Power Flame Incorporated

SUGGESTED SPECIFICATION
FOR MODEL NP2
ULTRA LOW NOx GAS BURNERS
SUB 9 to 20 PPM NOx

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NP2-1008

Suggested Specification for Power Flame NP2

(Ultra Low NOx Gas Burners from 400 to 6,100 MBH)

A. General Requirements

1. Furnish and install Power Flame Model NP(R)2-G-XXX Ultra Low NOx natural gas burner. The burner and burner installation shall meet all applicable local code requirements.

B. Low-NOx Burner Description

1. The burners shall be Power Flame Type NP2 forced draft surface stabilized combustion. Each burner shall have a maximum fired duty of (X,XXX) MBTU/hr. Gas pressure at the burner gas train supply connection shall be a minimum of (XX) and maximum (1) PSI

2. NOx emissions shall be guaranteed to be less than or equal to **(9, 12, 20) PPM,** corrected to 3% O_2, and CO emissions shall be guaranteed to be less than or equal to 50 ppm, over the full range of burner operation.

3. The burner shall operate **without flue gas recirculation** (FGR) with natural gas as the main fuel. Burner using flue gas recirculation will not be approved.

4. Burner turndown from maximum heat input shall be a minimum of 3:1.

5. Combustion head shall be of high temperature stainless steel all metal construction. Surface stabilized combustion head and be provided with refractory boiler mounting plate.

6. All combustion air shall be supplied by a blower mounted integral to the burner. The blower wheel shall be forward curved R series industrial model and shall be directly driven by a (**XX**) hp 3450 RPM 208/230/460 volt, 60 Hz, 3 phase motor. Open air inlet assemblies on the side of the blower wheel will have no moving parts, dampers or linkage. Combustion air connection shall be provided with a washable stainless steel metal mesh air filter assembly and be capable of accepting a direct fresh air connection.

7. The burner assembly shall be of welded steel construction. All surfaces shall be treated with a phosphate coating prior to applying a baked on polymer powder coat finish. Provide a three dimension drawing of the burner to assure proper fit up to the boiler or heating appliance.

C. Approval Codes

1. Each burner shall adhere to UL **(GE-Gap, FM, CSD-1 and former IRI)** design guidelines. Each burner shall be designed and constructed as an integrated combustion system package and shall be factory fire tested.

D. Ignition System

1. The burner ignition system shall utilize natural gas as the fuel source. The gas pilot system components shall include spark ignited pilot assembly, 6000 volt ignition transformer, pilot solenoid valve, pilot gas pressure regulator, and manual gas shutoff ball valve. (Optional: pilot normally open vent valve with locking shutoff cock, pilot gas strainer, gas pressure gauge and manual gas shutoff valve.) The flame proving system shall incorporate an Ultra-Violet flame detector which will monitor both the pilot and main flames. The pilot assembly shall fit within the confines of the burner/pilot assembly front mounting plate.

E. Fuel/Air Control System

1. Main gas supply shall be controlled by proportional on ratio fuel-air controller motorized gas safety shut-off valve.

2. The main gas valve will modulate the gas flow to the burner in response to changes in the blower housing air pressure. The speed of the blower motor shall be controlled by a variable frequency drive suitable to accept a 4-20 mA or 0-10 Volt control signal from a modulating type (temperature) (pressure) controller. Linkage or parallel positioning type controls shall not be accepted. When the operating control is satisfied the burner shall shutoff and return to the closed position. The proportional fuel-air ratio controller shall ensure a guaranteed low fire start position prior to the pilot trial for ignition sequence.

F. U. L. Gas Control Trains

1. The gas train shall contain the following:
   a. Manual shutoff cock
   b. Main gas pressure regulator
   c. Automatically operated main motorized proportional on ratio fuel-air valve
   d. Automatically operated auxiliary gas valve
   e. Manual reset Low and High gas pressure switches **(Optional: < 2,500 MBH)**
   f. Manual leakage test cock.
   g. Burner manifold gas pressure gauge
   h. (2) ¼" leak test cocks

2. FM Requirements (Optional)

   (Spec writer – For FM note that a standard U. L. burner and gas train is furnished for units with input up to 2,500 MBH. For units with input exceeding 2,500 MBH, in addition to U. L. requirements, add the following:)

   a. U. L. listed leak test cock.
   b. Automatically operated main motorized gas valve with proof of closure shall carry a FM label.

   (Spec writer - add for FM burners with input exceeding 5,000 MBH)

   c. Automatically operated auxiliary gas valve shall be motorized type, incorporate proof of closure feature and carry a FM label.

d. Both automatically operated motorized gas valves shall be equipped with 13 second timing motorized operators.

3. Former IRI Requirements (Optional)

(Spec writer – For IRI in addition to U. L. gas train requirements, add the following:)

a. U. L. listed leak test cock.
b. Both automatically operated gas valves (main and auxiliary) shall have motorized operators.
c. Automatically operated main gas valve shall have proof of closure feature (burners with input exceeding 5,000 MBH).
d. One (1) normally open vent valve sized according to IRI requirements.
e. Manual reset low and high gas pressure switches (specify for all burner inputs).

