

# Power Flame Incorporated



## **SUGGESTED SPECIFICATION FOR MODEL HP COMBINATION GAS/OIL BURNERS**

### ***THE POWER TO MANAGE ENERGY***

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**Suggested Specifications for Model HP  
Combination Gas/Light Oil Burners**

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**Suggested Specifications for Model HP Burners  
Using #2, 4, 5, 6 Oil and/or Natural or Propane Gas**

**GENERAL BURNER DESCRIPTION** (Use for all fuel types - select verbiage as required)

Furnish and install \_\_\_\_\_ Power Flame Model HPGAO \_\_\_\_\_ (Gas/Oil), HPG \_\_\_\_\_ (Gas), HPAO \_\_\_\_\_ (Oil), forced draft, high static pressure burners. Each burner shall be capable of burning \_\_\_\_\_ CFH of \_\_\_\_\_ BTU/CU. Ft. (natural) (propane) (other) gas, with a specific gravity of \_\_\_\_\_. Gas pressure to be supplied to the burner gas train supply connection shall be a minimum of \_\_\_\_\_ (In. W.C.) (P.S.I.) at full high fire rate and a maximum of \_\_\_\_\_ (In. W.C.) (P.S.I.) at static conditions. Each burner shall be capable of burning \_\_\_\_\_ G.P.H. of No. (2), (4), (5), (6), (Other) fuel oil, with a rating of \_\_\_\_\_ BTU/GAL. Minimum turndown ratio, while maintaining efficient combustion throughout the range shall be \_\_\_\_\_ to \_\_\_\_\_. Fuel changeover shall be accomplished by (fuel selector switch) and/or (automatic outdoor temperature control device) or (other) \_\_\_\_\_. There shall be no mechanical changes or other adjustments required, when switching from one fuel to the other.

Each burner shall be listed by Underwriters Laboratories and shall bear the appropriate U.L. label. (In addition to the U.L. requirements all equipment and installation procedures will meet the requirements of (IRI) (FM) (NFPA) (Other) \_\_\_\_\_ codes). Each burner shall be designed and constructed as an integrated combustion system package - and shall be factory fire tested.

Each burner shall be of welded steel construction and the firing head shall be complete with a steel flame retention fan and refractory throat. The complete diffuser assembly shall be easily removable from the burner front. All air required for combustion shall be supplied by a blower, mounted integral to the burner. The blower wheel shall be of the high static backward inclined design and shall be directly driven by a \_\_\_\_\_ H.P., 3450 RPM \_\_\_\_\_ Volt, 60 Hertz \_\_\_\_\_ phase motor.

A multiple opposed blade damper, located on the heat exchanger side of the windbox, shall meter the combustion airflow. Final flame shaping shall be accomplished by adjustable air baffles mounted internal to the windbox.

The Burner Ignition System shall utilize \_\_\_\_\_ (natural) (LP) gas as the fuel source. At minimum, pilot system components shall include spark ignited pilot assembly, 6000 Volt ignition transformer, pilot solenoid valve, pilot pressure regulator and manual gas shutoff cock. The flame proving system shall incorporate a Lead Sulfide (infrared) detector, which will monitor both pilot and main flames.

**BURNER CONTROL PANEL** (Use for all fuel types - select section as appropriate)

(Standard) All control components shall be mounted and wired within a **BLOWER SCROLL MOUNTED PANEL** and all indicating devices and switches shall be located on the front of the burner air housing.

(Option 1) - All control components shall be mounted and wired within an **INTEGRAL CONSOLE TYPE PANEL** mounted on the blower-housing front.

(Option 2) - All control components shall be mounted and wired within a REMOTE CONTROL PANEL to be (wall mounted) (mounted on the side of the heat exchanger) \_\_\_\_\_. Field wiring will require that electrical connections are made between the remote panel and a matched burner mounted terminal strip.

(Option 3) - All control components shall be mounted and wired within a REMOTE CONTROL PANEL TO BE FREE STANDING and floor mounted. The design and construction of the panel will incorporate fabrication such as to insure the necessary rigidity and support of a freestanding unit. Field wiring will require that electrical connections are made between the remote panel and a matched burner mounted terminal strip.

The panel shall include a fused (both primary and secondary) control circuit transformer, flame safeguard control, model number \_\_\_\_\_, as manufactured by (Fireye) (Honeywell) \_\_\_\_\_, manual potentiometer, starter(s) for blower, (fuel oil pump), (compressor), (preheater on No. 4, 5 or 6 oil), (fuel selector switch on multi-fuel burners) and indicating lights displaying - Power On, Ignition, Main Fuel, Flame Failure. An alarm will sound on flame failure.

