

# **SERIES 8H ATMOSPHERIC: GAS FIRED HOT WATER BOILER SUGGESTED SPECIFICATIONS**

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Note: To use as a project specification:

- A. Insert, in the blank spaces provided, the applicable model number, capacity, fuel, and electrical data.
- B. Delete the item in parentheses or marked "\*" which are not applicable to the project requirements.
- C. Insert, where applicable, optional non-standard features desired.

## **1. GENERAL SPECIFICATION**

Contractor shall furnish and install, where indicated on the drawings, \_\_\_\_\_ (quantity) Model 8\_\_\_\_H gas fired hot water boiler(s) having an I=B=R approved gross output of \_\_\_\_\_ MBH and a net rating of \_\_\_\_\_ MBH per boiler with an input of \_\_\_\_\_ MBH when fired with (natural or LP gas). Boiler(s) shall be constructed of cast iron sections manufactured in accordance with ASME requirements for low pressure boilers and each section shall be permanently marked with the ASME symbol and the maximum allowable working pressure.

## **2. BOILER EQUIPMENT SPECIFICATION**

- \*2.1 The boiler(s) shall be knocked down with the sections and base factory assembled as one unit. The knocked down boiler shall be shipped in a fully containerized shipping crate, capable of being stacked two high.
- \*2.2 The boiler(s) shall be factory packaged with jacket, manifold, burner, and controls mounted and wired. The packaged boiler shall be shipped on a wooden skid with reinforced cardboard to protect from damage.
- 2.3 Boiler sections shall have pin-like projections on each center section, evenly spaced on the vertical flue surfaces to extract the maximum heat from the hot flue gases.
- 2.4 Boiler sections shall be surface ground to ensure smooth positive mating surfaces.
- 2.5 Boiler sections shall be assembled with precision machined cast iron push nipples, pressed into a mating machined nipple port in the section eliminating the need for any gasket material which would be subject to deterioration due to corrosion or oil based chemicals.
- 2.6 All boiler sections shall be individually hydrostatically tested for 50 psi water working pressure in accordance with ASME Code Section IV.
- 2.7 Boiler shall have top access individual cleanout openings between sections.
- 2.8 Boilers shall be equipped with aluminized steel burners with air shutters which feature smooth ignition and positive flame extinction.
- 2.9 Boiler flue canopy shall be constructed of heavy gauge aluminized steel and shall be concealed under an insulated steel boiler jacket.
- 2.10 A draffhood shall be furnished for each boiler.
- \*2.11 Boiler shall be equipped with an automatic flue vent damper. (standard on size 805H)
- 2.12 The boiler jacket shall be deluxe extended type with 3" insulation and have a rust resistant baked enamel finish. The jacket shall be capable of being installed after system piping has been connected to the boiler section assembly.
- 2.13 Boiler trim shall include a 3-1/2" round pressure-temperature gauge with separated scales for pressure and water temperature. In addition, an ASME approved water relief valve shall be furnished sized to exceed the boiler gross output capacity and shall be factory set to relieve pressure at (30) (50) psi.

- 2.14 Boiler shall be manufactured of flake graphite/eutectic cell/ cast iron sections which shall have been subjected to a hydrostatic pressure test of 2-1/2 times MAWP at the factory before assembly and each section shall be marked, stamped or cast with the ASME Code symbol. After section assembly, the entire block of sections shall be hydrostatically tested at 1-1/2 times MAWP prior to shipment. Boiler shall be designed in accordance with the ASME Boiler and Pressure Vessel Code Section IV requirements.

### 3. BOILER CONTROLS

- 3.1 High limit control (a) or (b) below:  
(a) shall be automatic reset type suitable for 115 volt 60 Hz.  
(b) shall be manual reset type suitable for 115 volt 60 Hz.
- 3.2 A separate operating control shall be furnished by the contractor in addition to the high limit control and shall be automatic reset type suitable for 115 volt 60 Hz.
- 3.3 A low water cut-off shall be furnished and sized on the basis of boiler capacity and pressures involved. Provide the following:  
(a) McDonnell & Miller PS851 Probe Low Water Cut-off (Automatic Reset)  
(b) McDonnell & Miller No. 750P-MT Probe Low Water Cut-off (Manual Reset),  
(c) McDonnell & Miller No. 64 (Automatic Reset)  
(d) McDonnell & Miller No. 63M (Manual Reset)

