

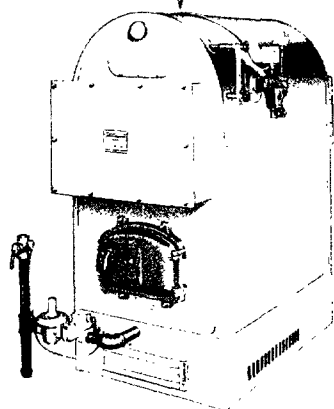
PLAINTIFF'S EXHIBIT

ASI-1193

featuring
'WHISPERING
QUIET'
blue-flame
heating

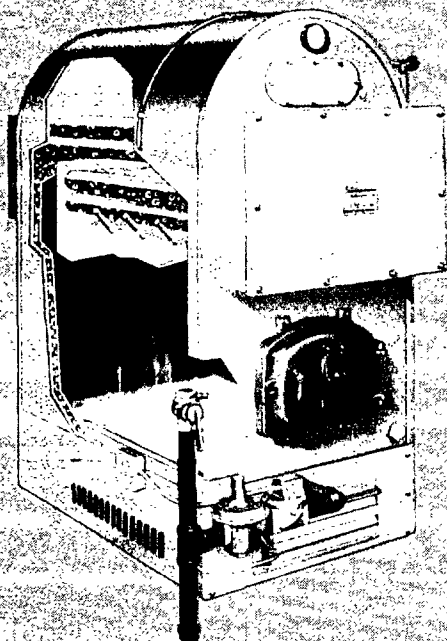
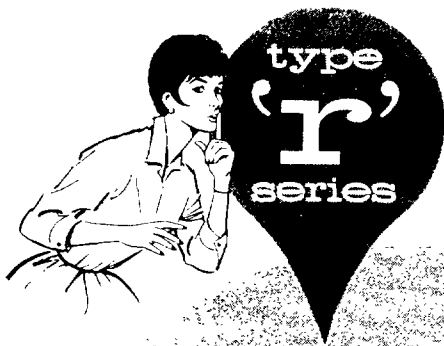
KEWANEE SQUARE- HEAT GAS BOILER

'r'
type series

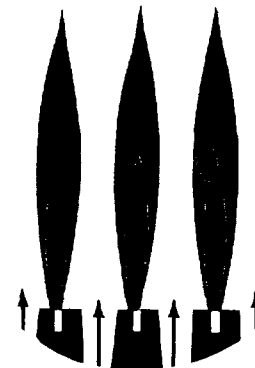


bulletin 1249-D
supersedes 3111

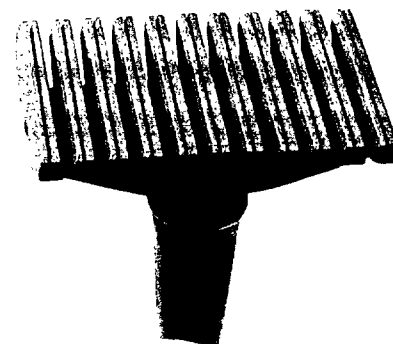
28501



- 12 sizes 405,000 to 2,250,000 Btu/h input
- for natural, mixed, manufactured or propane gases
- natural or induced draft



Secondary air on each side of burner port



PROVED DESIGN AND PERFORMANCE

The dependable performance, durability and efficiency of the Square-Heat boiler design has been proved by thousands of installations. Now an improved Kewanee gas package incorporating all the well known features of compact firebox boiler design . . . available for natural or induced draft operation.

THREE-PASS CONSTRUCTION

The large firebox with arched upright crown sheet provides the first pass and assures ample volume for complete and quiet combustion and an unusually large proportion of direct or primary heating surface. The second pass is from rear to front in the direct fire tubes. The third pass is from front to rear in the return fire tubes. This longer gas travel—with no refractory baffles to burn out or short circuit gases—gives the Square-Heat Gas Boiler exceptionally high operating efficiency.

