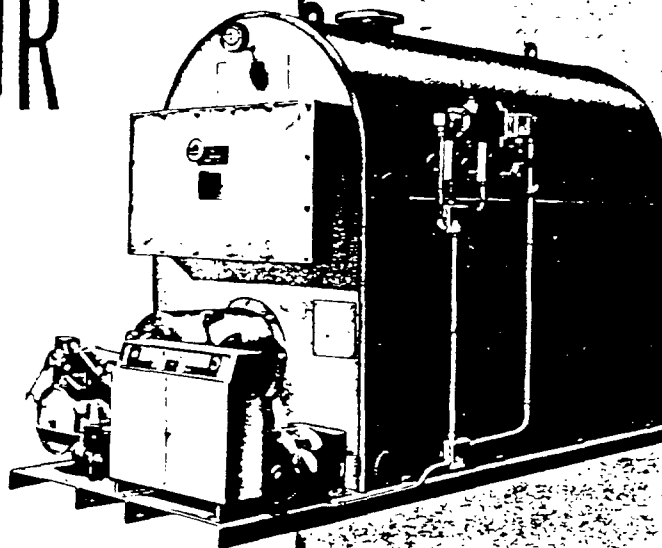




KEWANEE SQUARE-HEAT GENERATOR

the most compact generator available



**HEAT
SMALL SPACE**

**UL
LISTED**

low pressure steam
or hot water
450,000 to 5,050,000 Btuh

No. 5 or lighter oil
... gas ...
combination gas-oil

**BIG HEAT
SMALL SPACE**

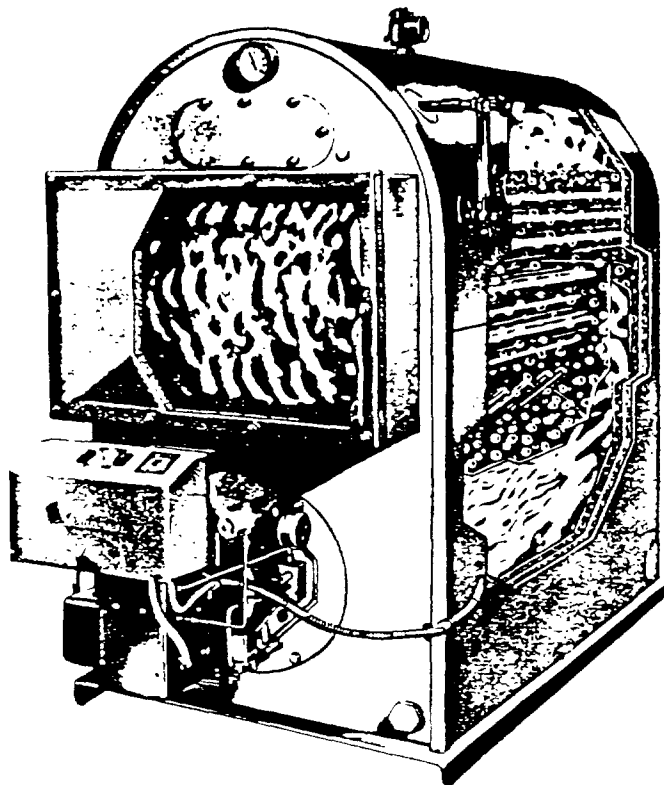
**KEWANEE
SQUARE-HEAT**

This new steam generator is ideal for office and store buildings, schools, motels, hospitals, small factories, apartments and other buildings of medium size

Intensive research, added to nearly a century of boiler experience, produced this modern Square-Heat Generator with amazing compactness, plus highest efficiency, plus Kewanee Time-Proved structural features

The secret of this remarkable design, which results in highest efficiency, top-quality performance, and long dependable service, is . . . exceptionally high proportion of primary (direct) heating surface which is many times more efficient than secondary (indirect) heating surface . . . plus . . . extra large furnace volume for complete combustion, smooth starts, clean firing, quiet operation, unrestricted gas flow and low heat release

The entire unit is listed by Underwriters' Laboratories, Inc

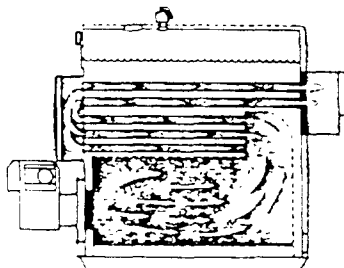


24911

COMPARE THESE QUALITY FEATURES

THREE PASS DESIGN

Assures maximum heat transfer with low stack temperature . . . highest operating efficiency. The large firebox with arched upright crown sheet provides thorough mixing of fuel and air . . . complete combustion before hot gases enter fire tubes. The second pass is rear to front through the direct fire tubes . . . the third from front to rear in the return tubes. Gas travel is longer and there are no refractory baffles to burn out and permit short circuiting of gases.



HIGH EFFICIENCY HEATING SURFACE

Primary heating surface (exposed directly to the flame) is 4 to 15 times more effective than secondary heating surface (exposed only to hot gases). The Square-Heat Generator design utilizes nearly 50% greater ratio of primary to secondary heating surface than competitive units. Square-Heat Generators provide MORE more effective heat transfer surfaces, and LESS less effective heat transfer surfaces.

LARGE FURNACE VOLUME

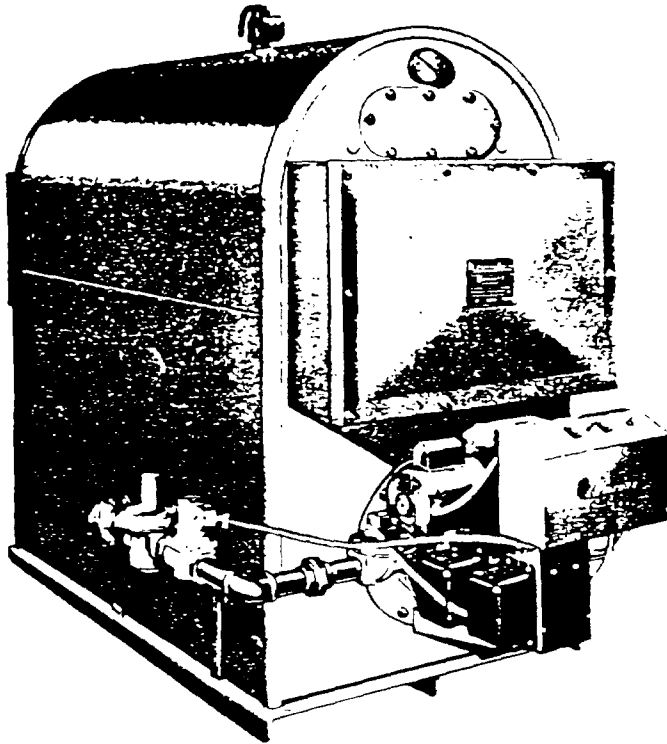
For complete combustion with smooth starts . . . clean firing . . . unrestricted gas flow . . . quiet operation . . . heat release averages 50% less than competitive units.

