AMERICAN-STANDARD

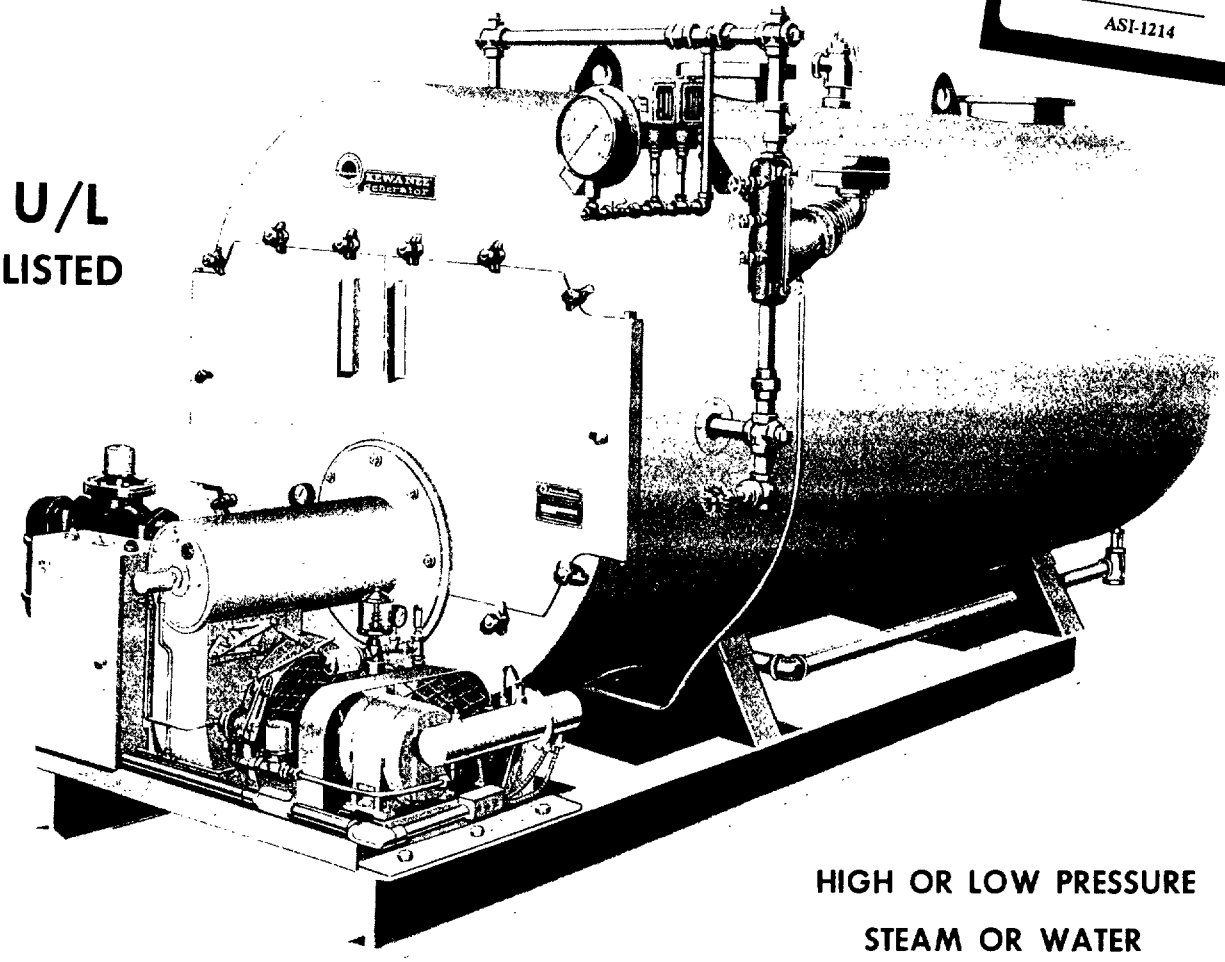
KEWANEE SCOTCH GENERATOR

FOR NO. 6 OR LIGHTER OIL — GAS — COMBINATION GAS—OIL

PLAINTIFF'S EXHIBIT

ASI-1214

U/L
LISTED



HIGH OR LOW PRESSURE
STEAM OR WATER

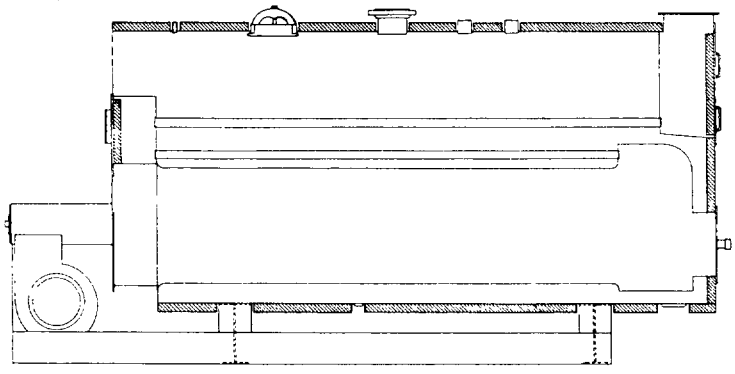
28676

AMERICAN-Standard
INDUSTRIAL DIVISION
DETROIT 32, MICHIGAN

BULLETIN 1749D
(1963 — REVISED)

KEWANEE SCOTCH GENERATOR

SCOTCH GENERATOR FEATURES



WETBACK DESIGN
Rear combustion chamber is completely immersed in water . . . insures maximum primary heating surface. . . eliminates refractory baffles that can burn out and short circuit hot gases to stack . . . reduces stresses and strains due to uneven expansion and contraction by providing a separate rear tube sheet for each pass of tubes.

THREE-PASS DESIGN
Longer gas travel and maximum heat transfer . . . combustion gases make three passes . . . furnace tube, direct fire tubes and return fire tubes. Construction meets or exceeds ASME Boiler Code requirements.

TOP REAR SMOKE OUTLET
Integral part of the boiler shell . . . ideally located for stub stack application and minimum interference with piping.

LARGE FURNACE TUBE
Provides greater proportion of primary heating surface . . . abundant volume for complete combustion and quiet operation . . . fuel is burned completely before gases enter rear uptake.

FORCED DRAFT OPERATION
Belt-driven heavy duty blower assures ample supply of combustion air for stub stack applications. Special assemblies are available for high altitude installations.

LARGE STEAM SPACE
Combined with abundant unbroken disengaging area and large water content, an integral steam separator assures steady water line and dry steam.

TUBES
All fire tubes are set in tube sheets by roller expander. No tubes are welded to tube sheets.

WELDED SHELL
Flange quality plate. Heads and furnace tube are firebox steel. High pressure shells are x-rayed and stress relieved.