TUBES

All tubes in Square-Heat Gas Boilers are 3" O.D., secured to the tube sheets by roller expander—no tubes are welded to the tube sheets. Spinner blades in return tubes swirl the hot gases against the tube surfaces for longer gas travel and maximum heat transfer.

CONTACT DESIGN

The Kewanee three-pass design requires only minimum boiler room dimensions for installation and accessibility. Low height teamed with a rear smoke outlet makes it a perfect application for compact boiler rooms.

WATER SQUARE SPACE

An unbroken disengaging area and ample water content assures steady water line and an adequate reserve of dry steam at all times.

STEEL JACKET AND FINISH

Heavy gauge steel jacket with attractive smooth enamel finish and glass or

mineral fiber insulation . . . reduces heat loss and is quickly and easily installed.

WATER HEATING COILS

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

EASY ASSEMBLY AND INSTALLATION

The Square-Heat Type R Gas Boiler is shipped ready for field assembly and installation. Simply set the boiler shell on the gas burner (which serves as the boiler base), slip on the insulated jacket—and the boiler unit is ready for trim, controls and piping. No sections to handle . . . no tie rods, push nipples, or refractory to install. Assembly and installation costs are reduced to an absolute minimum.

APPLICATIONS

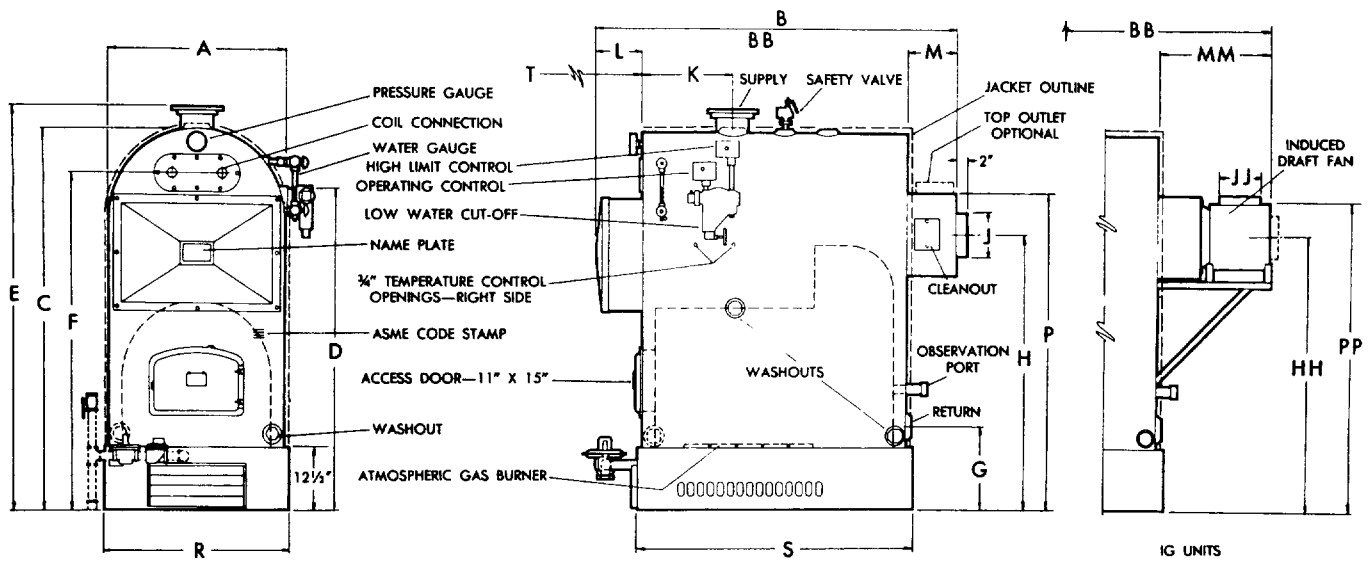
Available for all types of commercial gases—natural, manufactured, or propane. AG units are designed for installation with natural draft stacks. IG units are designed with an induced draft fan for installation with stub vents.