FORCED-DRAFT OPERATION

Provides ample combustion air for stub stack applications. Only a vent to the outside is needed. Special assemblies available for high altitude installations.

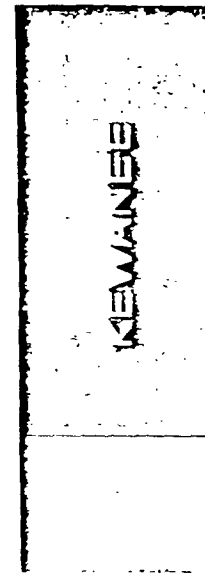
GENERATOR

**MORE ENERGY
PER SQUARE FOOT
OF OCCUPIED
FLOOR SPACE THAN ANY
OTHER COMPARABLE UNIT**



COMPACT

This Kewanee is the most compact generator you can buy. For example, you can have 80 hp in 42.7 square feet of occupied floor space. Two principal competitive 80 hp generators require 72.7 square feet and 78.0 square feet, respectively. The illustration above shows the contrast. Head room also is minimum.



COMPETITOR A

COMPETITOR B

24912

LARGE STEAM SPACE

Combined with abundant, unbroken disengaging area and ample water content assures steady water line and a plentiful reserve of dry steam.

TUBES ROLLER EXPANDED

All tubes are secured to tube sheets by roller expander—none are welded to tube sheets.

WELDED STEEL

Flange quality plate. All welded integral construction for strength and durability. Gas tight throughout.

SKID TYPE BASE

Refractory filled, provides ventilation under the unit and distributes weight evenly.

INSULATED STEEL JACKET

Heavy gauge steel jacket with insulating material. Glass or mineral fiber insulation, insulates the unit.

WATER HEATING COILS

Standard Kewanee "KI" (instantaneous) and "KT" (tank) coils available for all units. Coil opening at front of boiler avoids interference with controls, wiring or breeching.

EASY ACCESS TO TUBES

Steel flue access cover with insulation securely keyed in place provides easy access to flues without disturbing fuel burning equipment.

TESTED—APPROVED

ASME Boiler Construction Code requirements have been followed to the last detail . . . and the Kewanee name assures design and performance above and beyond any code requirements. These generators have Underwriters' Laboratories listing.

COMPLETELY ASSEMBLED

With burner and all accessories—may be moved in by fork truck, hoist, or rollers. Only service connections are needed to place unit in operation.



and to make reasonable changes of any kind without notice

KEWANEE[®]
SQUARE-HEAT

GENERATOR

BURNER FEATURES

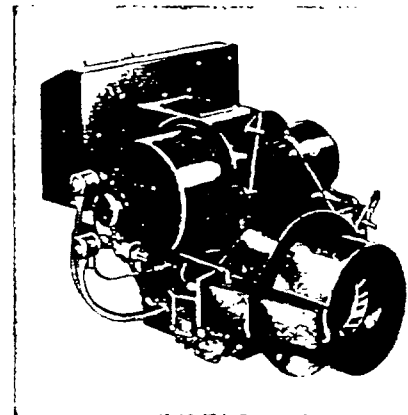
Kewanee Square-Heat Generators are available for oil, gas, or combination gas-oil firing. Each Kewanee Forced Draft Burner is custom engineered for the generator it fires, assuring long, dependable and economical service.

Two series of Kewanee Forced Draft Burners cover the entire range of boiler capacities and fuels.

The Kewanee KR Burner fires light oil (No. 2 CS12-48), gas, and combination gas-light oil in Units M-45 thru M-265. The oil burner is of the high pressure mechanical atomizing type, and the gas burner is of the multiple jet flame retention type.

Units M-45 thru M-175 with the KR burner feature on-off operation (with low fire start on oil-fired Units M-135 thru M-175). Combustion air is regulated by a fixed position damper in addition to an adjustable primary-secondary air shutter.

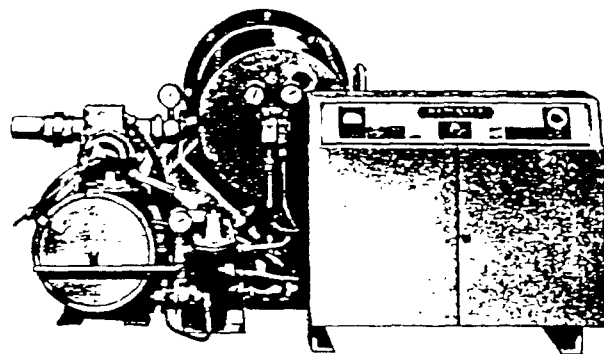
Units M-205 thru M-265 with the KR burner feature on-off operation with controlled low fire start. Fuel and air supply are regulated for both high and low firing by a two position motor. This provides smooth starting and top efficiency.



The Kewanee Burner (Pressure Atomizing) fires light oil (No. 2 CS12-48), gas, and combination gas-light oil in Units M-335 thru M-505. The oil burner is of the high pressure mechanical atomizing type, and the gas burner is of the flame retention type.

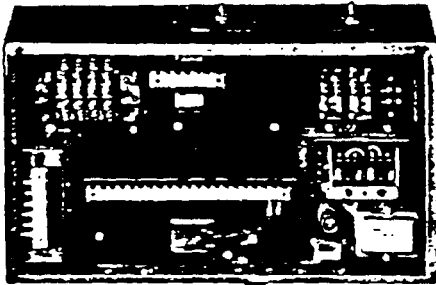
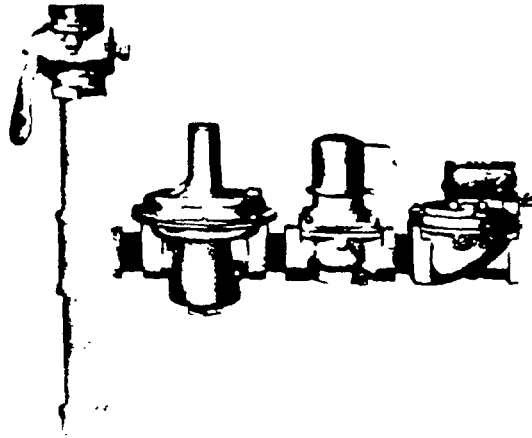
The Kewanee Burner (Air Atomizing) fires No. 5 or lighter oil, gas, and combination gas-oil in Units M-335 thru M-505. The oil burner is of the low pressure air atomizing type, and the gas burner is of the flame retention type.