**OPTIONAL LIGHT/ALARM FUNCTIONS** (Available on burner control panel options (1, 2 or 3 not available on standard panel - select as appropriate). Additional indicating lights shall display the following: (Low Water), (High Water) (High Temperature) (High Pressure) (High Gas Pressure) (Low Gas Pressure) (Low Oil Pressure) (Low Atomizing Air Pressure) (Pilot Failure) (Main Flame Failure) (Others) \_\_\_\_\_. An alarm will additionally sound on the following conditions \_\_\_\_\_. (An alarm-silencing switch shall be provided)

**FUEL FLOW AND CONTROL** (Use for all fuel types - select sections as appropriate)

Oil burner design shall utilize a single nozzle, air atomizing system. The complete nozzle assembly shall be easily removable from the firing head, without displacing the location of the air diffuser assembly.

Fuel flow to the nozzle shall be accomplished through a V Port-metering valve, driven by a modulating motor, which also positions the combustion air dampers. Burner mounted oil train components will, at minimum, include two (2) solenoid operated safety shutoff valves, 3 port back pressure regulating valve, low oil pressure switch, low atomizing air pressure switch, and nozzle air and oil pressure gauges. A combustion airflow switch shall be provided.

A separate belt driven \_\_\_\_\_ HP piston type air compressor set, of the mechanical lubricating type shall be provided. Unit to contain air pressure indicating gauge. Rotary Vane air compressors will not be accepted.

(For firing No. 2, 4, 5 or 6 fuel oils) - A separate belt driven \_\_\_\_\_ HP oil pressure pump set shall be supplied.

(For firing No. 2, Diesel, or lighter fuel oils) - A direct driven \_\_\_\_\_ HP pressure oil pump set shall be supplied.

Each pump set will be supplied with a removable mesh strainer; pressure relief adjustments and all components required for correct oil supply and pressure control.

(For firing No. 4, 5 and 6 oil) - The burner shall include an integrally mounted thermostatically controlled \_\_\_\_\_ KW \_\_\_\_\_ PH electric oil preheater, to provide final fuel temperature control to the nozzle. Unit to contain oil temperature thermometer and cold oil lockout switch.

(For firing No.5 or 6 fuel oil, - optional on No. 4 fuel oil) - The burner shall include a normally open lever action type solenoid valve, to provide continuous circulation of heated oil to the inlet of the safety shutoff valve. The burner shall include a compressed air system, which will purge oil from the outlet side of the safety shutoff valve through the nozzle, on each burner cycle.

(For gas firing) - The burner shall be of the multiple spud, nozzle mix type. The gas train, at minimum, shall consist of a manual shutoff cock, main gas pressure regulator, low and high gas pressure switches, main motorized gas valve with proof of closure switch, auxiliary gas valve, N.O. vent valve above 12.5 MBTU/HR input, leak test cock, butterfly type control valve and burner head gas pressure gauge. A modulating motor will automatically position the butterfly control valve and combustion airflow dampers. A combustion airflow switch shall be provided.

### **EFFICIENCY TESTING**

Final burner start up adjustments shall attain CO2 values of 10 to 13% with <#1 smoke on oil firing - 9 to 10% CO2 with <50 ppm Carbon Monoxide on Natural gas - 10 to 11% CO2 with <50 ppm Carbon Monoxide on Propane Gas. A complete Combustion Test Report will be submitted.

### **TECHNICAL DATA**

The owner shall be supplied with a computer printout listing the specific components used in the manufacture of the burner, wiring diagram, piping diagram, replacement parts data, individual component technical bulletins and a burner start up and instruction manual.

# BURNER START UP INFORMATION & TEST DATA

The following information shall be recorded for each burner start up:

Power Flame Model \_\_\_\_\_ Invoice No. \_\_\_\_\_ Serial No. \_\_\_\_\_

Installation Name \_\_\_\_\_ Start Up Date \_\_\_\_\_

Start Up Contractors Name \_\_\_\_\_ Phone \_\_\_\_\_

Name of Technician doing Start Up \_\_\_\_\_

Type of Gas: Nat.  LP  Other  Fuel Oil Grad No. \_\_\_\_\_

### Gas Firing

#### Gas Pressure at Train Inlet

Burner in Off Position \_\_\_\_\_ "W.C."  
 Low Fire \_\_\_\_\_ "W.C."  
 High Fire \_\_\_\_\_ "W.C."

#### Gas Pressure at Firing Head

Low Fire \_\_\_\_\_ "W.C."  
 High Fire \_\_\_\_\_ "W.C."

#### Gas Pressure at Pilot Test

Tee \_\_\_\_\_ "W.C."

#### Flame Signal Readings D.C. Volts Micro Amps

Pilot \_\_\_\_\_  
 Low Fire \_\_\_\_\_  
 High Fire \_\_\_\_\_

#### CO<sub>2</sub> or O<sub>2</sub> (Specify)

Low Fire \_\_\_\_\_ %  
 High Fire \_\_\_\_\_ %

#### CO

Low Fire \_\_\_\_\_ PPM  
 High Fire \_\_\_\_\_ PPM

#### Input Rate

Low Fire \_\_\_\_\_ BTU/HR  
 High Fire \_\_\_\_\_ BTU/HR

#### Overfire Draft

Low Fire \_\_\_\_\_ "W.C."  
 High Fire \_\_\_\_\_ "W.C."

