SUGGESTED SPECIFICATIONS

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Series GM™-e/Flex-Heat® Modular Atmospheric

I. GENERAL REQUIREMENTS

A. A modular boiler system shall consist of two or more compact boilers that offer significant advantages in terms of installation cost, efficiency, and reliability. These systems are based on step-firing just enough modules to meet domestic hot water or space heating demands. Systems are available in 456,000 to multi-million BTUh gross input. For additional information, see page 3 and 4 excerpts from the Series GM™-e Flex-Heat® Application Guide, #GM8102.

B. HOT WATER/GAS- GM™-e /Flex-Heat® Series Modular boiler Plant Engineering Specifications: Furnish and install, where indicated on plans, a gas-fired, modular hot water heating plant with a net output of___BTU/hr. (per Table 1), for use with natural gas (4.8" WC MIN./13.5" WC MAX). Installation shall be made in accordance with the manufacturer's recommendations and shall comply with requirements for modular boilers in Section IV of the ASME Boiler and Pressure Vessel Code and all other regulations of authorities having jurisdiction. The system shall consist of FH-_____(per Table 1) or approved equivalent, which shall meet or exceed all of the following specifications:

II. BOILER CONSTRUCTION FEATURES

A. HEAT EXCHANGER: The heat exchanger for each module shall be fabricated from cast iron vertical sections. Water seal between sections shall be metal to metal, gasket material is not acceptable.

B. BURNER: Each boiler module shall be equipped with aluminized steel main burners of a one piece slotted port design to provide quiet ignition and extinction.

C. COMBUSTION CHAMBER: Each boiler module shall have a corrosion resistant, aluminized steel base assembly lined with a ceramic fiber refractory type combustion chamber.

D. FLUE COLLECTOR: Flue collector on each module shall be fabricated of corrosion resistant aluminized steel.

E. DRAFT HOOD: Draft hood shall be supplied and ETL listed for use with each module.

F. CONSTRUCTION: Each boiler module shall be supplied fully assembled, including burners and factory installed jacket on each module to ease installation and service. Individual boiler shall be equipped with corrosion resistant base. Modules shall be assembled in a fashion that will provide top and front access to all piping and controls.

G. VENT DAMPER: Each boiler shall be supplied with a listed motorized vent damper and can be mounted in either the horizontal or vertical position to close on shut-down and prove open on start-up.

III. BOILER TRIM AND CONTROLS

A. MODULE OPERATING CONTROLS: Each module shall be equipped with an intermittent pilot ignition system, combination redundant gas valve with manual shut off, pressure regulator, pilot adjustment and 100% automatic shut off.

B. MODULE SAFETY CONTROLS: Each module shall be equipped with a combination control incorporating a high temperature limit, low water cut-off/boiler reset feature. Also separate flame roll-out safety shut off switch and blocked vent safety shut off switch to interrupt power to the gas valve in the event of related unsafe condition.

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C. CONTROL HEADER: Manufacturer shall provide a control manifold for installation in the supply piping to the system. The control header shall have four tappings for the installation of a manual reset high temperature limit, probe low water cut-off, combination pressure/temperature gauge and system water temperature sensor or other system controls that may be required.

D. SYSTEM SAFETY CONTROLS: The manufacturer shall supply an optional manual reset probe low water cut-off for field installation in the common header. A high limit control with manual reset shall also be supplied by the manufacturer and field mounted in the control header.

E. PRESSURE RATING: All modules shall be constructed for 100 PSI maximum working pressure and shall be tested in accordance with Section IV of the ASME Boiler and Pressure Vessel Code (specify 100, 80, 50 or 30 PSI relief valves).

Pressure relief valve: Each module shall be supplied with an ASME rated pressure relief valve. Relief valve shall be field piped to floor at a location that will show visible signs of relief.

F. WEIGHT: The heating plant floor load shall not exceed 160 pounds/square foot when equipped with factory headers and filled with water.

G. MAINTENANCE: Module design shall permit complete access to controls, burners, and heat exchanger for inspection and maintenance by removal of not more than two jacket panels.

H. APPROVALS: The following approvals shall be clearly marked on each module; ETL listed, AHRI certified, and ASME.

I. DOMESTIC HOT WATER (Optional): Manufacturer shall provide an external indirect fired water heater Model PP-_____ or PV-_____ with First Hour Rating of_____Gallons at__ °F Temperature Rise (per Tables 3 & 3.1). The installing contractor shall furnish a circulator of appropriate size.

IV. SYSTEM OPERATING CONTROLS

A. SEQUENCING CONTROL (Optional): Boiler modules shall fire in sequence as determined by a tekmar® CONTROL SYSTEM suitable for the number of modules and desired stages.

B. SUPPLY AND RETURN HEADERS (Optional): Manufacturer shall provide as optional equipment, prefabricated supply and return headers together with adjustable coupling, unions, nipples and fitting as required to interconnect all modules with a common supply and return connection.