INSULATED STEEL JACKET
Factory installed heavy gauge aluminum enameled steel jacket with glass or mineral fiber insulation and reinforced catwalk area.

WATER HEATING COILS
Standard Kewanee "KOI" (instantaneous) and "KOT" (tank) coils are available for all low pressure units.

EASY MAINTENANCE
Large access openings in rear combustion chamber and smokebox make rear tube sheets readily accessible for inspection. Large insulated gas-tight front doors permit easy inspection of front tube sheet and cleaning of tubes without disturbing burner equipment.

PROVED DEPENDABILITY - PEAK PERFORMANCE
Modern concept based on experienced engineering - conservative design and top quality construction - assure highest efficiency, faithful performance, long dependable service. Ratings are conservative - five square feet of fireside heating surface per horsepower - provides adequate reserve capacity. Firing rates are carefully matched to heating surface. Flame size and shape are matched to furnace dimensions. These combined features assure minimum operating efficiency of 80%.

ONE SOURCE RESPONSIBILITY
The entire generator is listed by the Underwriters' Laboratory (UL). Undivided responsibility for the complete unit. Boiler, burner, controls, accessory equipment . . . by Kewanee - the recognized leader in steel boilers for nearly a century.

28677

KEWANEE SCOTCH GENERATOR

KEWANEE BURNERS

Units 60 through 80 feature two-stage firing with proved low fire start. Fuel and air supply are regulated at both high and low firing rate by a two-position motor controlled by a boiler mounted pressure or temperature operating control.

Units 100 through 150 feature full modulation with proved low fire start. Fuel and air supply are regulated throughout the firing range by a modulating motor controlled by a boiler mounted pressure or temperature modulating potentiometer.

