2	5	3"	3"	3/4"	1"	1/2"
V378	37800	900	270	252	30	40 **	2	7 1/2	3"	3"	3/4"	1"	1/2"
V420	42000	1000	300	280	30	40	2	7 1/2	4"	3"	1"	1"	1/2"
V504	50400	1200	360	336	40	60	2	15	4"	3"	1"	1"	3/4"
V630	63000	1500	450	420	50	75	2	15	4"	4"	1"	1"	3/4"

*The Power to Manage Energy*

Power Flame

\* Gas pressure at first safety shutoff valve in standard UL gas train (outlet of Gas Pressure Regulator).  
 \*\* V378 L-shaped configuration requires a 50 hp motor.

NOTE:  
 The Vector Burner can be furnished in left-hand, right-hand, inline and inline-above configurations. Systems can be designed to meet UL, IRI, FM, NFPA8501 and other codes as required.

Represented By:



**Power Flame Incorporated**

2001 South 21st Street Phone 620-421-0480  
 Parsons, KS 67357 Fax 620-421-0948

Web Site: <http://www.powerflame.com>  
 E-Mail: [csd@powerflame.com](mailto:csd@powerflame.com)

Copyright © Power Flame Incorporated 1994 Printed in U.S.A.