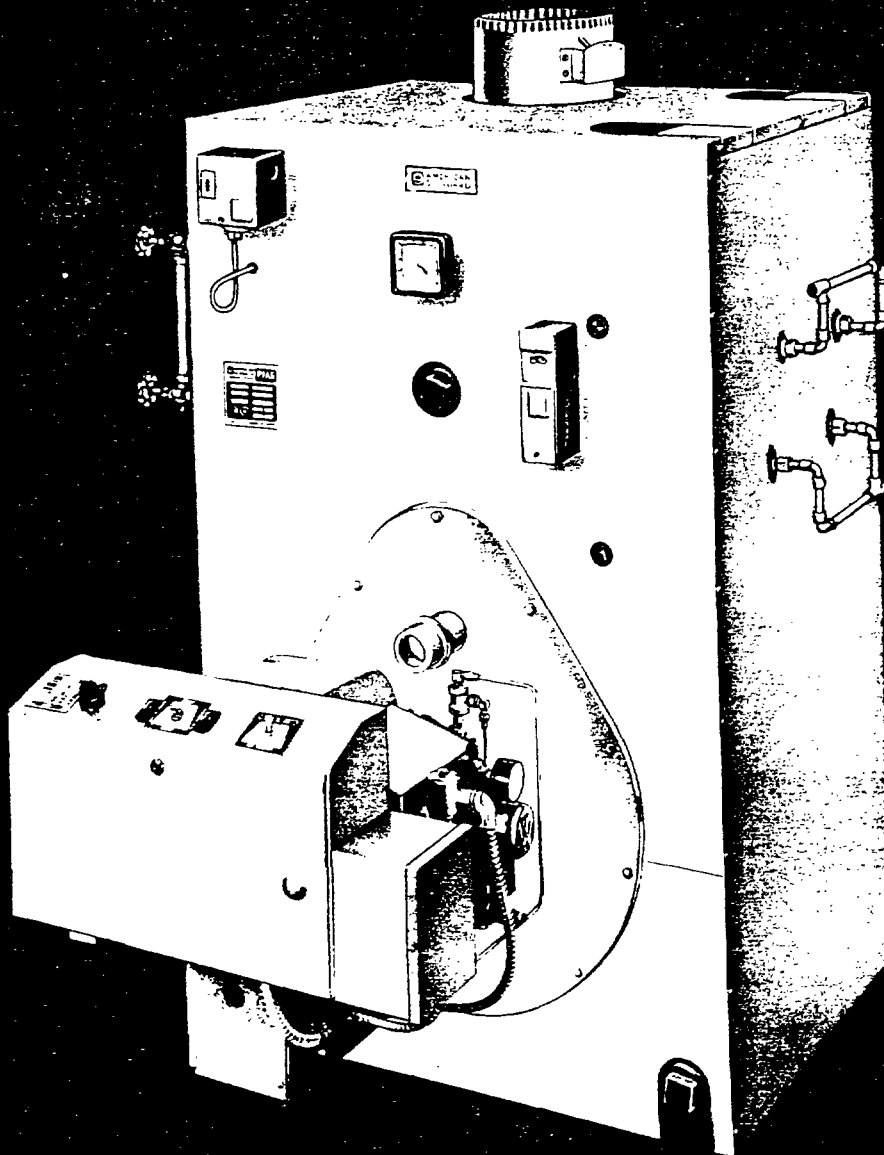


Technical Catalog Bulletin

PFA-5

pressure fired (forced draft)
for light oil,
gas/light oil, and gas burners
hot water or steam



PLAINTIFF'S
EXHIBIT

ASI-291

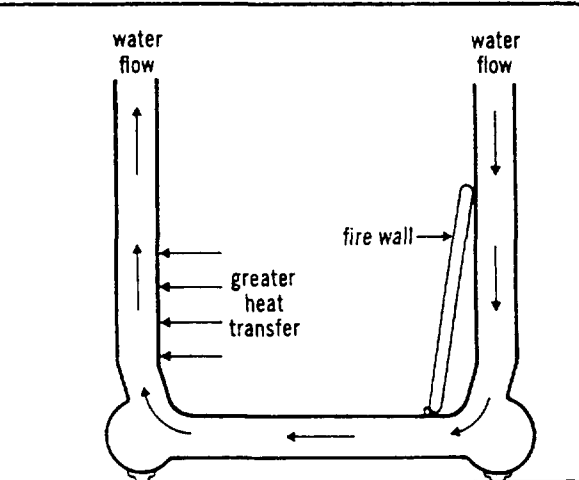
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The PFA-5 is the latest development in large cast iron boiler technology. Designed specifically for forced draft firing, the boiler is available with light oil, gas, or combination gas-light oil burners and operates with an efficiency of over 80%.