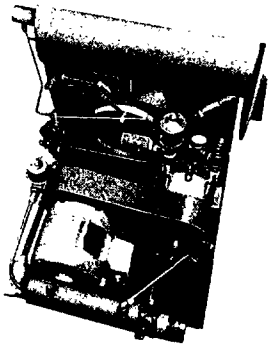
All units feature combination electronic flame safeguard and programmer to assure safe operation with pre-purge, post-purge, and proved ignition for both fuels. Enforced low fire start is provided by an interlock on the motor operator.

EXCLUSIVE COMBUSTION HEAD

Advanced design of burner firing head provides quiet stable combustion of gas or oil at all inputs. The radial-jet gas burner provides smooth firing with excellent flame retention. The pilot flame from the gas-electric ignition assembly surrounds the oil spray and contacts the tip of each gas jet for smooth lighting with maximum safety.

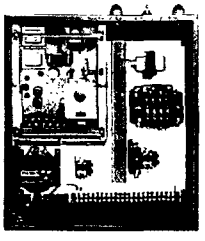
AIR-OIL UNIT

The air-oil unit assembly includes air compressor and oil pump, motor, and all necessary accessories to provide the fine oil atomization required for clean, efficient oil firing. A thermostatically controlled electric oil heater maintains uniform oil temperature to compensate for varying viscosities of residual oils. The multi-louvered opposed-blade air damper provides accurately measured air supply to match fuel supply for top operating efficiency at all firing rates.



CONTROL CABINET

The heavy-gauge steel, control cabinet is completely prewired and ready for connection to a source of power. Control cabinet components include Fireye flame safeguard system, and all necessary relays, switches and controls for full automatic operation.



MODEL DESIGNATION CHART

Construction Design			Output Rating	Fuel		
L	W	—	100	G	O	5

Design Pressure
- Low Pressure - L
- High Pressure - H

Heating Medium
- Water - W
- Steam - S

Unit Output
- Gross horsepower rating - designate

Method of Rating
- Standard rating of 5 sq. ft. fireside per horsepower - BLANK
- Special Rating - Designate, such as "Ohio"

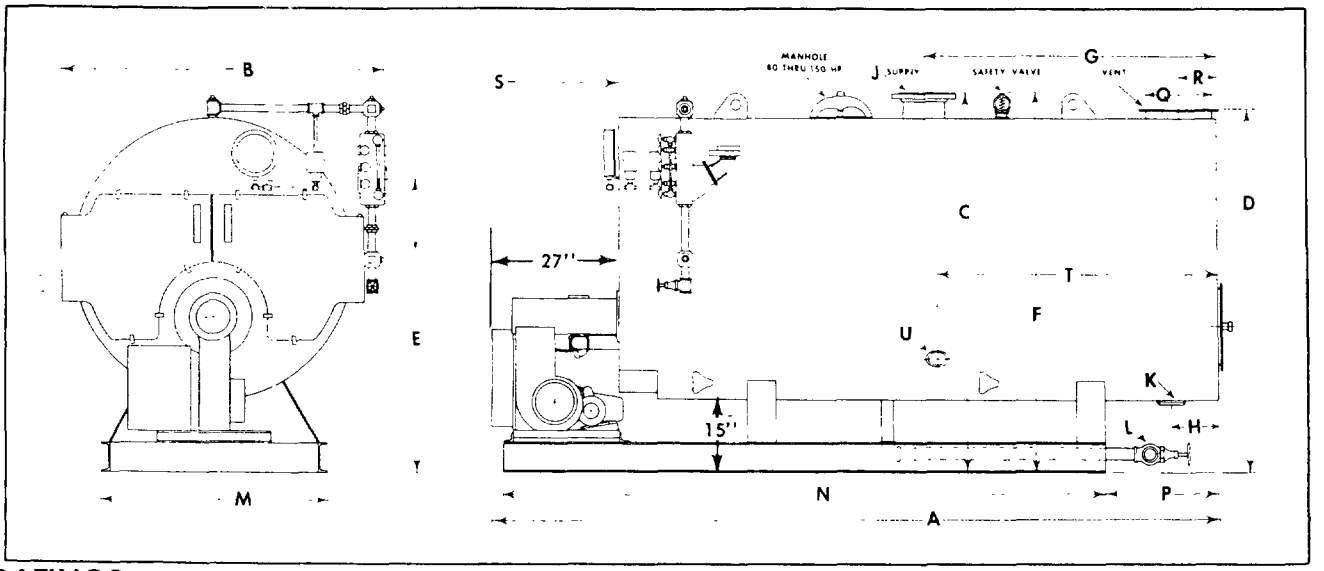
Fuel

Gas Firing
- All types of Gas - G

Oil Firing
- All Grades of Oil - O

Grade of Oil
- Air Atomizing Burner - Number of U.S. Com'l. Std. Grade
- Pressure Atomizing Burner - BLANK

