AMERICAN-STANDARD

for no. 2 or lighter oil-gas-combination gas-oil

PLAINTIFF'S EXHIBIT

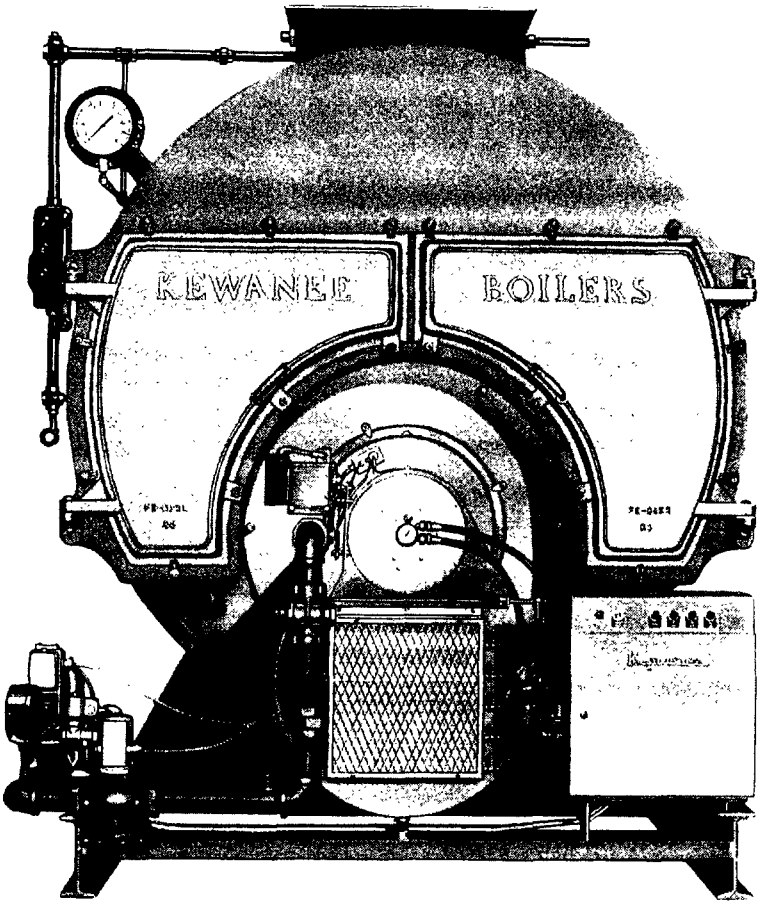
ASI-1207

KEWANEE

FORCED DRAFT SCOTCH PACKAGE UNITS

FOR LARGER SIZES AND HEAVIER OILS REFER TO BULLETIN 96-1-49D. FOR SMALLER SIZES REFER TO BULLETIN 749D.

HIGH PRESSURE 169 to 338 Bhp
LOW PRESSURE 173 to 346 Bhp



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BULLETIN 96-7-96B

KEWANEE

FORCED DRAFT SCOTCH PACKAGE UNITS

AVAILABLE IN 5 SIZES, HIGH AND LOW PRESSURE . . .
EACH BURNER SPECIFICALLY DESIGNED TO OPERATE AT
PEAK EFFICIENCY WITH THE BOILER IT FIRES . . .
LIGHT OIL, GAS OR COMBINATION GAS-OIL . . .

HIGH PRESSURE 169 to 338 Bhp

LOW PRESSURE 173 to 346 Bhp

BOILER FEATURES

Construction and materials meet or exceed ASME code requirements.

The welded shell and gasketed cast iron flue doors assure gas-tight construction. I-beam skids and reinforced saddles support the unit and distribute weight evenly. Skids and lifting loops facilitate handling.

Certified ratings are conservative, assuring adequate reserve capacity. Firing rates are carefully matched to heating surface. Two pass design, large furnace volume, more primary heating surface and forced draft operation assure quiet combustion with minimum 80% efficiency. Large steam space, disengaging area and water content provide steady water line and a plentiful reserve of dry quality steam.