Flexibility of installation with various stack or draft conditions makes the Square-Heat Gas Boiler ideal for both new construction and modernization of existing buildings.

ASME Boiler Construction Code requirements have been followed to the last detail. But more than that, the Square-Heat Gas Boiler gives performance well above and beyond any boiler code requirements.

CONSTRUCTION

Flange quality plate . . . heads and walls are firebox steel . . . gas-tight construction throughout . . . easy access to flues for cleaning . . . heavy cast iron front fire door for access to gas burner . . . integral in design and construction . . . thoroughly tested.



ratings and data

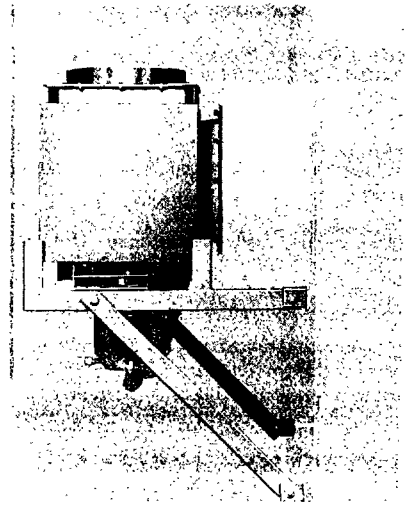
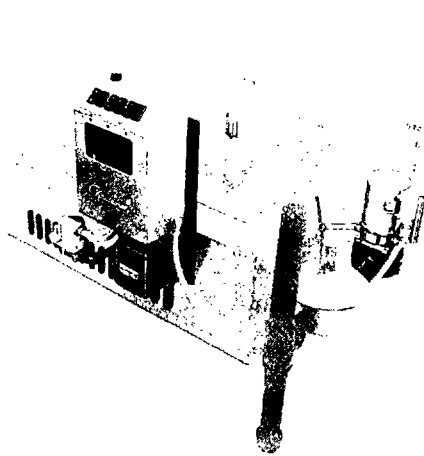
BOILER NUMBER (—AG or —IG Suffix)	3R1	3R2	3R3	3R4	3R5	3R6	3R7	3R8	3R9	3R10	3R11	3R12
Rating—MBh	324	396	468	540	648	792	936	1080	1260	1440	1620	1800
—horsepower	9.7	11.8	14.0	16.1	19.3	23.6	27.9	32.2	37.6	43.0	48.4	53.7
—steam per hour 212° F	lbs 334	408	482	556	668	816	965	1113	1298	1484	1670	1855
—steam (gross)	sq ft 1350	1650	1950	2250	2700	3300	3900	4500	5250	6000	6750	7500
—steam (MCA net)	sq ft 1010	1240	1460	1690	2020	2480	2930	3380	3940	4500	5060	5620
Input—gas	MBh 405	495	585	675	810	990	1170	1350	1575	1800	2025	2250
Heating surface	sq ft 53	65	77	88	106	129	153	177	206	236	265	294
Furnace volume	cu ft 8.8	10.4	12.0	13.5	17.2	20.1	23.0	26.3	32.6	37.0	41.1	45.3
Safety valve capacity—lbs. steam per hour	324	396	468	540	648	792	936	1080	1260	1440	1620	1800
Vent diameter (AG) natural draft	in 12	12	12	12	15	15	15	15	18	18	18	18
Stack size (AG) natural draft	in 10	10	12	12	14	14	14	16	16	16	18	18
diameter	ft 30	35	35	35	30	35	40	40	40	40	45	50
height												
Vent diameter (IG) induced draft	10	10	10	10	10	10	10	14	14	14	14	14
Supply size	in 4	4	4	4	4	4	4	4	6*	6*	6*	6*
Return size	in 3	3	3	3	4	4	4	4	4	4	4	4
Gas controls size (natural gas)	in 1	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2
Gas pressure required (natural gas)	in wc 6	6	6	6	6	6	6	6	6	6	6	6
Gas control size (propane gas)	in 1	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2
Approx. dry weight (AG)	lbs 1700	1875	2050	2225	2600	2925	3200	3550	3975	4475	4625	5000
Approx. dry weight (IG)	lbs 1800	1975	2150	2325	2700	3025	3300	3850	4275	4775	4925	5300