Units M-335 thru M-505 with the Kewanee burner 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.



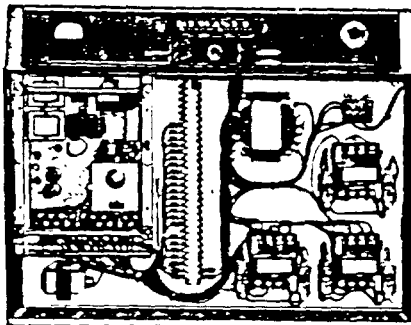
MAXIMUM SAFETY

Dual automatic main gas valves (on units over 1000 MBh input) provide added protection. Boiler passages are purged of combustible gases before and after each firing cycle. Combustion is continuously monitored by an electronic flame safeguard.



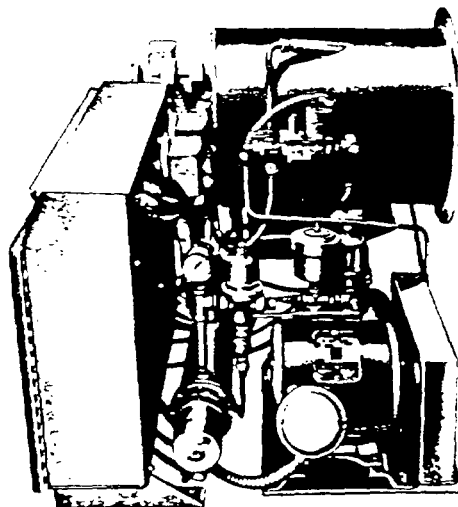
CONTROL CABINET

Programming and flame safeguard relays, switching relays, motor magnetic starter (if required), numbered terminal strips, indicating lights for major operations, and fuel selector switch—all mounted and wired in a heavy-gauge steel control cabinet mounted on the boiler unit. Wiring is ready for connection to a source of power.



AIR-OIL UNIT

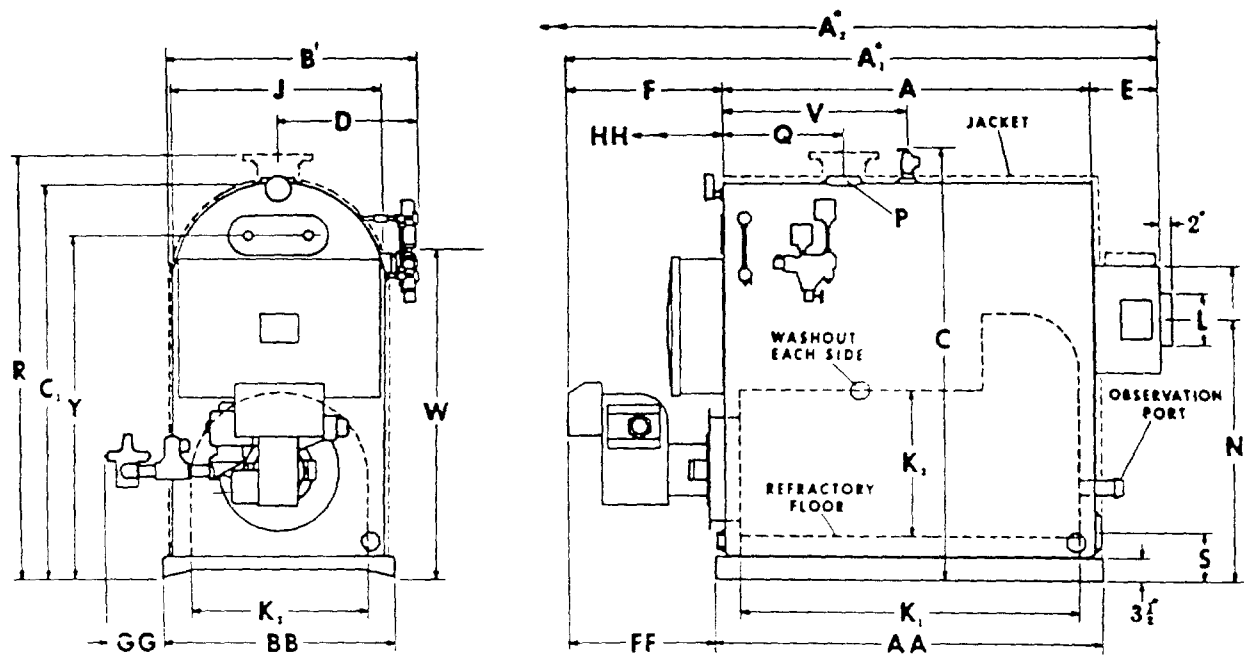
The air-oil unit assembly of the Kewanee burner includes air compressor, oil pump, valves, belt drive, motor, and all necessary accessories to provide the fine oil atomization required for clean, efficient oil firing. A thermostatically controlled electric oil heater maintains uniform oil temperature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