BURNER FEATURES

All fuel burning equipment UL approved.

Each burner is custom engineered for the boiler it fires to provide full modulating operation with proved low fire start. Fuel supply and combustion air are regulated throughout the firing range by a modulating motor controlled by a boiler-mounted pressure or temperature modulating potentiometer. Enforced low fire start is provided by an interlock on the modulating motor. Combination electronic combustion safeguard and programmer assures safe operation with prepurge, post-purge and proved ignition for both fuels. Dual automatic main gas valves provide best protection against valve leakage.

Master programming flame safeguard relay, switching relays, necessary motor magnetic starters, numbered terminal strip, indicating lights for major operations and fuel selector switch—all are mounted and wired in a heavy gauge steel, dust proof control cabinet. Wiring is ready for connection to power source.

OIL BURNERS

Oil burners are of the mechanical pressure atomizing type complete with motor, fan, oil pump, nozzles, gas-electric ignition, oil filter, combustion controls and relays necessary for automatic operation. Oil piping is ready for field connection to fuel supply.

GAS BURNERS

Gas burners are of the multiple-jet flame retention type complete with motor, fan, gas-electric ignition, dual automatic gas valves, manual gas shut-off cock, gas pressure regulator, combustion controls and relays necessary for automatic operation. Gas piping is ready for connection to fuel supply.

GAS-OIL BURNERS

Combination gas-oil burners include the features of both the gas burners and oil burners in a single unit. No burner modifications to change fuels . . . Just flip a switch.

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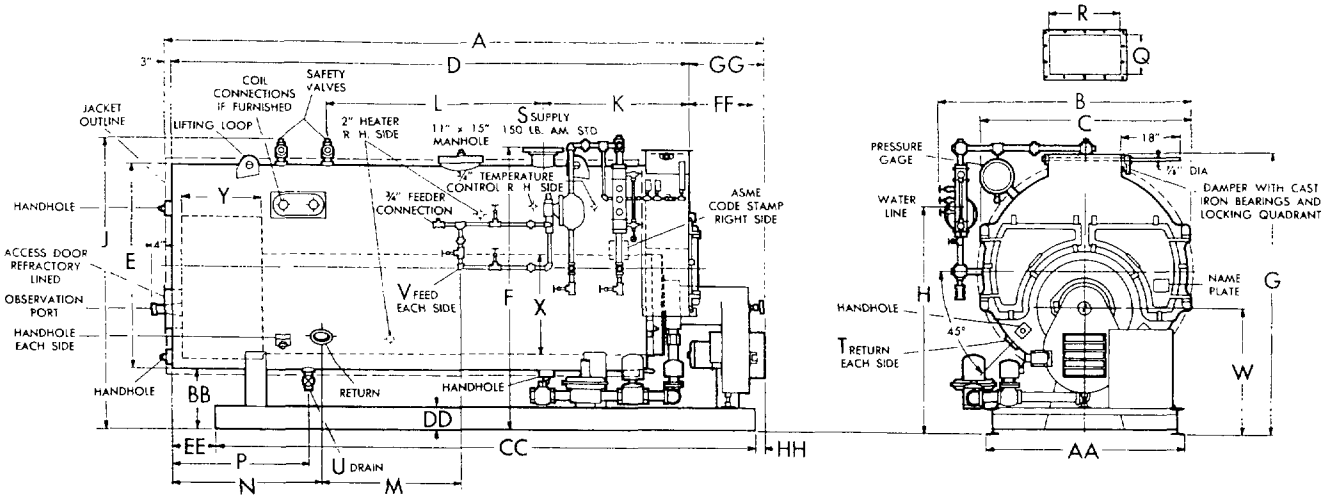
LOW PRESSURE