*150 lb American Standard Flange.

dimensions—Inches

BOILER NUMBER (—AG or —IG Suffix)	3R1	3R2	3R3	3R4	3R5	3R6	3R7	3R8	3R9	3R10	3R11	3R12
A —Boiler width—shell	30	30	30	30	34	34	34	34	41	41	41	41
—Boiler width—jacketed	31	31	31	31	35	35	35	35	42	42	42	42
B —Boiler length (AG)	46 1/4	52 1/4	58 1/4	64 1/4	59 1/4	67	75	83 3/4	75	83	90 1/2	98
BB —Boiler length (IG)	61	67	73	79	74	82	90	106	97	105	112	120
C —Boiler height	64 1/4	64 1/4	64 1/4	64 1/4	71 1/4	71 1/4	71 1/4	71 1/4	80 1/4	80 1/4	80 1/4	80 1/4
D —Water line height	54	54	54	54	61	61	61	61	69	69	69	69
E —Supply height	65	65	65	65	72	72	72	72	84 1/4	84 1/4	84 1/4	84 1/4
F —Coil connection height	56	56	56	56	63	63	63	63	71	71	71	71
G —Return height	16	16	16	16	16 1/2	16 1/2	16 1/2	16 1/2	16 1/2	16 1/2	16 1/2	16 1/2
H —Rear vent height (AG)	44 3/4	44 3/4	44 3/4	44 3/4	49 3/4	49 3/4	49 3/4	49 3/4	56 1/2	56 1/2	56 1/2	56 1/2
HH —Rear vent height (IG)	44 3/4	44 3/4	44 3/4	44 3/4	49 3/4	49 3/4	49 3/4	49 3/4	56 1/2	56 1/2	56 1/2	56 1/2
J —Breeching connection diameter (AG)	12	12	12	12	15	15	15	15	18	18	18	18
JJ —Breeching connection diameter (IG)	10	10	10	10	10	10	10	14	14	14	14	14
K —Supply location	10	12	14	16	14	17	19	22	16	18	20	24
L —Front smokebox depth	8	8	8	8	9	9	9	9	10	10	10	10
M —Rear smokebox depth (AG)	8	8	8	8	8	8	8	8	9	9	9	9
MM —Draft inducer depth (IG)	23	23	23	23	23	23	23	30	31	31	31	31
P —Top vent height (AG)	51 1/4	51 1/4	51 1/4	51 1/4	58 1/4	58 1/4	58 1/4	58 1/4	66 1/2	66 1/2	66 1/2	66 1/2
PP —Top vent height (IG)	51	51	51	51	56	56	56	60 1/2	67	67	67	67
R —Base width	31 1/2	31 1/2	31 1/2	31 1/2	35 1/2	35 1/2	35 1/2	35 1/2	42 3/8	42 3/8	42 3/8	42 3/8
S —Base length	32 1/2	38 1/2	44 1/2	50 1/2	44 1/2	52 1/4	60 1/4	69	58 1/4	66 1/4	73 3/4	81 1/4
T —Clearance for tube replacement	32	38	44	50	44	52	60	69	58	66	73	81