TABLE 1

(OTHER COMBINATIONS ALSO AVAILABLE)

TYPICAL FLEX-HEAT® MODULAR BOILER SYSTEMS

System Number	Module Quantity & Size	Input (MBH)	Gross Output (MBH)	Gross Output (H.P.)	Net Output (MBH)	AFUE Efficiency
FH-429	(2) 5 section	429	364	10.9	316	84%
FH-482	(1) 5 section, (1) 6 section	482	408	12.2	355	84%
FH-536	(2) 6 section	536	452	13.5	394	84%
FH-598	(2) 7 section	598	504	15.1	438	84%
FH-696	(2) 5 section, (1) 6 section	696	590	17.6	513	84%
FH-750	(1) 5 section, (2) 6 section	750	634	18.9	552	84%
FH-804	(3) 6 section	804	678	20.3	591	84%
FH-897	(3) 7 section	897	756	22.6	657	84%
FH-964	(2) 5 section, (2) 6 section	964	816	24.4	710	84%
FH-1072	(4) 6 section	1072	904	27.0	788	84%
FH-1165	(1) 6 section, (3) 7 section	1165	982	29.3	854	84%
FH-1196	(4) 7 section	1196	1008	30.1	876	84%
FH-1371	(4) 6 section, (1) 7 section	1371	1156	34.5	1007	84%
FH-1495	(5) 7 section	1495	1260	37.6	1095	84%
FH-1554	(1) 5 section, (5) 6 section	1554	1312	39.2	1143	84%
FH-1608	(6) 6 section	1608	1356	40.5	1182	84%
FH-1732	(2) 6 section, (4) 7 section	1732	1460	43.6	1270	84%
FH-1794	(6) 7 section	1794	1512	45.2	1314	84%
FH-1876	(7) 6 section	1876	1582	47.3	1379	84%
FH-1907	(6) 6 section, (1) 7 section	1907	1608	48.0	1401	84%
FH-2000	(3) 6 section, (4) 7 section	2000	1686	50.4	1467	84%
FH-2062	(1) 6 section, (6) 7 section	2062	1738	51.9	1511	84%
FH-2093	(7) 7 section	2093	1764	52.7	1533	84%
FH-2299	(3) 6 section, (5) 7 section	2299	1938	57.9	1686	84%
FH-2392	(8) 7 section	2392	2016	60.2	1752	84%
FH-2521	(5) 6 section, (4) 7 section	2521	2138	63.9	1861	84%
FH-2691	(9) 7 section	2691	2268	67.8	1971	84%
FH-2990	(10) 7 section	2990	2520	75.3	2190	84%

TABLE 2

SERIES GM™-e RATINGS

Boiler Model Number	Input, MBH	Heating Capacity[1], MBH	Net Ratings Water[2,3], MBH	Intermittent Ignition AFUE[1], %	Water Content (Gallons)
GM-e-05	214.5	182	158	84.2	6.15
GM-e-06	268	226	197	84.0	7.2
GM-e-07	299	252	219	84.2	8.25

(1) Heating Capacity and Annual Fuel Utilization Efficiency (AFUE) ratings are based on U.S. Government test.
(2) Net water ratings based on an allowance of 1.15.
(3) Consult factory before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.

TABLE 3

PEERLESS® PARTNER® PP RATINGS AND FLOW SPECIFICATIONS

Model Number	Peerless® Partner® Ratings				Peerless® Partner® Flow Specifications		
	First Hour Rating[1], (Gallons)		Min. Boiler Output[2] to Achieve First Hour Rating (BTU per hour)	Heat Exchanger Surface Area (ft^2)	Recommended Flow Rate	Heat Exchanger Pressure Drop	Domestic Water Connection Sizes
	140°F	115°F					
PP-30-LB	169	234	114,000	15	8 gpm	6.0 ft.	3/4 NPT
PP-40	212	292	141,000	20	10 gpm	7.9 ft.	3/4 NPT
PP-60	266	370	174,000	20	10 gpm	7.9 ft.	1 NPT
PP-80	330	440	212,000	34	12 gpm	9.1 ft.	1-1/2 NPT
PP-120	423	564	269,000	34	14 gpm	11.3 ft.	1-1/2 NPT

(1) First hour rating based on heating water from 50°F to 140/115°F with 180°F boiler water temperature. Gas- and Oil-fired and electric water heater first hour ratings based on DOE test procedure using 90°F temperature rise (55°F to 145°F).
(2) Net I=B=R Output, Water.

TABLE 3.1

PEERLESS® PARTNER® PV RATINGS

Water Heater Model Number	Potable Water Volume, gallons	Standby Loss, °F/h	Continuous Draw, gal/h	First Hour Rating, gal/h	Min. Heat Source Output, MBH	Min. Heat Source Flow, gpm	Heat Source Friction Loss, Feet w.c.
PV-40	30.0	0.8	177	199	115000	8.0	18.7
PV-60	55.0	0.6	177	217	115000	8.0	18.7
PV-80	80.0	0.4	315	381	199000	14.0	16.0
PV-120	119.0	0.4	381	477	244000	14.0	20.0

These ratings were obtained with a heat source output and heat source flow rate as listed in the chart using the parameters of the Domestic Cold Water inlet at 58°F. Domestic Temperature Rise of 77°F and Boiler Temperature Output of 180°F. Other results will be obtained under different conditions.