RATINGS

UNIT NUMBER	KGP-84	KGP-85	KGP-86	KGP-87	KGP-88
Ratings—horsepower	173	208	242	277	346
—MBh	5820	6982	8138	9300	11619
—steam per hour 212°F. lbs	5980	7170	8360	9550	11930
—steam radiation sq. ft	24250	29090	33910	38750	48410
—water sq. ft	38800	46550	54250	62000	77460
Net Steam Radiation (MCA) sq. ft	17860	21440	25000	28580	35720
Firing Rate—oil 140,000 Btu. gph	52.0	62.3	72.7	83.0	103.7
—gas MBh	7274	8728	10172	11626	14524
Heating Surface (ASME) sq. ft	866	1039	1211	1384	1729
Net furnace volume cu. ft	112.8	137.4	152.6	182.0	223.4
Safety valve capacity—lbs steam per hr	5820	6982	8138	9300	11619

DATA

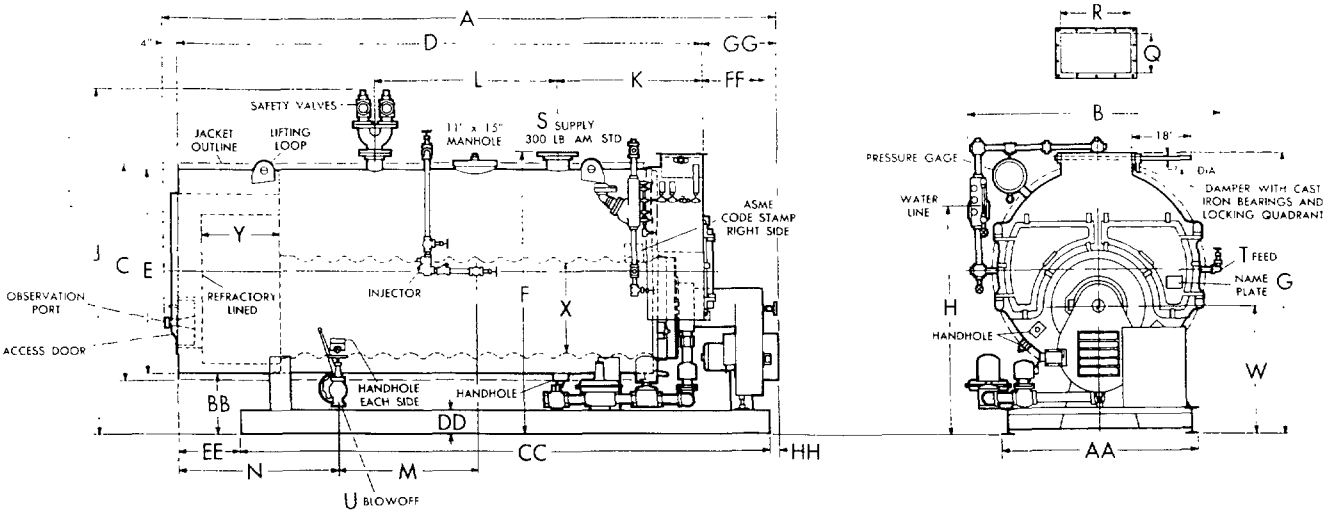
Motors—Fan hp	3	3	5	5	5
—oil pump hp	½	½	¾	¾	¾
Std gas controls—size in	3	3	3	3	3
Required inlet gas pressure in. wc	9	11½	14½	17	19½
Vent diameter in	20	22	23	24	26
Outside surface to cover (unjacketed) sq. ft	308	337	378	410	470
Approximate dry weight lbs	16600	19200	21250	25200	29250

DIMENSIONS (Inches)