standard and optional equipment



Standard Equipment

all units

- 1 Three-Pass ASME Code Boiler
- 2 Gas Tight Insulated Front Smokebox
- 3 Gas Tight Rear Smokebox
- 4 Cast Iron Front Firedoor
- 5 3" Firetubes with Spinner Blades in Return Tubes
- 6 Wrap-around Insulated Steel Jacket
- 7 Flue Cleaner with Handle
- 8 Washout Plug Socket Wrench
- 9 Operating Limit Control
- 10 Safety High Limit Control
- 11 Gas Burner Assembly including: 12½" Boiler Base; Gas Manifold; Orifices; Slotted Port Premix Type Cast Iron Burner Heads; Adjustable Secondary Air Inlet Louver; and Primary Air Inlet Dampers
- 12 Thermocouple Flame Safeguard with Constant Pilot including: Thermocouple; Pilot Safety Relay; Pilot Valve for 100% Safety Shutoff; and Pilot Burner with Shield and Mounting Bracket
- 13 Gas Control Group including: Automatic Diaphragm Gas Valve; Main Gas Pressure Regulator (Omit for propane gas); Manual Gas Cock; Pilot Cock with Tubing; and Pilot Gas Pressure Regulator
- 14 Standard Voltage—115 V, 60 cy., 1 ph.
- 15 Barometric Draft Regulator
- 16 Necessary Insulation and Compound for Air-Tight Seal between Boiler and Burner-Base Assembly
- 17 Boiler Shell; Insulated Jacket; Trim and Controls; and Burner-Base Assembly Shipped Ready for Field Installation
- 1 Flue Gas Temperature Gauge
- 2 Pyrex Observation Port
- 3 Instantaneous or Tank-Type Hot Water Coils
- 4 Room Thermostat Control
- 5 Electronic Flame Safeguard with Constant Pilot
- 6 Electronic Flame Safeguard with Gas-Electric Ignition Assembly for Intermittent Pilot
- 7 Electronic Flame Safeguard with Gas-Electric Ignition Assembly for Constant Pilot including: Control Cabinet with Indicating Lights, Switches, Component Check Relay and Mounting Bracket
- 8 Automatic Motorized Gas Valve with Damper Arm and Linkage for Operation of Secondary Air Inlet Louver
- 9 Safety Solenoid Gas Valve in addition to Standard Automatic Valve
- 10 Gas Controls to Meet FM Requirements
- 11 Gas Controls to Meet Local or Utility Requirements
- 12 Gas Controls for Other Than Standard Inlet Pressure
- 13 Starting Service
- 14 One Year Service

steam units

- 1 No. 767 Low Water Cut-Off
- 2 Safety Valve
- 3 Compound Steam and Vacuum Gauge
- 4 Water Gauge and Glass
- 1 Combination Low Water Cut-Off and Pump Control
- 2 Combination Low Water Cut-Off and Water Feeder
- 3 Second Low Water Cut-Off
- 4 Surface Blow-Off Opening

hot water units

- 1 No. 64A Quick Hook-up Low Water Cut-Off
- 2 Relief Valve
- 3 Combination Altitude Gauge and Thermometer

- 1 Combination Low Water Cut-Off and Water Feeder

natural draft (all units)

- 1 Horizontal Discharge (Rear) Vent for Natural Draft Stack Application
- 1 Vertical Discharge (Top) Vent for Natural Draft Stack Application

induced draft (all units)

- 1 Induced Draft Fan including: 115 V, 60 cy., 1 ph. Constant Speed Motor with Adjustable Pitch Sheave; Boiler Mounting Brackets; and Vertical Discharge (Top) Vent for Stub Stack Application
- 1 Horizontal Discharge (Rear) Vent for Stub Stack Application
- 2 Pre-Purge Relay
- 2 Draft Safety Switch
- 3 Pre-Purge and Post-Purge Relay

28504

Combustion noise is "whispering quiet" . . . The intense blue flame produced by the precision built cast iron burner heads is both efficient and quiet . . . Makes this boiler unit ideal for office and store buildings, schools, hospitals, apartments, and other medium size buildings where exceptionally quiet boiler operation is desired.

KEWANEE GAS BURNER FEATURES

The Kewanee atmospheric premix gas burner is actually the boiler base . . . compact, easy to handle and install. Accurately machined deep slotted ports in the cast iron burner heads provide high capacity, prevent flash back, and insure smooth light-off from a single pilot.