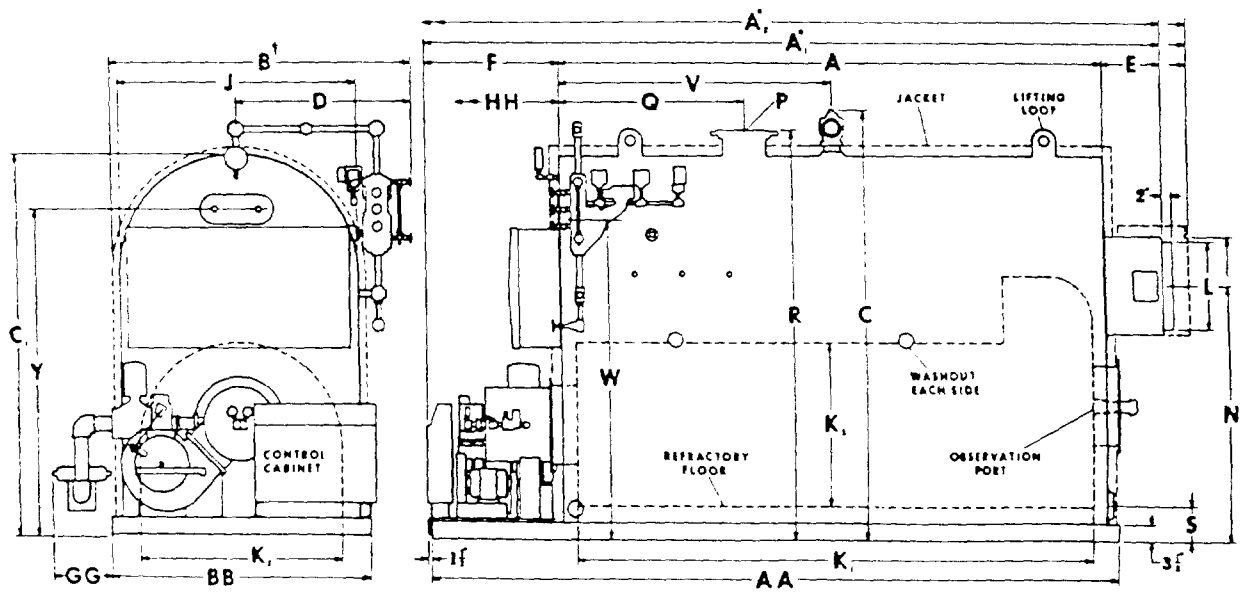
KEWANCE
SQUARE-HEAT

GENERATOR

DIMENSIONAL DRAWINGS



M-45 thru M-265



M-335 thru M-505

Rating—MBH	450	550	650	750	950	1,150	1,350	1,550	1,750	2,050	2,350	2,650	3,350	4,250	6,050
—Horsepower	13.4	16.4	19.4	22.4	28.4	34.4	40.3	46.3	52.3	61.2	70.0	80.0	100.0	126.9	150.8
—Steam per hour—212°F	464	567	670	773	979	1,186	1,392	1,598	1,804	2,113	2,423	2,732	3,452	4,380	6,204
—Steam (gross output)	sq. ft. 1,875	2,291	2,708	3,125	3,954	4,792	5,625	6,454	7,292	8,542	9,791	11,042	13,958	17,708	21,042
—Steam (MCA net)	sq. ft. 1,410	1,723	2,036	2,349	2,976	3,603	4,230	4,855	5,483	6,422	7,362	8,302	10,490	13,110	15,733
Firing rate—Gas 1,000 Btu/cu. ft.	563	688	813	938	1,188	1,438	1,688	1,938	2,188	2,563	2,937	3,313	4,181	5,312	6,312
—Oil 140,000 Btu/gal	4.0	4.9	5.8	6.7	8.5	10.3	12.1	13.8	15.6	18.3	21.0	23.6	30.0	38.0	45.0
—Oil 150,000 Btu/gal	—	—	—	—	—	—	—	—	—	—	—	—	27.9	34.8	41.7
Heating surface—Total	sq. ft. 63	78	92	107	127	154	180	209	239	275	309	343	450	562	675
—Primary	sq. ft. 19.0	21.1	23.2	25.4	30.8	34.2	37.6	41.4	47.6	51.9	55.9	59.9	86.3	100.2	112.9
Furnace volume	cu. ft. 7.8	9.1	10.5	11.7	15.4	17.9	20.4	23.3	29.5	33.4	37.1	40.8	66.0	80.4	94.3
Safety valve capacity—Steam per hr.	lbs. 450	550	650	750	950	1,150	1,350	1,550	1,750	2,050	2,350	2,650	3,350	4,250	5,050
Approx. dry weight	lbs. 1,900	2,050	2,200	2,350	2,600	2,950	3,300	3,650	4,000	4,450	4,900	5,300	6,200	9,300	10,800

UNIT NUMBER	450	550	650	750	950	1,150	1,350	1,550	1,750	2,050	2,350	2,650	3,350	4,250	6,050
Fuel control—Gas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Oil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Air control	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Programming and flame safeguard control	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gas controls—Min. inlet pressure	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
—Size	1"	1"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	2"	2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	3"
Motors—Fan—HP	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1 1/2	1 1/2	1 1/2	2	3	5
—Voltage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Oil pump—HP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Voltage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Air Unit—HP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Voltage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Electric preheater—Watts	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Voltage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

*No. 4 and No. 5 Oil Only—Requires Separate Fused Disconnect Switch By Others

UNIT NUMBER	450	550	650	750	950	1,150	1,350	1,550	1,750	2,050	2,350	2,650	3,350	4,250	6,050
A—Boiler length	30 1/2	36 1/2	42 1/2	48 1/2	42 1/2	50 1/2	58	67	56 1/2	64 1/2	72	79 1/2	91	112	132
A1—Overall length*	65 1/2	71 1/2	77 1/2	83 1/2	77 1/2	85 1/2	93	102	96 1/2	104 1/2	112	119 1/2	136	157	177
A2—Overall length including tube removal*	70	82	94	106	94	110	125	143	123	135	154	165	195	231	271
1B—Overall width	37 1/2	37 1/2	37 1/2	37 1/2	42	42	42	42	49	49	49	49	66 1/2	66 1/2	66 1/2
C—Overall height	62 1/2	62 1/2	62 1/2	64 1/2	71 1/2	74	74	74	83	83	83	83	93 1/2	93 1/2	93 1/2
C1—Shell height	55	55	55	55	62	62	62	62	71	71	71	71	78	78	78
D—Boiler centerline to greatest width	21 1/2	21 1/2	21 1/2	21 1/2	23 1/2	23 1/2	23 1/2	23 1/2	27	27	27	27	37 1/2	37 1/2	37 1/2
E—Rear smokebox depth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Rear outlet	8	8	8	8	8	8	8	8	9	9	9	9	12	12	12
—Top outlet	8 1/2	8 1/2	8 1/2	8 1/2	10 1/2	10 1/2	10 1/2	10 1/2	12 1/2	12 1/2	12 1/2	12 1/2	17 1/2	17 1/2	17 1/2
F—Burner to front of boiler	27	27	27	27	27	27	27	27	31	31	31	31	33	33	33
J—Boiler inside width	28 1/2	28 1/2	28 1/2	28 1/2	32 1/2	32 1/2	32 1/2	32 1/2	39 1/2	39 1/2	39 1/2	39 1/2	48	48	48
K1—Firebox length	25 1/2	31 1/2	37 1/2	43 1/2	37 1/2	45	53	62	51	55	66 1/2	74	84 1/2	105 1/2	125 1/2
K2—Firebox width	24	24	24	24	28	28	28	28	35	35	35	35	42	42	42
K3—Firebox height	18 1/2	18 1/2	18 1/2	18 1/2	23	23	23	23	28	28	28	28	36	36	36
L—Smoke outlet diameter	6	6	6	6	8	8	8	8	10	10	10	10	16	16	18
M—Smoke outlet height	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—Rear outlet	36	36	36	36	41	41	41	41	47 1/2	47 1/2	47 1/2	47 1/2	52	52	52
—Top outlet	43	43	43	43	49	49	49	49	58	58	58	58	62	62	62
P—Supply size	4	4	4	4	4	4	4	4	6**	6**	6**	6**	8**	8**	8**
Q—Supply location	10	12	14	16	14	17	19	22	16	18	20	24	27	38	48
R—Supply height	56	56	56	56	63	63	63	63	75 1/2	75 1/2	75 1/2	75 1/2	83	83	83
S—Return location	7	7	7	7	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2
—Return size	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4
V—Safety valve location	18	20	22	24	22	27	29	32	28	30	32	36	45	56	66
W—Normal waterline	45	45	45	45	52	52	52	52	60	60	60	60	64	64	64
Y—Coil connection height	47	47	47	47	54	54	54	54	62	62	62	62	67	67	67
AA—Base length	32 1/2	35 1/2	45 1/2	51 1/2	45 1/2	53 1/2	61 1/2	70	55 1/2	67 1/2	75	82 1/2	125	146	166
BB—Base width	32 1/2	32 1/2	32 1/2	32 1/2	37	37	37	37	44	44	44	44	54	54	54
FF—Burner front to base	25 1/2	25 1/2	25 1/2	25 1/2	25 1/2	25 1/2	25 1/2	25 1/2	29 1/2	29 1/2	29 1/2	29 1/2	1 1/2	1 1/2	1 1/2
GG—Standard gas train to base	5	5	5	5	7	7	7	7	8 1/2	8 1/2	8 1/2	8 1/2	12	12	12
HH—Tube removal space	31 1/2	37 1/2	43 1/2	49 1/2	43 1/2	51 1/2	59	68	57 1/2	65 1/2	73	80 1/2	92	113	133