A—length overall	199	202½	226½	228½	253
B—width overall	89	94	94	100	110
C—boiler—width	75	81	81	87	93
D— —length	181½	181½	205½	206	220½
E— —inside diameter	72	78	78	84	90
F—steam supply height	97	102	102	107½	114½
G—smoke outlet height	97½	102	102	107½	113
H—water line height	74½	77½	77½	82	87½
J—safety valve height	100½	105½	107	113	119
K—steam supply	57	58	64	65	65
L—safety valve	84	84	96	84	98
M—feedwater—each side	43	43	49	43	49
N—return—each side	51½	50½	56½	68	70½
P—drain	41½	46½	46½	59	59½
Q—smoke outlet—inside width	14	15	15	16	16
R— —inside length	23	28	28	29	34
S—steam or water supply size*	8	8	8	8	10
T—return size (two)	4	4	4	4	6*
U—drain size	2	2	2½	2½	2½
V—feedwater size	1½	1½	1½	1½	1½
W—furnace—height	41	42	42	43	44½
X— —inside diameter	34¾	37¾	37¾	41	43½
Y— —rear chamber	24	28	28	30	32
AA—base—width	72	78	78	84	90
BB— —floor to boiler	18½	17½	17½	17	17
CC— —length	188½	189	213	201	229½
DD— —height	8	8	8	10	10
EE— —location	10½	9½	9½	21	23½
FF—tube replacement space	124½	119	142½	139	151½
GG—burner—to shell	17½	21	21	22½	32½
HH— —to skid	—	4	4	6½	—

*150 lb. American Standard Flange

HIGH PRESSURE



RATINGS

UNIT NUMBER	KGP-84	KGP-85	KGP-86	KGP-87	KGP-88
Rating—horsepower	169	202	236	270	338
—MBh	5665	6787	7916	9072	11357
—steam per hour 212°F. lbs	5820	6970	8130	9310	11660
—steam radiation sq. ft	23600	28280	32980	37800	47320
Firing Rate—oil 140,000 Btu gph	50.6	60.6	70.7	81.0	101.4
—gas .MBh	7081	8484	9895	11340	14196
Heating Surface (ASME) sq. ft	843	1010	1178	1350	1690
Net furnace volume cu. ft	118.5	149.9	164.1	185.1	228.2
Safety valve capacity—lbs. steam per hr	6744	8080	9424	10800	13520

DATA

Motors—Fan hp	3	3	5	5	5
—oil pump hp	½	½	¾	¾	¾
Std gas controls—size in	3	3	3	3	3
Required inlet gas pressure in. wc	9	11½	14½	17	19½
Vent diameter in	20	22	23	24	26
Outside surface to cover (unjacketed) sq. ft	297	332	373	383	438
Approximate dry weight lbs	21500	26100	28500	32900	39200

DIMENSIONS (Inches)

A—length overall	210½	220½	244½	235½	259½
B—width overall	92	98	98	104	110
C—boiler—width	77½	84	84	90	96
D— —length	193	199	223	213	227
E— —inside diameter	72	78	78	84	90
F—steam supply height	97	102½	102½	108	114½
G—smoke outlet height	97½	102	102	108	113
H—water line height	75	78½	78½	82	89
J—safety valve height	117½	122½	126½	132	144
K—steam supply	57	58	64	65	65
L—safety valve	60	60	78	66	78
M—feedwater	53	47	59	52	60
N—blowoff	53	64	64	66	66
Q—smoke outlet—inside width	14	15	15	16	16
R— —inside length	23	28	28	29	34
S—steam supply size	6	6	6	6	8
T—feedwater size	1½	1½	1½	1½	1½
U—blowoff size	2	2	2½	2½	2½
W—furnace—height	41	42	42	43	44½
X— —inside diameter	31¾	34¾	34¾	38	40½
Y— —rear chamber	28	33	33	33	35
AA—base—width	72	78	78	84	90
BB— —floor to boiler	18½	17½	17½	17	17
CC— —length	188½	189	213	201	229½
DD— —height	8	8	8	10	10
EE— —location	22	27½	27½	28	30
FF—tube replacement space	129	128	152	139	151
GG—burner—to shell	17½	21½	21½	22½	32½
HH— —to skid	—	4	4	6½	—