#### NOx (Corrected to 3% O<sub>2</sub>)

Low Fire \_\_\_\_\_ PPM  
 High Fire \_\_\_\_\_ PPM

#### Stack Outlet Test Point Draft

Low Fire \_\_\_\_\_ "W.C."  
 High Fire \_\_\_\_\_ "W.C."

#### Net Stack Temperature

Low Fire \_\_\_\_\_ °F  
 High Fire \_\_\_\_\_ °F

#### Combustion Efficiency

Low Fire \_\_\_\_\_ %  
 High Fire \_\_\_\_\_ %

#### Windbox O<sub>2</sub>

Low Fire \_\_\_\_\_ %  
 High Fire \_\_\_\_\_ %

### Oil Firing

#### High Fire Vacuum Reading on Oil

Pump Inlet \_\_\_\_\_ "H.G."

#### Gas pressure at Pilot Train

Inlet (if applicable) \_\_\_\_\_ "W.C."

#### Gas Pressure at Pilot Test

Tee (if applicable) \_\_\_\_\_ "W.C."

#### Oil Nozzle Supply Pressure

Low Fire \_\_\_\_\_ PSIG  
 High Fire \_\_\_\_\_ PSIG

#### Oil Nozzle Atomizing Medium Pressure

Low Fire \_\_\_\_\_ PSIG  
 High Fire \_\_\_\_\_ PSIG

#### Flame Signal Readings

Pilot (if applicable) \_\_\_\_\_ D.C. Volts  
 Low Fire \_\_\_\_\_  
 High Fire \_\_\_\_\_

#### GPH Firing Rate

Low Fire \_\_\_\_\_ GPH  
 High Fire \_\_\_\_\_ GPH

#### CO<sub>2</sub> or O<sub>2</sub> (Specify)

Low Fire \_\_\_\_\_ %  
 High Fire \_\_\_\_\_ %

#### Bachrach Scale Smoke Number

Low Fire \_\_\_\_\_  
 High Fire \_\_\_\_\_

#### NOx (Corrected to 3% O<sub>2</sub>)

Low Fire \_\_\_\_\_ PPM  
 High Fire \_\_\_\_\_ PPM

#### Over Fire Draft

Low Fire \_\_\_\_\_ "W.C."  
 High Fire \_\_\_\_\_ "W.C."

#### Stack Outlet Test Point Draft

Low Fire \_\_\_\_\_ "W.C."  
 High Fire \_\_\_\_\_ "W.C."

#### Net Stack Temperature

Low Fire \_\_\_\_\_  
 High Fire \_\_\_\_\_

#### Combustion Efficiency

Low Fire \_\_\_\_\_ %  
 High Fire \_\_\_\_\_ %

**Control Settings**

**Gas**

Operating control cut out setting \_\_\_\_\_  
 Operating control cut in setting \_\_\_\_\_

Low gas pressure switch \_\_\_\_\_ "W.C."  
 High gas pressure switch \_\_\_\_\_ "W.C."

Limit control cut out setting \_\_\_\_\_  
 Limit control cut in setting \_\_\_\_\_

Other \_\_\_\_\_

Power supply: Volts \_\_\_\_\_ Ph \_\_\_\_\_ Hz \_\_\_\_\_  
 Control circuit: Volts \_\_\_\_\_  
 Blower motor amps at high fire \_\_\_\_\_

**Oil**

Other \_\_\_\_\_

Low oil pressure switch \_\_\_\_\_ lbs.  
 High oil pressure switch \_\_\_\_\_ lbs.  
 Atomizing low pressure switch \_\_\_\_\_ lbs.

Oil pump motor amps at high fire \_\_\_\_\_  
 Other \_\_\_\_\_

**Operation Checklist**

<b>Checked For Proper Operation Of:</b>	<b>Yes</b>	<b>No</b>		<b>Yes</b>	<b>No</b>
Low water cut off	_____	_____	Barometric damper	_____	_____
High water cut off	_____	_____	Boiler room combustion air & ventilation provision correct	_____	_____
Flame safeguard control ignition failure	_____	_____	Oil tank vent system correct	_____	_____
Flame safeguard control main flame failure	_____	_____	All oil lines checked for leaks	_____	_____
Burner air flow switch	_____	_____	All gas lines checked for leaks	_____	_____
Induced draft fan controls	_____	_____	Gas lines & controls properly vented	_____	_____
Over fire draft controls	_____	_____	Other system components (specify)	_____	_____
Fresh air damper end switch	_____	_____		_____	_____

Notified \_\_\_\_\_ of the following system deficiencies: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_