*Add for increased length for top outlet—see Dim. E

**150 lb. American Std. Flange

†Add GG for increased width on gas and gas oil units

STANDARD AND OPTIONAL EQUIPMENT

KEWANEE[®]
SQUARE HEAT

STANDARD EQUIPMENT

OPTIONAL EQUIPMENT

ALL UNITS

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Three-Pass ASME Code Boiler 2. Refractory Filled Skid Type Base 3. Gas-Tight Insulated Front Smokebox 4. Pyrex Observation Ports (Front and Rear) 5. 2" Firetubes—Roller expanded 6. Gas-Tight Rear Smokebox with Horizontal Discharge (Rear) Vent 7. Wrap-around Insulated Steel Jacket 8. Lifting Loops (Units M-335 thru M-505) 9. Washout Plug Socket Wrench and Flue Cleaner with Handle 10. Forced Draft Operation 11. Operating Limit Control 12. Safety High Limit Control 13. Control Voltage—115 V, 60 cy, 1 ph. Includes Reduced Voltage Transformer where required 14. Control Cabinet Including: Electronic Flame Safeguard, Programming Control, Control Circuit Fuse, Burner Switches, Indicating Lights (2), Numbered Terminal Strip, Color Coded Wiring, Engraved Nameplates, and Necessary Relays, Magnetic Starters, and Transformers 15. 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) 16. Starting Service | <ol style="list-style-type: none"> 1. Explosion Relief Door 2. Vertical Discharge (Top) Vent 3. Instantaneous or Tank Type Hot Water Coils 4. Flue Gas Temperature Gauge 5. Alarm Bell or Alarm Horn 6. Circuit Breaker 7. Other Than Standard Voltages 8. Controls for FM 9. Controls for FIA 10. One Year Service Period |
|--|--|

STEAM UNITS

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. No. 767 Low Water Cut-Off (Units M-45 thru M-265) 2. No. 157 Combination Water Column, Low Water Cut-Off, and Pump Control (Units M-335 thru M-505) 3. Safety Valve(s) 4. Compound Steam and Vacuum Gauge 5. Water Gauge and Glass | <ol style="list-style-type: none"> 1. Combination Low Water Cut-Off and Pump Control 2. Combination Water Feeder, Low Water Cut-Off, and Alarm Switch 3. Second Low Water Cut-Off |
|---|--|

HOT WATER UNITS

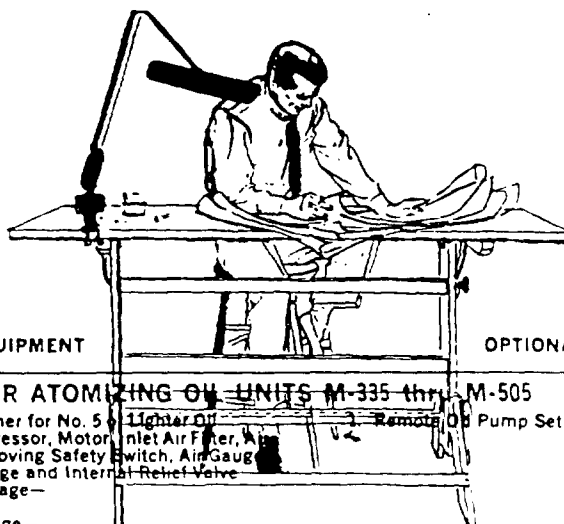
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. No. 764 Low Water Cut-Off 2. Relief Valve(s) 3. Combination Altitude Gauge and Thermometer | <ol style="list-style-type: none"> 1. Combination Water Feeder, Low Water Cut-Off, and Alarm Switch 2. Second Low Water Cut-Off |
|---|---|