EXAMPLE: LW-100-GO5 is standard low pressure hot water 100 horsepower generator equipped for combination gas and No. 5 oil firing.



RATINGS

Unit Number*	60	70	80	100 Ohio	100	125	150
Rating —horsepower	60	70	80	100	100	125	150
—MBh	2010	2344	2680	3348	3348	4185	5022
—steam per hour - 212°F lbs	2070	2415	2760	3450	3450	4312	5175
—steam (gross) sq ft	8375	9765	11160	13950	13950	17438	20925
—steam (MCA net)—low pressure sq ft	6240	7280	8320	—	10400	13000	15600
Firing Rate—oil, 140,000 btu gph	18.0	21.0	24.0	30.0	30.0	37.5	45.0
—oil, 150,000 btu gph	16.7	19.5	22.3	27.9	27.9	34.9	41.9
—gas MBh	2511	2930	3348	4185	4185	5231	6278
Heating surface (ASME) sq ft	300	350	400	358	500	625	750
Furnace volume cu ft	19.7	21.8	28.7	28.7	33.5	41.8	47.9
Safety valve capacity—low pressure—steam per hour. lbs	2010	2344	2680	3348	3348	4185	5022
—high pressure—steam per hour lbs	2400	2800	3200	4000	4000	5000	6000

DATA

Unit Number *	60	70	80	100 Ohio	100	125	150
Insulation thickness in	1 1/2	1 1/2	2	2	2	2	2
Minimum stack diameter in	12	12	14	14	14	16	16
Gas controls (standard UL)—							
—Size in	2	2	2 1/2	2 1/2	2 1/2	2 1/2	3
—Required inlet pressure in wc	6 1/2	6 1/2	7	7	7	8	8
Motors —Forced draft blower hp	3/4 230-60-1	1 208/240-60-3	1 1/2 208/240-60-3	2 208/240-60-3	2 208/240-60-3	3 208/240-60-3	3 208/240-60-3
—Pressure atomizing oil pump hp	1/4 115-60-1	1/4 230-60-1	1/4 230-60-1	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1
—Air Atomizing air-oil unit hp	1 208/240-60-3	1 208/240-60-3	1 208/240-60-3	1 1/2 208/240-60-3	1 1/2 208/240-60-3	1 1/2 208/240-60-3	1 1/2 208/240-60-3
—Separate pump set (No. 6 oil) hp	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1	1/3 230-60-1
—Oil heater—No. 4, 5, 6 oil watts	2000	2000	3000	3000	3000	4000	4000
Control Circuit voltage	115-60-1	115-60-1	115-60-1	115-60-1	115-60-1	115-60-1	115-60-1
Fuel-Air Control	Two-position	Two-position	Two-position	Modulating	Modulating	Modulating	Modulating
Flange Safeguard—gas, light oil, gas-light oil	FJ-2	FJ-2	FJ-2	FP-2	FP-2	FP-2	FP-2
—heavy oil, gas-heavy oil	FP-2	FP-2	FP-2	FP-2	FP-2	FP-2	FP-2
Approximate dry weight-low pressure lbs	6400	7000	8100	8600	8900	11100	13000
-high pressure lbs	7000	7700	9200	9700	10600	13000	15000

DIMENSIONS (Inches)