### 4. GAS TRAINS & IGNITION SYSTEMS

- 4.1 Each boiler shall be furnished with an A.G.A. certified gas train.
- 4.2 The gas control train of each boiler shall be factory assembled and consist of (select option a, b, or c):

#### Option (a)

**(This is standard equipment on 806-807, optional on other sizes with 4.3.c and 4.3.d ignition system)  
(Thermocouple controlled gas train when used with 4.3.a and 4.3.c ignition system)  
(Electronically controlled gas train when used with 4.3.d ignition system)**

a combination 24 volt gas valve with 100% shut-off, a 24 volt solenoid gas valve, and a 1/8" N.P.T. pressure tapping.

#### Option (b)

**(This is standard equipment on 805, 808-810, optional on 806-807)  
(Electronically controlled, EI, gas train - see 4.3.b)**

a combination 24 volt redundant gas valve with 100% shut-off and a 1/8" N.P.T. pressure tapping.

#### Option (c)

**(IRI approved gas train)**

two manual shut-off valves, pilot gas filter, pilot shut-off valve, pilot gas pressure regulator, pilot solenoid gas valve, main gas pressure regulator, dual main motorized gas valves, normally open vent valve, and main high and low gas pressure switches.

**(NOTE TO SPECIFIER:** IRI gas trains are factory assembled and shipped separately to be mounted on the side of the boiler. This will change the minimum side clearance from 1" to 24".)

- 4.3 Each boiler ignition system shall be (select option a, b, c, d, e or f):

#### Option (a)

**(This is standard on 806-807)**

**(This ignition system must be used only with gas control train, Option a.)**

a manually lighted continuous burning pilot, supervised by a thermocouple, and shall provide for 100% gas shut-off.

#### Option (b)

**(This is standard on 805, 808-810, optional on 806-807)**

**(This ignition system must be used only with gas control train Option b.)**

of the EI type electronic control system which shall provide an electrically ignited intermittent gas pilot and permit the main gas valve to open only when the pilot burner is proven to be lit. Should a loss of pilot flame occur, the main gas valve will close and the spark will recur within 0.8 seconds. If pilot fails to ignite within 90 seconds, control will attempt to relight after 5 minutes. System shall include an electronic ignition module, pilot assembly, and pilot gas valve.

**Option (c)**

**(This ignition system must be used only with gas control train Option a.)**

of the OP type electronic control system which provides manual ignition of electronic pilot assembly, 100% shut-off constant burning pilot, electronic supervision of pilot flame, 0.8 second flame response time, 30 second safety switch timing and shall include (1) factory pre-wired electronic control panel including: Honeywell RM7890C relay module, main power on switch and light, gas valve on switch and light, alarm light to indicate flame failure and terminal strip.

**Option (d)**

**(This ignition system must be used only with gas control train Option a.)**

of the EP type electronic control system which provides electric ignition, 100% shut-off, intermittent pilot flame operation, electronic supervision of the pilot flame, 0.8 second flame response time, 30 second safety switch timing, and shall include (1) factory-prewired electronic control panel including: Honeywell RM7890A relay module, main power on switch and light, gas valve on switch and light, alarm light to indicate flame failure and terminal strip.

**Option (e)**

**(This ignition system must be used only with gas control train Option c.)**

of the OP-IRI type electronic control system which provides manual ignition of electronic pilot assembly, 100% shut-off constant burning pilot, electronic supervision of pilot flame, 0.8 second flame response time, 30 second safety switch timing and shall include (1) factory pre-wired electronic control panel including: Honeywell RM7890C relay module, main power on switch and light, gas valve on switch and light, alarm light to indicate flame failure, alarm bell, silencing switch, and terminal strip.

**Option (f)**

**(This ignition system must be used only with gas control train Option c.)**

of the EP-IRI type electronic control system which provides electric ignition, 100% shut-off, intermittent pilot flame operation, electronic supervision of the pilot flame, 0.8 second flame response time, 30 second safety switch timing, and shall include (1) factory-prewired electronic control panel including: Honeywell RM7890A relay module, main power on switch and light, gas valve on switch and light, alarm light to indicate flame failure, alarm bell, silencing switch, and terminal strip.