PRESSURE ATOMIZING OIL UNITS M-45 thru M-265

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. High Pressure Mechanical Atomizing Oil Burner for No. 2 Oil 2. Two-Stage Oil Pump direct connected to Burner Motor 3. Motor Horsepower and Voltage— <ol style="list-style-type: none"> 1/2 HP, 115 V, 60 cy, 1 ph. (Units M-45 thru M-75) 3/4 HP, 115 V, 60 cy, 1 ph. (Units M-95 thru M-155) 1 HP, 230 V, 60 cy, 1 ph. (Unit M-175) 1 1/2 HP, 230 V, 60 cy, 3 ph. (Units M-205 thru M-265) 4. On-Off Firing Sequence (Units M-45 thru M-115) 5. On-Off Firing Sequence with Low Fire Start (Units M-135 thru M-265) 6. Fixed Position Air Supply (Units M-45 thru M-175) 7. Two-Position Air Supply Controlled by Modutrol Motor (Units M-205 thru M-265) 8. RA 890 Flame Safeguard with Photocell Flame Detector and T-4 Timer for Pre-Purge and Post-Purge Timing (Units M-45 thru M-175) 9. R-4150 Flame Safeguard with Photocell Flame Detector (Units M-205 thru M-265) 10. Oil Atomizing Nozzle (Dual Nozzles on Units M-205 thru M-265) 11. Oil Solenoid Valve (Dual Valves on Units M-135 thru M-265) 12. Direct Spark Electric Ignition 13. Oil Filter (Not Mounted) 14. Factory Component and Control Check | <ol style="list-style-type: none"> 1. Fireeye Flame Safeguard System 2. DC Voltmeter for Fireeye System 3. High-Low Off Firing Sequence (Units M-95 thru M-265) 4. Modulating Firing Sequence (Units M-135 thru M-265) 5. Manual Potentiometer for Modulating Fire Control 6. Factory Firetest |
|---|--|

PRESSURE ATOMIZING OIL UNITS M-335 thru M-505

1. High Pressure Mechanical Atomizing Oil Burner for No. 2 Oil
2. Two-Stage Oil Pump Assembly with Gauge, Relief Valve 1/2 HP, 230 V, 60 cy, 1 ph. motor
3. Motor Horsepower and Voltage—
 - 2 HP, 230 V, 60 cy, 3 ph. (Unit M-335)
 - 3 HP, 230 V, 60 cy, 3 ph. (Unit M-425)
 - 5 HP, 230 V, 60 cy, 3 ph. (Unit M-505)
4. Modulating Firing Sequence with Low Fire Start
5. Modutrol Motor with Low Fire Interlock to Control Air and Fuel Supply
6. Operating Control for Modutrol Motor (Boiler Mounted)
7. DC Voltmeter for Fireeye System
8. Manual Potentiometer
9. Fireeye FP-2 Flame Safeguard System with Lead Sulphide Flame Detector
10. Air Flow Safety Switch
11. Variable Capacity Oil Nozzle
12. Oil Solenoid Valve
13. Oil Metering Valve
14. Gas Electric Ignition Assembly
15. Oil Filter (Not Mounted)
16. Factory Firetest



STANDARD EQUIPMENT

OPTIONAL EQUIPMENT

AIR ATOMIZING OIL UNITS M-335 thru M-505

1. Low Pressure Air Atomizing Oil Burner for No. 5 Oil
2. Air-Oil Unit Consisting of: Air Compressor, Motor, Inlet Air Filter, Air Pressure Regulating Valve, Air Proving Safety Switch, Air Gauge, and Oil Pump Assembly with Gauge and Internal Relief Valve
3. Air Unit Motor Horsepower and Voltage—
1½ HP, 230 V, 60 cy, 3 ph.
4. Blower Motor Horsepower and Voltage—
2 HP, 230 V, 60 cy, 3 ph. (Unit M-335)
3 HP, 230 V, 60 cy, 3 ph. (Unit M-425)
5 HP, 230 V, 60 cy, 3 ph. (Unit M-505)
5. Modulating Firing Sequence with Low Fire Start
6. Modutrol Motor with Low Fire Interlock For Fuel-Air Control
7. Operating Control for Modutrol Motor (Boiler Mounted)
8. DC Voltmeter for Fireye System
9. Manual Potentiometer for Modulating Fire Control
10. Fireye FP-2 Flame Safeguard System with Lead Sulphide Flame Detector
11. Air Flow Safety Switch
12. Air-Oil Nozzle
13. Oil Metering Valve
14. Thermostatically Controlled Electric Oil Heater—
5,000 Watts (On No. 4 & 5 Oil Only)
15. Gas-Electric Ignition Assembly
16. Oil Strainer (Not Mounted)
17. Factory Firetest

GAS UNITS M-45 thru M-265

1. Multiple-Jet Flame Retention Type Gas Burner
2. Motor Horsepower and Voltage—
½ HP, 115 V, 60 cy, 1 ph. (Units M-45 thru M-75)
½ HP, 115 V, 60 cy, 1 ph. (Units M-95 thru M-155)
¾ HP, 230 V, 60 cy, 1 ph. (Unit M-175)
1½ HP, 230 V, 60 cy, 3 ph. (Units M-205 thru M-265)
3. On-Off Firing Sequence (Units M-45 thru M-175)
On-Off Firing Sequence with Low Fire Start (Units M-205 thru M-265)
4. Fixed Position Air and Fuel Supply (Units M-45 thru M-175)
Two position Air and Fuel Supply Controlled by Modutrol Motor (Units M-205 thru M-265)
5. RA-890 Flame Safeguard with Flame Rod Flame Detector and T-4 Timer for Pre-Purge and Post-Purge Timing (Units M-45 thru M-175)
6. R-4150 Flame Safeguard with Flame Rod Flame Detector (Units M-205 thru M-265)
7. Air Flow Safety Switch
8. UL Gas Control Group Including: Automatic Operating Gas Valve, Automatic Safety Gas Valve (Units M-95 thru M-265 only), Gas Volume Control Valve (Units M-205 thru M-265 only), Gas Pressure Regulator, and Manual Gas Cock
9. Gas-Electric Ignition Assembly
10. Factory Component and Control Check
1. Fireye Flame Safeguard System
2. DC Voltmeter for Fireye System
3. High-Low-Off Firing Sequence (Units M-95 thru M-265)
4. Modulating Firing Sequence (Units M-95 thru M-265)
5. Manual Potentiometer for Modulating Fire Control
6. Automatic Safety Gas Valve (Units M-45 thru M-75)
7. Gas Controls for Other Than Standard Pressures
8. Factory Firetest

GAS UNITS M-335 thru M-505

1. Flame Retention Type Gas Burner
2. Motor Horsepower and Voltage—
2 HP, 230 V, 60 cy, 3 ph. (Unit M-335)
3 HP, 230 V, 60 cy, 3 ph. (Unit M-425)
5 HP, 230 V, 60 cy, 3 ph. (Unit M-505)
3. Modulating Firing Sequence with Low Fire Start
4. Modutrol Motor with Low Fire Interlock to Control Air and Fuel Supply
5. Operating Control for Modutrol Motor (Boiler Mounted)
6. DC Voltmeter for Fireye System
7. Manual Potentiometer
8. Fireye FP-2 Flame Safeguard System with Lead Sulphide Flame Detector
9. Air Flow Safety Switch
10. UL Gas Control Group Including: Automatic Operating Gas Valve, Automatic Safety Gas Valve, Gas Volume Control Valve, Gas Pressure Regulator, Gas Pressure Gauge, and Manual Gas Cock
11. Gas-Electric Ignition Assembly
12. Factory Firetest
1. Gas Controls for Other Than Standard Pressures

COMBINATION GAS-OIL UNITS

1. Manual Fuel Changeover Switch

KEWANEE SQUARE-HEAT

GENERATOR

FOR ALL UNITS M-45 THRU M-505

The contractor shall furnish and install Model No. Square-Heat Generator(s) for (No. (2) (4) (5) oil), (gas), (combination gas-No. (2) (4) (5) oil) firing. The unit(s) shall be three-pass compact firebox design with arched upright crown sheet and two passes of firetubes, and constructed in accordance with the ASME Code for (15 lbs. steam) (30 lbs. water).