The individually spaced cast fins on the burner heads permit a continuous flow of secondary air between and over each fin . . . cooling and adding years of life to the burner heads. Secondary air surrounds both sides of the flame thoroughly mixing gas and air for rapid, quiet combustion . . . producing a short flame height without excess air . . . maximum burner efficiency from a quiet hot blue flame.

Primary air supply and secondary air supply are separately controlled . . . permits flame adjustment for all types of gases under varying draft and operating conditions.

Various control and safety combinations are available, all with 100% safety shut off . . . thermocouple pilot and safety relay with automatic diaphragm gas valve is standard. Electronic safety relay . . . electronic safety relay with automatic electric ignition . . . motorized gas valve with linkage to operate secondary air inlet louvers . . . automatic safety gas valve in addition to standard operating gas valve. All these, plus other control options are available to meet specific job and local code requirements.

burner data

Unit —AG or —IG	Input MBh	Number of Burner Heads		Dimensions—Inches			Gas Controls			IG Units Induced Draft Fan Data*** Size HP
		Natural Gas	Propane Gas	Width	Length	Height	Natural Gas*	Required Inlet Pressure	Propane Gas** Size	
3R1	405	4	4	31½	32½	12½	1"	6" w.c.	1"	10 DI—¼
3R2	495	4	4	31½	38½	12½	1"	6" w.c.	1"	10 DI—¼
3R3	585	4	6	31½	44½	12½	1¼"	6" w.c.	1"	10 DI—¼
3R4	675	6	6	31½	50½	12½	1¼"	6" w.c.	1"	10 DI—¼
3R5	810	6	8	35½	44½	12½	1¼"	6" w.c.	1"	10 DI—¼
3R6	990	8	8	35½	52¼	12½	1½"	6" w.c.	1¼"	10 DI—¼
3R7	1170	8	10	35½	60¼	12½	1½"	6" w.c.	1¼"	10 DI—¼
3R8	1350	10	12	35½	69	12½	1½"	6" w.c.	1¼"	14 DL—¼ C
3R9	1575	12	15	42⅞	58¼	12½	1½"	6" w.c.	1½"	14 DL—¼ C
3R10	1800	15	15	42⅞	66¼	12½	2"	6" w.c.	1½"	14 DL—¼ C
3R11	2025	15	18	42⅞	73¼	12½	2"	6" w.c.	1½"	14 D—¼ C
3R12	2250	18	18	42⅞	81¼	12½	2"	6" w.c.	2"	14 D—¼ C

*1000 Btu/cf. 0.60 s.g.

**11" w.c. standard inlet pressure.

***115v, 60 cy., 1 ph constant speed motor with adjustable pitch sheave.

The contractor shall furnish and install Model No. Square-Heat Gas Boiler(s) for (natural) (manufactured) (propane) gas. The unit shall be of three-pass firebox design with arched upright crown sheet and two passes of fire tubes, and constructed in accordance with the ASME Code for (15 pounds steam) (30 pounds water).

The boiler(s) shall contain not less than cubic feet of furnace volume and shall have a gross output rating not less than MBh. Heat release shall not exceed 52,000 Btu per cubic foot of furnace volume.

An insulated cast iron fire door shall be provided for access to the gas burner heads. A 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.

Boiler(s) shall be provided with a wrap-around steel jacket with 1" 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 baffling to provide the second or third pass will be permitted. Spinner blades shall be provided in the return fire tubes.

NOTE: Strike out clauses in parenthesis which are not applicable.

Boiler(s) shall be equipped for operation (with a natural (AG Series) draft stack inches in diameter and feet in height) (with an induced (IG Series) draft fan with safety draft switch with a inch diameter vent.)

Electrical characteristics shall be 115 volt, 60 cycle, single phase.