Unit Number *	60	70	80	100 Ohio	100	125	150
A—Length overall	132	146	141	141	165	165	188
B—Width overall	57	57	68	68	68	74	74
C—Steam supply height—low pressure	69	69	75	75	75	81	81
—high pressure	68 1/2	68 1/2	74 1/2	74 1/2	74 1/2	80 1/2	80 1/2
D—Vent height	68	68	74	74	74	80	80
E—Water line height—low pressure	54	54	59	59	59	63	63
—high pressure	56	56	60	60	60	64 1/2	64 1/2
F—Safety valve height	70	70	80 1/2	80 1/2	80 1/2	86 1/2	86 1/2
G—Steam supply location	54	68	51	51	74	65	88
H—Return location—low pressure—steam or water	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	14	14
J—Supply size—low pressure—steam or water	6	6	8	8	8	8	8
—high pressure water	4	4	6	6	6	6	6
—high pressure steam	4	4	4	4	4	4	4
K—Return size—low pressure—steam or water	4	4	4	4	4	4	4
L—Drain size	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
M—Base width	42	42	48	48	48	54 1/2	54 1/2
N—Base length	105	119	110	110	133	138	161
P—Base location	22	22	27	27	27	22	22
Q—Vent opening size	12	12	14	14	14	16	16
R—Vent opening location	7	7	8	8	8	9	9
S—Required tube replacement length	80	94	86	86	110	108	132
T—Return location—high pressure water	40 1/4	40 1/4	53 1/2	53 1/2	53 1/2	53 1/2	61 1/2
U—Return size—high pressure water	2-3"	2-3"	2-4"	2-4"	2-4"	2-4"	2-4"

*See complete unit designation chart on page 3.

KEWANEE SCOTCH GENERATOR

STANDARD EQUIPMENT

1. Three-pass ASME Code Boiler
2. Scotch Wet-Back Design
3. Full Length Skid Type Base
4. Gas-Tight Construction
5. Pyrex Observation Ports (Front & Rear)
6. 2" Firetubes
7. 16" Diameter Rear Access Opening
8. Top Vent (Round)
9. Metal Jacket with Mineral Fiber Insulation
10. Lifting Loops
11. Explosion Relief Door
12. Forced Draft Operation
13. Operating Limit Control
14. Safety High Limit Control
15. High-Low-Off Firing Sequence (Units 60 thru 80)
    Modulating Firing Sequence (Units 100 thru 150)
16. Motor Operator to Control Air and Fuel Supply
    Two-Position (Units 60 thru 80) — Modulating (Units 100 thru 150)
17. Control for Motor Operation (Boiler-Mounted)
    Two-Position (Units 60 thru 80) — Modulating (Units 100 thru 150)
18. Low Fire Start
19. Air-Flow Safety Switch
20. Flame Detector (Lead Sulphide)
21. Gas-Electric Ignition Assembly
22. Control Cabinet including: Electronic Flame Safeguard and Programming Control; Control Circuit Fuse; Control Circuit Switch, Burner Switch, Indicating Lights (2); Numbered Terminal Strip; Engraved Name Plates, and Necessary Relays and Magnetic Starters
23. Blower Motor Horsepower and Voltage:
    3/4 HP, 230 v, 60 cy., 1 ph. (Unit 60)
    1 HP, 208/220/240 v, 60 cy., 3 ph. (Unit 70)
    1-1/2 HP, 208/220/240 v, 60 cy., 3 ph. (Unit 80)
    2 HP, 208/220/240 v, 60 cy., 3 ph. (Units 100-Ohio & 100)
    3 HP, 208/220/240 v, 60 cy., 3 ph. (Units 125 & 150)
24. Control Voltage - 115 v, 60 cy., 1 ph.
    Includes Reduced Voltage Transformer where required
25. Listed Standard and Selected Optional Equipment Mounted, Piped, Wired, Ready for Field Connection to Fuel, Water, Steam, and Electricity
26. Factory Fire-Test
27. Starting Service
28. Manhole (Units 80 thru 150)

OPTIONAL EQUIPMENT

ALL UNITS

1. Flue Gas Temperature Gauge
2. Other Than Standard Voltages
3. Circuit Breakers
4. Alarm Bell
5. DC Voltmeter
6. Modulating Firing Sequence (Units 60 thru 80)
7. Manual Reset Lockout with Manual-Automatic Switch
8. Instantaneous or Tank Type Coils (Low Pressure Units in Front Head)
9. One-Year Service Period