KEWANEE FORCED DRAFT SCOTCH PACKAGE UNITS

standard equipment | *optional equipment*

ALL UNITS

1. Two-pass Scotch ASME Code Boiler
2. 3" Firetubes with Spinner Blades
3. Skid Type Base
4. Gas Tight Front Steel Smokebox with Gasketed Doors
5. Rear Access Opening with Pyrex Observation Port
6. Lifting Loops
7. Insulated Steel Jacket
8. Manhole
9. Flue Cleaner and Handle
10. 208-220-240V, 60 cy., 3 ph. Motors with 115 V Control Circuit
11. Air Flow Safety Switch
12. Modulating Motor, Transformer, Linkage
13. Low Fire Start Interlock
14. Modulating Operating Control
15. Operating Limit Control
16. Safety High Limit Control
17. Gas-Electric Ignition Assembly Including:
    Ignition Transformer, Automatic Gas Valve, Gas Pressure Regulator and Gas Cock
18. Control Cabinet Including: Electronic Flame Safeguard and Programming Relay; Burner "On-Off" Switch; Control Circuit Transformer; Control Circuit Fuse; Indicating Lights (4); Manual Potentiometer with Manual-Automatic Switch; Necessary Relays; Numbered Terminal Strips; Engraved Name Plates
19. Listed Standard and Selected Optional Equipment Mounted, Piped, Wired, Ready for Field Connection to Fuel, Water, Steam and Electricity (Exceptions: Items shipped separately to prevent shipping damage.)
20. Factory Firetest
21. Starting Service

1. Explosion Relief Door
2. Instantaneous or Tank Type Water Heating Coils (low pressure units)
3. Other than Standard Electrical Characteristics
4. Flue Gas Temperature Gauge
5. Alarm Bell
6. DC Voltmeter
7. Circuit Breakers
8. Sequencing Draft Controls
9. Controls for FM Requirements
10. Controls for FIA Requirements
11. One Year Service Period

LOW PRESSURE STEAM UNITS

1. Safety Valves
2. Steam Gauge and Cock
3. Kewanee Water Column
4. MM-51-2 Combination Water Feeder, Low Water Cut-Off and Alarm Switch
5. Water Gauge and Try Cocks
6. Wet Back Type Construction
7. Angle Drain Valve

1. Second Low Water Cut-Off
2. MM-157 Combination Water Column, Pump Control and Low Water Cut-Off
3. Chain Operated Water Gauge and Try Cocks

HIGH PRESSURE STEAM UNITS

1. Safety Valves
2. Steam Gauge and Cock
3. MM-157 Combination Water Column, Pump Control and Low Water Cut-Off
4. Water Gauge and Try Cocks
5. Injector
6. Globe and Check Valves for Boiler Feed Line
7. Rear Combustion Chamber Refractory
8. Quick-Action and Slow-Action Blow-Off Valves

1. Second Low Water Cut-Off
2. MM-193 Combination Water Column, Pump Control and Low Water Cut-Off
3. Higher than Standard Steam Working Pressure
4. Chain Operated Gauge and Try Cocks

WATER UNITS

1. Relief Valves
2. Dial Type Pressure Gauge
3. Dial Type Thermometer
4. MM-63 Low Water Cut-Off
5. Wet Back Type Construction

1. Second Low Water Cut-Off
2. MM-51-2 Combination Water Feeder, Low Water Cut-Off and Alarm Switch
3. Higher than Standard Water Working Pressure

OIL UNITS

1. Forced Draft Mechanical Pressure Atomizing Oil Burner
2. Two-Stage Oil Pump Assembly with Filter, Gauge, Relief Valve
3. Variable Capacity Oil Nozzle
4. Oil Solenoid Valve
5. Oil Metering Valve

GAS UNITS

1. Forced Draft Multiple-Jet Flame Retention Type Gas Burner
2. UL Gas Control Group Including:
   Automatic Motorized Gas Valve, Automatic Safety Gas Valve, Gas Volume Control Valve, Gas Pressure Gauge, Gas Pressure Regulator and Gas Cock