Unit(s) shall have not less than _____ total square feet of waterside heating surface including a minimum of _____ square feet of primary or direct heating surface.

Unit(s) shall contain not less than _____ cubic feet of furnace volume and shall have a gross output rating of not less than _____ MBH. Heat release shall not exceed 83,200 Btu per cubic foot of furnace volume.

Normal water line of unit(s) shall not exceed _____ inches. A pyrex observation port shall be provided at the rear of the firebox. Front flue access cover, with refractory securely keyed in place and of a size permitting easy access to all fire tubes, shall be mounted on a gas-tight, insulated front smokebox. Gas-tight rear smokebox shall be provided with a (rear) (top) outlet.

Unit(s) shall be provided with a wrap-around steel jacket with glass or mineral fiber insulation and smooth enamel finish. All tubes shall be set with a roller expander at each end. No welding of tubes to the tube sheets nor use of refractory baling to provide the second or third pass will be permitted.

Unit(s) shall be assembled and wired, with burner, controls, trim, insulated steel jacket, and refractory filled 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, flame sensing device, and control cabinet containing electronic flame safeguard and programming timer, burner switch, control circuit fuse, two indicating lights for major operations, numbered terminal strips, color-coded wiring, engraved nameplates, and necessary relays, starters and switches for automatic operation.

All motors shall be for _____ volts, _____ cycle, _____ phase operation. Controls shall be 115 volt, 60 cycle, single phase. Magnetic motor starters with thermal overload 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) 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 start-up.

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 utility requirements.

FOR PRESSURE ATOMIZING OIL UNITS M-45 THRU M-175

Oil burner shall be of the high pressure mechanical atomizing type for No. 2 oil, with a two-stage oil pump direct connected to the blower motor. Burner shall include oil atomizing nozzles; oil solenoid valves; 12,000 volt ignition transformer; T-4 Timer for pre-purge and post-purge; RA-890E flame safeguard with photocell flame detector; and all necessary controls for "on-off" type of operation. Air control shall be by fixed position air inlet damper and adjustable primary-secondary air shutter.

FOR PRESSURE ATOMIZING OIL UNITS M-205 THRU M-265

Oil burner shall be of the high pressure mechanical atomizing type for No. 2 oil, with a two-stage oil pump direct connected to the blower motor. Burner shall include dual oil atomizing nozzles, dual oil solenoid valves; 12,000 volt ignition transformer; R-4150 flame safeguard with photocell flame detector and all necessary controls and linkage for "on-off" type of operation with controlled low fire start. Fuel-air control shall provide two-position regulation of the air inlet damper and the high fire oil solenoid valve by means of a modutrol motor.

FOR PRESSURE ATOMIZING OIL UNITS M-335 THRU M-505

Oil burner shall be of the high pressure mechanical atomizing type for No. 2 oil, with a two-stage oil pump assembly with internal relief valve mounted on the boiler base. Burner shall include variable-flow oil atomizing nozzle; oil solenoid valve; oil metering valve; gas-electric ignition assembly; 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock; air flow safety switch; Fireye FP-2 flame safeguard system with lead sulphide flame detector, low fire interlock; and all necessary controls and linkage for modulated firing with proved low fire start. Fuel-air control shall provide modulated regulation of the air damper and the oil metering valve by means of a modutrol motor.

FOR AIR ATOMIZING OIL UNITS M-335 THRU M-505

Oil burner shall be of the low pressure air atomizing type for No. 5 or lighter oil with an air-oil unit consisting of air compressor, motor, inlet air filter, air proving safety switch, air gauge oil pump assembly, and relief valve mounted on the boiler base. Burner shall include air-oil atomizing nozzle; oil solenoid valve; oil metering valve; thermostatically controlled electric heater (omit for No. 2 oil); gas-electric ignition assembly; 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock; air flow safety switch; Fireye FP-2 flame safeguard with lead sulphide flame detector; low fire interlock; and all necessary controls and linkages for modulated firing with proved low fire start. Fuel-air control shall provide modulated regulation of the air damper and the oil metering valve by means of a modutrol motor.

FOR GAS UNITS M-45 THROUGH M-175

Gas burner shall be of the multiple-jet flame retention type including a main gas control group consisting of an automatic diaphragm gas valve, automatic safety gas valve on inputs over 1,000 MBH, gas pressure regulator, and manual gas cock; gas electric ignition assembly consisting of a 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator and manual gas cock; air-flow safety switch; T-4 Timer for pre-purge and post-purge; RA-890E flame safeguard with flame rod flame detector; and all necessary controls for "on-off" type of operation. Air control shall be by fixed position air inlet damper and adjustable primary-secondary air shutter.



TYPICAL SQUARE-HEAT GENERATOR SPECIFICATIONS

FOR GAS UNITS M-205 THRU M-265

Gas burner shall be of the multiple-jet flame retention type, including a main gas control group consisting of an automatic diaphragm gas valve, automatic safety gas valve, gas volume control valve, gas pressure regulator, and manual gas cock; gas-electric ignition assembly consisting of a 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock; air-flow safety switch; R-4150 flame safeguard with flame rod flame detector; and all necessary controls and linkage for "on-off" type of operation with controlled low fire start. Fuel-air control shall provide two-position regulation of the air inlet damper and the gas volume control valve by means of a modutrol motor.

FOR GAS UNITS M-335 THRU M-505

Gas burner shall be of the 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 manual gas cock; gas-electric ignition assembly, 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock; air flow safety switch; Fireye FP-2 flame safeguard with lead sulphide flame detector; low fire interlock, and all necessary controls and linkage for full modulated firing with proved low fire start. Fuel-air control shall provide modulated regulation of the air damper and the gas volume control valve by means of a modutrol motor.