STEAM UNITS

1. No. 157 Combination Water Column, Low Water Cut-Off, and Pump Control (No. 42K on Low Pressure Units 60 and 70)
2. Safety Valve(s)
3. Steam Gauge
4. Water Glass and Gauge
5. Injector (High Pressure Units 125 & 150)
6. Blow-Off Valves (High Pressure Units)
7. Drain Valve (Low Pressure Units)

1. No. 193 Combination Water Column, Low Water Cut-Off, Pump Control & Alarm Switch
2. Combination Low Water Cut-Off, Water Feeder and Alarm Switch (Low Pressure Units)
3. Second Low Water Cut-Off
4. Surface Blow-Off
5. Higher Than Standard Working Pressure

HOT WATER UNITS

1. No. 63B Low Water Cut-Off
2. Relief Valve(s)
3. Pressure Gauge
4. Thermometer

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

PRESSURE ATOMIZING OIL UNITS

1. High Pressure Atomizing Oil Burner for No. 2 or Lighter Oil
2. Two-Stage Oil Pump Assembly with Relief Valve and Gauge
3. Oil Pump Motor Horsepower & Voltage:
   1/4 HP, 115/230 v, 60 cy., 1 ph. (Units 60 thru 80)
   1/3 HP, 115/230 v, 60 cy., 1 ph. (Units 100 thru 150)
4. Oil Atomizing Nozzles—
   Single Nozzle (Units 60 thru 80)
   Variable Flow Nozzle (Units 100 thru 150)
5. Oil Solenoid Valves—
   Dual Valves (Units 60 thru 80) — Single Valve (Units 100 thru 150)
6. Oil Metering Valve (Units 100 thru 150)
   Oil Relief Valve (Units 60 thru 80)
7. Fireye Flame Safeguard System—
   FJ-2 (Units 60 thru 80) — FP-2 (Units 100 thru 150)
8. Oil Filter (Not Mounted)

1. Direct Spark Electric Ignition
2. Oil Controls for FM
3. Oil Controls for FIA
*4. Oil Controls for Local Code Requirements
5. Fireye FP-2 (Units 60 thru 80)

AIR ATOMIZING OIL UNITS

1. Low Pressure Air Atomizing Oil Burner for No. 6 or Lighter Oil
2. Air-Oil Unit Consisting of: Air Compressor, Air Pressure Regulating Valve, Motor, Inlet Air Filter, Check Valve, Air Proving Safety Switch, Air Purge Relay, Air Gauge, Oil Pump Assembly with Gauge and Internal Relief Valve.
3. Air-Oil Unit Motor Horsepower & Voltage
   1 HP, 208/220/240 v, 60 cy., 3 ph. (Units 60 thru 80)
   1-1/2 HP, 208/220/240 v, 60 cy., 3 ph. (Units 100 thru 150)
4. Thermostatically Controlled Electric Oil Heater: 2000 Watts (Units 60 thru 70) — 3000 Watts (Units 80 thru 100) — 4000 Watts (Units 125 & 150)
5. Air-Oil Nozzle
6. Oil Solenoid Valve
7. Oil Metering Valve
8. Straight Tube Boiler Mounted Oil Heater for No. 6 Oil. Below-Waterline Heater with Pump Control (Low Pressure Steam and Water) Steam Heater with Steam Pressure Regulating Valve, Modulating Valve and Trap (High Pressure Steam)
9. Remote Oil Pump Set with Push Button Starter (No. 6 oil units)
10. Fireye FP-2 Flame Safeguard System
11. Oil Strainer (Not Mounted)

1. Oil Controls for FM
2. Oil Controls for FIA
*3. Oil Controls for Local Code Requirements
4. Omit Electric Heater for No. 2 Oil
5. Safety Type Boiler Mounted Oil Heater for No. 6 Oil

GAS UNITS

1. Forced Draft Radial-Jet Flame Retention Type Gas Burner
2. UL Gas Control Group including: Automatic Motorized Gas Valve, Automatic Safety Gas Valve, Gas Pressure Regulator, Gas Volume Control Valve, Gas Pressure Gauge, and Gas Cock
3. Fireye Flame Safeguard System—
   FJ-2 (Units 60 thru 80) — FP-2 (Units 100 thru 150)

1. Gas Controls for Other Than Standard Pressures
2. Gas Controls for FM
3. Gas Controls for FIA
*4. Gas Controls for Local Utility Requirements
5. Fireye FP-2 (Units 60 thru 80)