(Spec writer - add the following for FM:)

4. For burners above 2800 MBH thru 12,500 MBH use two (2) FM labeled valves, or one (1) valve with proof of closure and FM label.
5. For burners above 12,500 MBH, both valves shall have proof of closure and FM label.

G. Burner Operating Controls

1. The On-Off operation of the burner shall be controlled by a (pressure) (temperature) control. System (pressure) (temperature) shall be _____ (PSIG) (Degrees F). A safety manual reset type limit control shall be provided by others to shut the burner down in the event of excessive (pressure) (temperature). The proportional fuel-air ratio controller shall be controlled by a modulating type (pressure)(temperature) control in addition to the On-Off operating control.

H. Interlocks

1. The combustion sequenced will allow for four (4) complete air changes of the combustion chamber and breaching. Proven low fire start interlock to insure burner starts at the low fire setting.

I. Flame Safeguard Control

The flame safeguard control shall include ultra-violet sensor for flame detection and provide fully automatic sequencing of pre-purge and post-purge, blower motor, interrupted ignition system, and fuel/air flow components. Flame safeguard shall provide safety shutdown with manual reset on air flow failure. The flame safeguard control shall be a Honeywell RM7840L or equal as manufactured by Fireye.

J. Control Panel

1. Each burner shall be complete with a burner mounted control panel which shall house all required operating electrical components. All flame safeguard wiring within the combustion control system shall be factory pre-wired utilizing a UL listed preprinted main circuit board. All optional controls will be wired to a din rail mounted terminal strip within the control panel. The main Honeywell flame safeguard control will plug into the main circuit board and provide minimal wiring

within the control panel. The main circuit board will connect to the light and switch circuit board on the top of the control panel with a plug in connector. The light and switch circuit board will have a laminated indication label for each function on the light and switch circuit board. The light and switch circuit board will included On-off power switch, ultra bright LED indication lights for “Power On”, load “Demand”, “Main Fuel”, Flame Safeguard “FSG Alarm” and “Low Water”, Manual-Auto selector switch and manual potentiometer with ultra bright LED indication when in the manual mode. Include in the panel a variable speed drive and panel vents.

(Optional remote panel) All wiring for remote panel electrical components shall be factory pre-wired to a terminal strip mounted within the control panel. A junction box pre-wired to the burner components shall be mounted on the burner. It shall have a terminal strip which shall match a terminal strip in the remote panel. Field wiring shall be required between the burner mounted junction box and the remote control panel.

2. Appropriate electrical knockouts shall be provided on both sides of the panel to allow for necessary power and limit control wiring. The control panel shall be constructed of 14 gauge steel and shall be complete with a top switch and control section which shall be hinged to allow for full access to all panel mounted components. The control panel shall have a baked on powder coat finish in a color identical to the burner being supplied.

3. The control panel shall include a din rail mounted control circuit transformer with integral fuses on both the primary and secondary windings to power 120 V components, din rail mounted motor starters, relays, terminal blocks and other electrical devices as required The control panel shall include a step-down control circuit transformer fused on both the primary and secondary.

4. Provide an alarm buzzer and auto reset alarm silencing switch to signal any failure status.

5. Optional lights and alarms indications: Additional ultra bright LED auxiliary light circuit boards nested in groups of 4, 6 or 8 lights on printed circuit boards will be mounted in the top indication section of the panel and include an engraved label indicating the function of each light. The following indication lights will be supplied along with necessary isolation circuits as required.

    a. Auxiliary Light Circuit Board with **4** additional ultra bright LED’s. “High Temperature” (R), “Low Gas Pressure” (R),“High Gas Pressure” (R), “Pilot Failure” (R) with alarm buzzer and alarm silencing switch.

    b. Auxiliary Light Circuit Board with **6** additional ultra bright LED’s. “High Temperature” (R), “Low Gas Pressure” (R), “High Gas Pressure” (R), “Pilot Failure” (R), “Ignition On”(A) “Air Flow Failure” (B), with alarm buzzer and alarm silencing switch.

    c. Auxiliary Light Circuit Board with **8** additional ultra bright LED’s. “High Temperature” (R), “Low Gas Pressure” (R), “High Gas Pressure” (R), “Pilot Failure” (R), “Ignition On”(A), “Air Flow Failure” (B), “Pilot On” (A), “High Limit” (R) with alarm buzzer and alarm silencing switch.

Additional auxiliary light circuit boards with ultra bright LED indications are available in-groups of 4, 6 or 8 lights specify desired light functions and isolation circuits as required.

K. Product Liability Insurance

The burner manufacturer will provide an Insurance Certificate documenting his current coverage of Product Liability Insurance.

L. Burner Start-up Information and Test Data

(1) On natural gas firing, NOx emissions will not exceed **(9, 12, 20) PPM,** and CO emissions will not exceed 50 PPM all emissions measurements are to be corrected to 3% O_2.

(2) Burner Start-Up Information and Test Data Form must include NOx and CO emissions measurements. On completion of the burner system start up, the installing contractor shall complete a Burner Startup Information Sheet and a Control Setting Sheet and deliver to the Specifying Engineer and to the owner prior to final payment.