FOR COMBINATION GAS-PRESSURE ATOMIZING OIL UNITS M-45 THRU M-175

Gas-oil burner shall consist of a combination multiple-jet flame retention type gas burner and a high pressure mechanical atomizing oil burner for No. 2 oil, including all necessary controls for "on-off" type of operation. Gas controls shall include a main gas control group consisting of an automatic diaphragm gas valve, automatic safety gas valve on inputs over 1,000 MBH, gas pressure regulator, and manual gas cock; gas-electric ignition assembly consisting of a 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock, and flame rod flame detector. Oil controls shall include a two-stage oil pump direct connected to the blower motor; oil atomizing nozzles, oil solenoid valves; 12,000 volt ignition transformer, and photocell flame detector. Controls for both fuels shall include T-4 Timer for pre-purge and post-purge, RA-890E flame safeguard, and air-flow safety switch. Air control shall be by fixed position air inlet damper and adjustable primary-secondary air shutter. 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-PRESSURE ATOMIZING OIL UNITS M-215 THRU M-265

Gas-oil burner shall consist of a combination multiple-jet flame retention type gas burner and high pressure mechanical atomizing oil burner for No. 2 oil, including all necessary controls for "on-off" type of operation with controlled low fire start. Gas controls shall include a main gas control group consisting of an automatic diaphragm gas valve, an automatic safety gas valve, gas volume control valve, gas pressure regulator, and manual gas cock; gas-electric ignition assembly consisting of a 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock; and flame rod flame detector. Oil controls shall include a two-stage oil pump direct connected

to the blower motor, dual oil atomizing nozzles; dual oil solenoid valves; 12,000 volt ignition transformer; and photocell flame detector. Controls for both fuels shall include R-4150 flame safeguard and air-flow safety switch. Fuel-air control shall provide two-position regulation of the air inlet damper, the gas volume control valve, the high fire oil solenoid valve by means of a modutrol motor. 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.

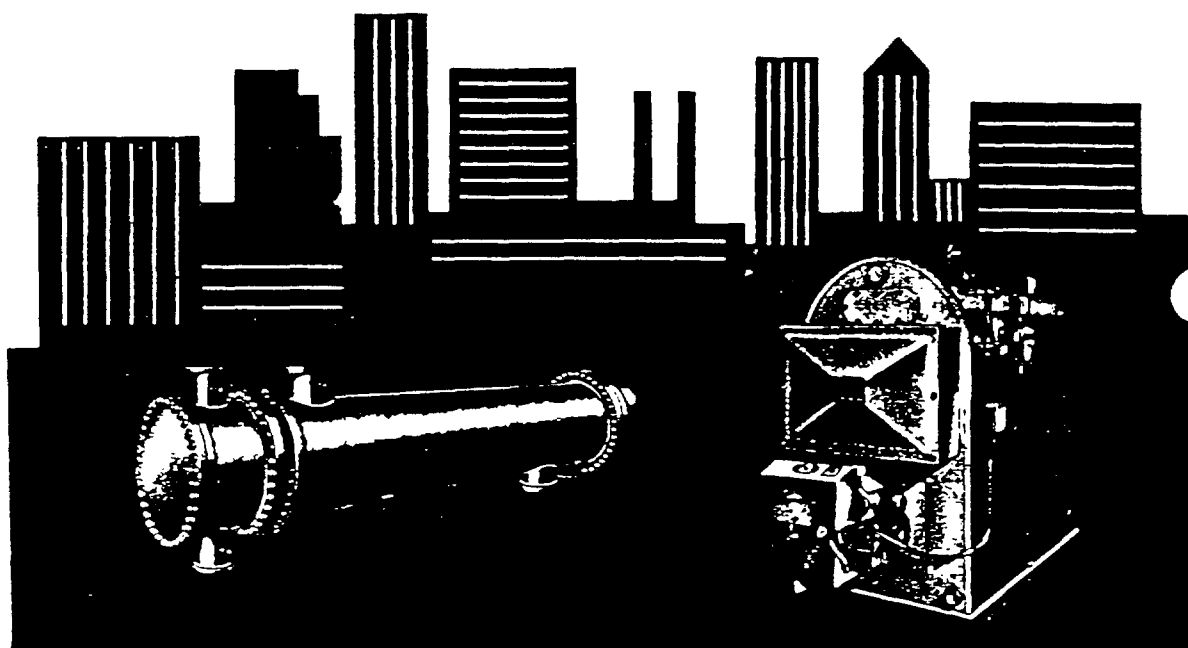
FOR COMBINATION GAS-PRESSURE ATOMIZING OIL UNITS M-335 THRU M-505

Gas-oil burner shall consist of a combination flame retention type gas burner and high pressure mechanical atomizing oil burner for No. 2 oil, including all necessary controls for modulated 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 manual gas cock. Oil controls shall include a two-stage oil pump assembly with internal relief valve; variable flow oil atomizing nozzle; oil solenoid valve, oil metering valve. Controls for both fuels shall include Fireye FP-2 flame safeguard with lead sulphide flame detector; air flow safety switch, low fire interlock; and gas-electric ignition assembly, 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock. Fuel-air control shall provide modulated regulation of the air damper, the gas volume control valve, and the oil metering valve by means of a modutrol motor. 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, the proper ignition timing for the fuel being burned.

FOR COMBINATION GAS-AIR ATOMIZING OIL UNITS M-335 THRU M-505

Gas-oil burner shall consist of a combination flame retention type gas burner and low pressure air atomizing oil burner for No. 5 or lighter oil with all necessary controls for modulating 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 manual gas cock. Oil controls shall include an air-oil unit consisting of an air compressor, motor, inlet air filter, air proving safety switch, air gauge, oil pump assembly and relief valve, air-oil atomizing nozzle, oil solenoid valve; oil metering valve, thermostatically controlled electric oil heater (omit for No. 2 oil). Controls for both fuels shall include Fireye FP-2 flame safeguard with lead sulphide flame detector, air flow safety switch, low fire interlock, and gas-electric ignition assembly, 6,000 volt ignition transformer, automatic gas valve, gas pressure regulator, and manual gas cock. Fuel-air control shall provide modulated regulation of the air damper, the gas volume control valve, and the oil metering valve by means of a modutrol motor. 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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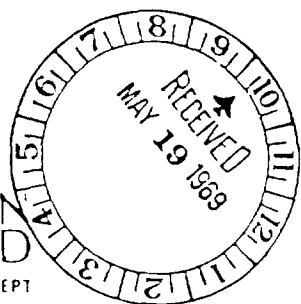
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