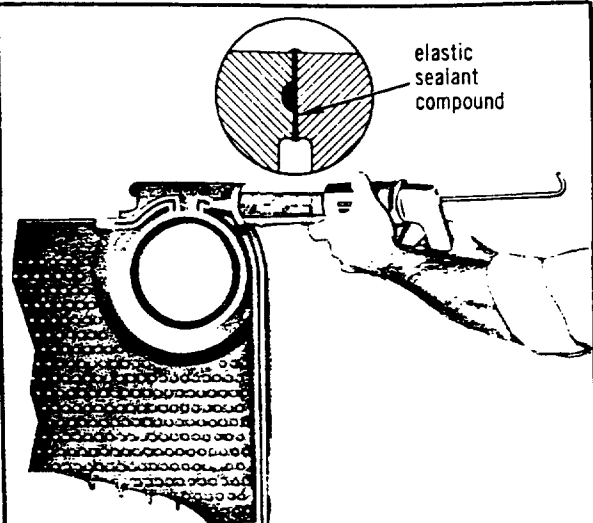
Forced draft boilers in addition to increased operating efficiencies require much less space than conventional boilers of comparable size and eliminate the need for external draft devices such as a high chimney or mechanical draft equipment—the PFA-5 features: compact, light weight, wet base design;

no separate base or combustion chamber; provision for multiple tankless heaters; eighteen sizes ranging from 620 MBH to 3,430 MBH gross output; and the availability of factory assembled section assemblies.

The PFA-5 is further enhanced by two exclusive innovations—the use of elastic compound for sealing and the use of a built-in thermal pump for improved internal circulation—which helps make this boiler a leader in both performance and dependability.

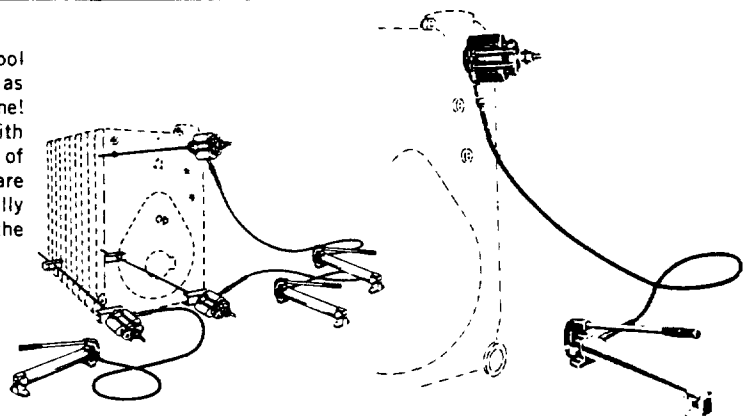


thermal pump—Incorporated into the design of the PFA-5 is a thermal pump—water and steam boilers—which improves internal circulation insuring good steam quality and maximum tankless heater capacity. The thermal pump operates by causing heat transfer to be greater on one side of the boiler than on the other and thereby causing an upward flow of water on the side where transfer is greater and downward on the side where transfer is lower. (A patent application is pending).



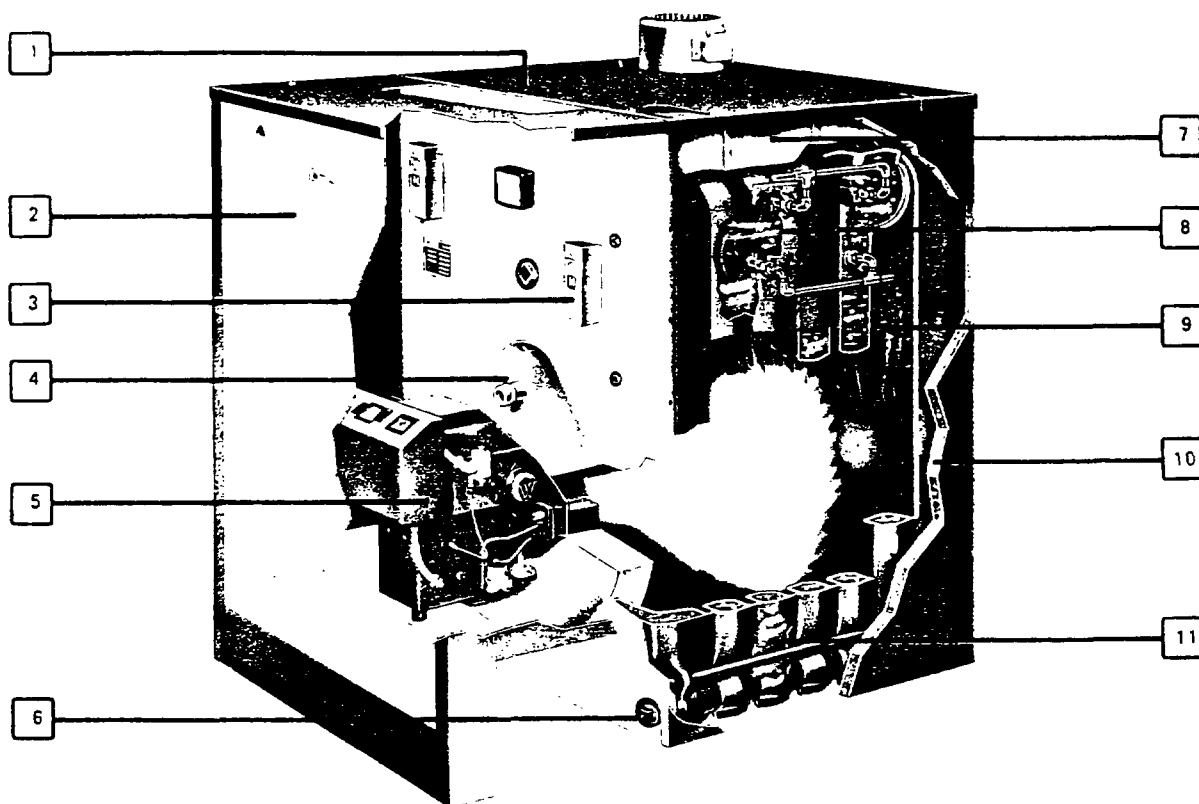
elastic sealant—It is imperative that forced draft boilers be absolutely gas tight. This quality is attained with the PFA-5 by sealing all section joints and canopy connections with elastic compound. (Covered by a pending patent application). The sealant requires less installation time than gasketing methods and provides a superior airtight seal, which will maintain its integrity over the years.