COMBINATION GAS-OIL UNITS

1. Manual Fuel Change-Over Switch

*1. Automatic Fuel Change-Over Switch

*Special Application Only

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KEWANEE SCOTCH GENERATOR

TYPICAL SCOTCH GENERATOR SPECIFICATIONS

The contractor shall furnish and install . . . Model No. . . . . Kewanee Scotch Generator(s) for (No. (2)(4)(5)(6) oil), (gas), or (combination gas – No. (2)(4)(5)(6) oil) firing. The unit(s) shall be of three-pass wetback scotch design with two passes of firetubes, and constructed in accordance with the ASME Code for (15 lbs. steam) (30 lbs. water) (150 lbs. steam).

The unit(s) shall contain not less than . . . cubic feet of furnace volume and shall have a gross output rating of not less than . . . (MBh) (Bhp). Heat release shall not exceed 135,000 Btu per cubic foot of furnace volume.

Normal water line of the unit(s) shall not exceed ". A refractory lined access opening with pyrex observation port shall be provided to permit entry into the rear combustion chamber. Unit shall be of gas tight construction throughout. Flue doors shall be gasketed and lined with insulating refractory.

Unit(s) shall be provided with lifting loops and factory installed aluminum enameled steel jacket with glass or mineral fiber insulation.

All tubes shall be set with a roller expander at each end. No welding of tubes to the tube sheets nor use of refractory baffling to provide the second or third pass will be permitted.

Unit(s) shall be assembled and wired, with burner, controls, trim, and skid type base installed at the factory.

Fuel burning equipment shall be forced draft type. Factory assembled, wired, mounted, and tested. The entire unit shall bear the Underwriters' Laboratories label and shall be ready for field connection to power and fuel supply. Equipment shall include forced draft fan with air damper; dual high limit controls; motor operator control; flame sensing device; and control cabinet containing Fireye (FP-2) (FJ-2) electronic flame safeguard and programmer, control circuit switch, necessary switching relays, two indicating lights for major operations, numbered terminal strip, color-coded wiring and engraved nameplates.

All motors shall be for . . . volts, . . . cycle, . . . phase operation. Controls shall be 115 volt, 60 cycle, single phase. Magnetic motor starters with thermal over-load protection and a step-down control circuit transformer shall be provided in the control cabinet when other than 115 volt motors are specified.

Fuel burning equipment shall be set and adjusted by a factory-authorized representative to burn . . . G.P.H. of No. (2)(4)(5)(6) oil (and) (or) . . . C.F.H. 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 instructions in care and maintenance of the unit at the time it is started up by the service representative. Contractor shall provide a free service period of 90 days after startup.

NOTE: Select applicable paragraphs below according to fuel and unit size. The following equipment conforms to UL requirements. Specify additional controls if FM or FIA insured, or subject to special local utility requirements.

FOR GAS UNITS

Gas burner shall be of the radial-jet flame retention type including a main gas control group consisting of an automatic motorized gas valve, automatic safety gas valve, gas volume control valve, gas pressure regulator, gas gauge, and gas cock; gas-electric ignition assembly consisting of a pilot burner, 6000 volt ignition transformer, automatic gas valve, gas pressure regulator, and gas cock; air flow safety switch; lead sulphide flame detector; low fire interlock; and all necessary controls and linkage for (modulated) (two-position) firing with proved low fire start. Fuel-air control shall provide (modulated) (two-position) regulation of the air damper and the gas volume control valve by means of a motor operator.

FOR PRESSURE ATOMIZING OIL UNITS

Oil burner shall be of the pressure atomizing type for No. 2 oil with a two-stage oil pump assembly with internal relief valve mounted on the boiler skid. Burner shall include oil atomizing nozzle; oil solenoid valve(s), oil control valve, gas-electric ignition assembly with pilot burner, 6000 volt ignition transformer, automatic gas valve, gas pressure regulator and gas cock; air flow safety switch; lead sulphide flame detector, low fire interlock; and all necessary controls and linkage for (modulated) (two-position) firing with proved low fire start. Fuel-air control shall provide (modulated) (two-position) regulation of the air damper and the oil control valve by means of a motor operator.