**5. MULTIPLE BOILER EQUIPMENT AND CONTROL SYSTEM**

- \*5.1 Factory fabricated water manifolds shall be provided that are designed for primary/secondary circulation. One combination supply and return manifold with interconnecting boiler-to-manifold piping shall be installed by the contractor.
- \*5.2 Factory fabricated water manifolds shall be provided that are designed for parallel supply and return circulation. One set of supply and return manifolds with interconnecting boiler-to-manifold piping shall be installed by the contractor.
- 5.3 The manifolds shall be furnished with two three-quarter inch tappings for gauges or controls and have lateral connections that can be used with union connectors or flexible couplings.
- 5.4 Contractor shall furnish and install a multiple boiler control system to step fire boilers as needed to meet system demand. (select option a, b, c, d, e, f, or g):

**Option (a)**

- 5.4.1 Boiler control system shall maintain a constant water temperature by step firing up to eight boiler modules. The system shall consist of a Johnson A350 control module with supply water sensor and well, a Y350 power module, and (1) S350 stage module for each boiler except the first. Provide a Burnham Control Package A.

**Option (b)**

- 5.4.1 Boiler control system shall regulate supply water temperature based on outdoor air temperature by step firing up to ten boiler modules. The system shall include warm weather shutdown, adjustable reset ratio of 1:5 to 3:1, adjustable differential from 1° to 30°F, and adjustable minimum supply temperature. It shall consist of a Johnson A350RN control module, supply water sensor, outdoor air sensor, Y350R power module, and (1) S350 stage module for each boiler except the first.

**Option (c)**

- 5.4.1 Boiler control system shall regulate supply water temperature based on outdoor air temperature by step firing up to eight boiler modules. It shall have fixed reset ratio of 1.5:1, 1:1, or 1:1.5. It shall consist of a T475A control with 30ft. capillary on first boiler and (1) T6031A outdoor air sensor with 20 ft. capillary and bulb shield on each additional boiler. Provide a Burnham Control Package B.

**Option (d)**

- 5.4.1 Boiler control system shall be microprocessor based and shall regulate supply water temperature based on outdoor air temperature by step firing up to ten boiler modules on a first on first off basis. It shall have an adjustable reset ratio of 4:1 to 1:4 and auto rotate of lead boiler to equalize run time. It shall include a NEMA 1 control panel with lock and key, power on, system pump on, and boiler on lights, manual/off/auto switches, terminal strip, fuse and fuse holder, and 24V transformer. It shall consist of a W7100J sequence control (and Y7100J for 7 thru 10 boilers), supply water sensor and well, outdoor air sensor with bulb shield. Optional features shall include T675A system starter with bulb shield, combustion air damper relays, a setback clock, a digital display of supply water temperature and outdoor air temperature, and an alarm bell. Provide a Burnham Control Package E.

**Option (e)**

- 5.4.1 Boiler control system shall be microprocessor based and shall regulate supply water temperature based on outdoor air temperature by step firing up to two boiler modules. It shall include 10 LED's to indicate key operating functions, warm weather shutdown, adjustable settings for reset ratio, DHW supply temperature, minimum supply temperature, and boiler differential. It shall also include auto rotate to equalize run time, DHW priority, and a pre-programmed test sequence. It shall consist of a Tekmar 252 control in NEMA 1 locking enclosure, supply water sensor, outdoor air sensor, and 24V transformer.

**Option (f)**

- 5.4.1 Boiler control system shall be microprocessor based and shall regulate supply water temperature based on outdoor air temperature by step firing up to four boiler modules. It shall include 12 LED's to indicate key operating functions, warm weather shutdown, adjustable settings for reset ratio, DHW supply temperature, minimum supply temperature, and boiler differential. It shall also include auto rotate to equalize run time, DHW priority, and a pre-programmed test sequence. It shall consist of a Tekmar 254 control in NEMA 1 locking enclosure, supply water sensor, outdoor air sensor, and 24V transformer.

**Option (g)**

- 5.4.1 Boiler control system shall be microprocessor based and shall regulate supply water temperature based on outdoor air temperature by step firing up to eight boiler modules. It shall include 18 LED's to indicate key operating functions, warm weather shutdown, adjustable settings for reset ratio, minimum supply temperature, and boiler differential. It shall also include auto rotate to equalize run time, a combustion air damper relay, a pre-programmed test sequence, an LCD display of supply water temperature, outdoor air temperature, boiler running times, and time of day. It shall consist of a Tekmar 258 control in NEMA 1 locking enclosure, supply water sensor, outdoor air sensor, and 24V transformer.