1. Gas Controls for Other than Standard Pressures
2. Gas Controls for Local Utility Requirements

COMBINATION GAS-OIL UNITS

1. Manual Fuel Changeover Switch

1. Automatic Fuel Changeover Control

KEWANEE

FORCED DRAFT SCOTCH PACKAGE UNITS

SPECIFICATIONS

HIGH PRESSURE STEAM

The contractor shall furnish and install No. KGP Kewanee Forced Draft Scotch Package Unit(s) for (No. 2 oil) (gas) (combination gas—No. 2 oil) firing. The Unit shall have a certified output rating of . . . . . HP and shall contain not less than . . . sq. ft. of heating surface (ASME, Fireside) and a minimum furnace volume of . . . . cu. ft. The heat release shall not exceed 65,000 BTU per cubic foot of combustion space when operating at certified output rating.

The shell shall be of the Scotch type, two pass, horizontal firetube design, ASME Code construction for 150 PSIG Steam. The boiler shall be mounted on steel skid base with forced draft burner and burner controls.

The furnace tube openings in the front and rear tube sheets shall be flanged to provide maximum strength at junction of tube sheets and corrugated furnace tube. The outer edges of the tube sheets shall also be flanged so that the joining of the shell and tube sheets will provide maximum efficiency. The boiler shell shall be x-rayed and stress relieved in full compliance with the latest ASME Boiler Construction Code.

All tubes shall be set with a roller expander and beaded at each end. Welded tube ends will not be permitted. Access to both front and rear tube sheets must be provided without disconnecting or removing any piping or wiring.

The front smokebox shall be heavy gauge steel welded to the boiler to secure a gas tight fit. The flue doors shall be of cast iron and gasketed to secure a gas tight fit with a minimum number of clamps. They shall be lined with insulating refractory securely keyed in place and capable of withstanding a temperature of 1500°F. A damper with cast iron bearings and a locking quadrant shall be furnished in the flue outlet.

The rear flue gas chamber shall be of pressure tight construction, lined with insulating castable refractory and provided with an access door of at least 16" diameter.

Boiler trim shall consist of the following, mounted, piped and wired: Safety valves; steam gauge with siphon and cock; combination water column, pump control and low water cut-off; water gauge and try cocks assembly; quick action and slow action blow-off valves; globe and check valves for boiler feed line; injector.

Unit shall be provided with factory installed aluminum finished steel jacket with 2" mineral fiber insulation and cover rings at all openings. Lifting loops shall be provided so that unit may be handled without damage to the jacket.

LOW PRESSURE STEAM OR WATER

The contractor shall furnish and install . . . . . No. KGP . . . . . Kewanee Forced Draft Scotch Package Unit(s) for (No. 2 oil) (gas) (combination gas—No. 2 oil) firing. The units shall have a certified output rating of . . . . . HP, and shall contain not less than . . . . . sq. ft. of heating surface (ASME) and a minimum furnace volume of . . . . . cu. ft. Heat release shall not exceed 67,000 BTU per cubic foot of furnace volume.

The boiler shall be of the Scotch type, two pass, horizontal firetube design, ASME construction for (15 PSIG steam) (30 PSIG water) mounted on steel skid base with forced draft burner and burner controls. The boiler shall be of the wet back type requiring no refractory in rear combustion chamber. An access door of at least 16" in diameter shall be provided to permit entry into the rear combustion chamber.

The furnace tube openings in the front and rear tube sheet shall be flanged to provide maximum strength at junction of the tube sheets and circular furnace tube.

All tubes shall be set with a roller expander at each end. Welded tube ends will not be permitted. Access to both front and rear tube sheets must be provided without disconnecting or removing any piping or wiring.

The front smokebox shall be of heavy gauge steel welded to the boiler to secure a gas tight fit. The flue doors shall be of cast iron and gasketed to secure a gas tight fit with a minimum number of clamps. They shall be lined with insulating refractory securely keyed in place and capable of withstanding a temperature of 1500°F. A damper with cast iron bearings and a locking quadrant shall be furnished in the flue outlet.