FOR AIR ATOMIZING OIL UNITS

Oil burner shall be of the air atomizing type for No. (5)(6) or lighter oil with an air-oil unit consisting of air compressor, air pressure regulating valve, motor, inlet air filter, check valve, air proving safety switch, air gauge, oil pump assembly and relief valve mounted on the boiler skid. Burner shall include air-oil atomizing nozzle, oil solenoid valve, oil metering valve, air purge relay and valve, thermostatically controlled electric oil heater *(omit for No. 2 oil)*; gas-electric ignition assembly consisting of a pilot burner, 6000 volt ignition transformer, automatic gas valve, gas pressure regulator and gas cock; air flow safety switch, lead sulphide flame detector; low fire interlock; and all necessary controls and linkages for (modulated) (two-position) firing with proved low fire start. Fuel-air control shall provide (modulated) (two-position) regulation of the air damper and the oil control valve by means of a motor operator. [Oil burning equipment for No. 6 oil shall include factory mounted and piped (straight tube oil preheater) (safety type oil preheater) complete with necessary temperature control for (below-water line water operation) (steam operation). A control shall be provided to permit continuous operation of separate oil pump and oil preheaters when burner is not running.]

Note: Specify oil tank heating system to be used.

FOR COMBINATION GAS-PRESSURE ATOMIZING OIL UNITS

Gas-oil burner shall consist of a combination radial-jet flame retention type gas burner and pressure atomizing oil burner for No. 2 oil including all necessary controls for (modulated) (two-position) type of operation with proved low fire start. Gas controls shall include a main gas control group consisting of an automatic motorized gas valve, an automatic safety gas valve, gas volume control valve, gas pressure regulator, gas gauge, and gas cock. Oil controls shall include a two-stage oil pump assembly with internal relief valve; oil atomizing nozzle; oil solenoid valve(s), oil control valve. Controls for both fuels shall include a lead sulphide flame detector, air flow safety switch; low fire interlock, and gas-electric ignition assembly consisting of a pilot burner, 6000 volt ignition transformer, automatic gas valve, gas pressure regulator and gas cock. Fuel-air control shall provide (modulated) (two-position) regulation of the air damper, the gas volume control valve and the oil control valve by means of a motor operator. Changeover from one fuel to the other shall be accomplished by means of a manual fuel selector switch in the control cabinet. No changes in linkage, burner position, or mechanical adjustment shall be necessary when changing fuels. The fuel selector switch shall provide, through the combustion control relay, proper ignition timing for the fuel being burned.

FOR COMBINATION GAS-AIR ATOMIZING OIL UNITS

Gas-oil burner shall consist of a combination radial-jet flame retention type gas burner and air atomizing oil burner for No. (5)(6) or lighter oil with all necessary controls for (modulated) (two-position) type of operation with proved low fire start. Gas controls shall include a main gas control group consisting of an automatic motorized gas valve, automatic safety gas valve, gas volume control valve, gas pressure regulator, gas gauge and gas cock. Oil controls shall include an air-oil unit consisting of an air compressor, air pressure regulating valve, motor, inlet air filter, check valve, air proving safety switch, air gauge, oil pump assembly and relief valve; air-oil atomizing nozzle, oil solenoid valve, oil metering valve, air purge relay and valve; thermostatically controlled electric oil heater *(omit for No. 2 oil)*. [Oil burning equipment for No. 6 oil shall include factory mounted and piped (straight tube oil preheater) (safety type oil preheater) complete with necessary temperature control for (below-water line water operation) (steam operation). A control shall be provided to permit continuous operation of separate oil pump and oil preheaters when burner is not running.] *Note: Specify oil tank heating system to be used.* Controls for both fuels shall include lead sulphide flame detector, air flow safety switch; low fire interlock; and gas-electric ignition assembly consisting of a pilot burner, 6000 volt ignition transformer, automatic gas valve, gas pressure regulator and gas cock. Fuel-air control shall provide (modulated) (two-position) regulation of the air damper, the gas volume control valve, and the oil metering valve by means of a motor operator. Changeover from one fuel to the other shall be accomplished by means of a manual fuel selector switch in the control cabinet. No changes in linkage, burner position, or mechanical adjustment shall be necessary when changing fuels. The fuel selector switch shall provide, through the combustion control relay, proper ignition timing for the fuel being burned.

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