Gas burner equipment shall be an integral part of the boiler base, and shall include: atmospheric up-shot type cast iron heads with accurately machined deep slotted ports; separate air inlet dampers for control of primary and secondary air; gas manifold; necessary safety burner pilots; automatic gas valve; gas pressure regulators (omit for propane gas) and manual gas valves for both pilot and main burner.

Automatic gas valve shall be of the (diaphragm type) (motorized type with linkage for control of secondary air inlet louvers) (with an additional automatic safety solenoid valve).

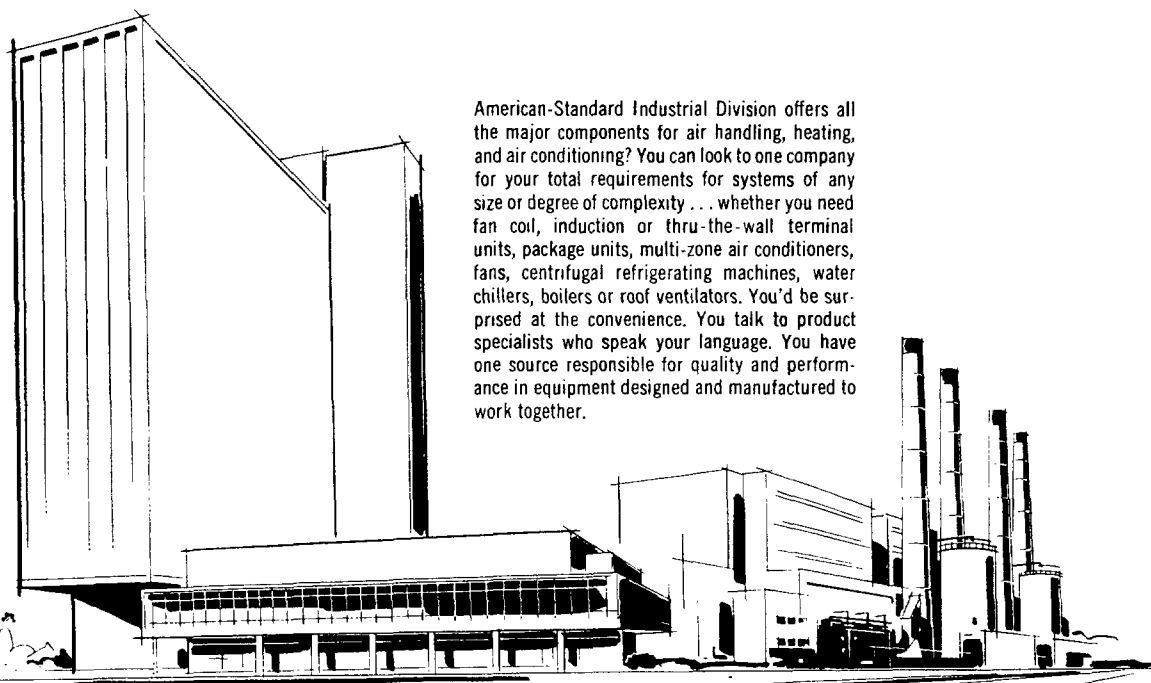
Combustion safety control, including 100% safety shut off, shall be by (electronic relay with gas-electric ignition assembly for constant pilot, complete with control cabinet with indicating lights, switches, component check relay and mounting bracket) (electronic relay with gas-electric ignition assembly for intermittent pilot) (electronic relay with constant pilot) (thermocouple with constant pilot).

Boiler mounted controls shall consist of safety limit switch, operating limit switch, low water cut-off, gauges, trim and safety or relief valves for (15 pounds steam) (30 pounds water) operation.

Boiler, burner, controls and insulated jacket shall be packaged and shipped as separate components by the boiler manufacturer ready for field assembly. Unit shall be field assembled, piped, and wired by the contractor.

NOTE: Specify starting service and period of free service if it is to be supplied by an authorized service representative of the boiler manufacturer.

Owner's representative shall be present to receive instructions in the care and maintenance of the boiler unit at the time the boiler is started.



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28506



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