Boiler trim shall consist of the following, mounted, piped and wired:

For Steam—Safety valves; steam gauge with a siphon and shut off cock; water column with water gauge and try cocks assembly; combination water feeder, low water cut-off and alarm switch; drain valve.

For Hot Water—Relief valves; pressure gauge; thermometer; low water cut-off; drain valve.

Units shall be provided with factory installed aluminum finished steel jacket with 2" mineral fiber insulation and cover rings at all openings. Lifting loops shall be provided so that the unit may be handled without damage to the jacket.

BURNER EQUIPMENT

Fuel burning equipment shall be of the forced draft type; factory assembled, wired, mounted, and firetested; bear the Underwriters Laboratory label and shall be ready for field connection to power and fuel supply. Equipment shall include windbox with refractory; forced draft fan with inlet air damper; gas-electric ignition assembly consisting of ignition transformer, automatic gas valve, gas pressure regulator and gas cock; safety limit control; operating limit control; lead sulphide scanner; air flow safety switch; and all necessary controls and linkage for modulated firing with proved low fire start. Air-fuel ratio shall be regulated through the entire firing range by a modulating motor controlled by a boiler-mounted modulating potentiometer. The control cabinet shall contain (Fireye FP-2) (MH R4127) electronic combustion safeguard and programming timer, manual potentiometer with manual-automatic switch, burner on-off switch; necessary switching relays, four indicating lights, numbered terminal strips, color-coded wiring, and engraved name plates.

All motors shall be for . . . . . volts, ... cycle, ... phase operation. Controls shall be 115 volt, 60 cycle, single phase. Magnetic starters with thermal overload protection and a step-down control circuit transformer shall be provided in the control cabinet.

Fuel burning equipment shall be set and adjusted by a factory authorized representative to burn . . . . . G.P.H. of No. 2 oil (and) (or) . . . . . CFH of . . . . . BTU/cu. ft. (natural) (manufactured) (L.P.) gas having a . . . . . sp. gr. with . . . . . inches W.C. pressure at inlet of burner manual gas cock. Unit efficiency, based on flue gas analysis, shall be not less than 80%. *(Note: Specify job altitude if over 2,500 ft. above sea level.)*

Owner's representative shall be present to receive instruction in the care and maintenance of the boiler unit at the time the boiler unit is started up by the Service Representative. *(Note: Specify a free service period of not less than 90 days after start-up.)*

Note: The following equipment conforms to UL requirements. Specify additional controls if FM or FIA insured or subject to special local utility requirements.

OIL UNITS

Oil burner shall be of the mechanical pressure atomizing type for No. 2 oil with a two-stage oil pump assembly with filter, gauge and relief valve. Burner shall include variable-flow oil atomizing nozzle; oil solenoid valve; and oil metering valve.

GAS UNITS

Gas burner shall be of the multiple-jet flame retention type complete with automatic motorized gas valve, automatic safety gas valve, gas volume control valve, gas pressure regulator, gas gauge and manual gas cock.

COMBINATION GAS-OIL UNITS

Gas-oil burner shall consist of a combination multiple-jet flame retention type gas burner and mechanical pressure atomizing oil burner for No. 2 oil. Gas controls shall include automatic motorized gas valve, automatic safety gas valve, gas volume control valve, gas pressure regulator, gas gauge and manual gas cock. Oil controls shall include a two-stage oil pump assembly with filter, gauge and relief valve; variable-flow oil atomizing nozzle; oil solenoid valve; and oil metering valve.

Change-over from one fuel to the other shall be accomplished by means of a manual fuel selector switch without changing linkage, burner position or mechanical adjustment. The fuel selector switch shall provide, through the combustion control relay, proper ignition timing for the fuel being burned.

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Bulletin 96-7-96B 7/64 5M SM

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