hydraulic assembly tool is an easy-to-use tool which allows the assembler to cut as much as two-thirds off the normal section assembly time! It replaces the installer's arm and wrench with ten tons of hydraulic pressure upon each end of the three full-length draw-up rods. Sections are pressed together tightly and evenly, practically eliminating the chance of cocked nipples—the major cause of installation problems!



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1—jacket—smartly-styled of sturdy steel in sparkling brown and beige color combination.

2—optional acoustically treated jacket extension—matches jacket and has removable front panel for ready access to burner and control.

3—control—mounted on front of boiler for ease of maintenance and adjustment.

4—burner plate—designed for a compressed insulation seal between the burner plate and the front section. A round, shutter-type sight glass is incorporated into the burner plate for flame observation.

5—burners—three models available (light oil, gas/light oil, gas) for mounting on boilers. Burners are laboratory tested for clean, efficient firing in all PFA-5 boiler-burner units.

6—tappings—4" supply (top) and 3" return (bottom) located in both front and back sections.

7—flue canopy—aluminized steel construction with reinforcing channels and welded seams. Access for cleaning canopy is provided through small doors in side of the canopy.

8—water heater—internal tankless type with finned copper tubing. Unique arrangement permits flexibility in meeting domestic hot water requirements ranging from 8 to 64 gpm.

9—boiler sections—are ruggedly constructed of cast iron and feature vertical flue design with large 7-inch top nipple port. Off-center location of nipple port speeds up circulation; projecting studs extract maximum heat from combustion gases. Sections are water tested at 125 psi (2½ times rated capacity of relief valve). Accessible from left side for cleaning. Sections are sealed against combustion leakage with an elastic sealant.

10—insulation—heavy glass fiber insulation prevents wasteful heat loss, keeps jacket cool.

11—wet base construction—provides extra heat-absorbing wet base. Waterways completely surround combustion space.

pressure relief door—(not shown)—located in back section. Provided for relief of excessive pressures in the combustion space. The door also contains a sight port for flame observation.

00386



PFA-5 ratings

boiler number	boiler H.P.	gross I=B=R output (Btuh)	net I=B=R rating			I=B=R burner capacity		gas pressure required (inches water column)	heating surface (ft. ²)	net firebox volume (ft. ³)	pressure in firebox (inches water column)	water content full (lbs.)	I=B=R vent diameter (inches)
			steam (sq. ft.)	steam (Btuh)	water (Btuh)	light oil (gph)	gas (mbh)						
PFA-504	18.5	620,000	1,938	465,100	539,100	5.45	763	5.1	66	8.5	.244	581	10
PFA-505	23.4	786,000	2,457	589,600	683,500	6.90	966	6.3	85	11.1	.244	700	10
PFA-506	28.4	950,000	2,969	712,700	826,100	8.35	1,169	6.0	104	13.7	.245	818	10
PFA-507	33.3	1,116,000	3,488	837,200	970,400	9.80	1,372	6.4	123	16.3	.245	937	10
PFA-508	38.2	1,282,000	4,016	963,900	1,114,800	11.20	1,568	6.6	142	18.9	.246	1056	10
PFA-509	43.2	1,446,000	4,582	1,099,600	1,257,400	12.65	1,771	6.6	161	21.5	.246	1174	14
PFA-510	48.2	1,612,000	5,159	1,238,100	1,401,700	14.00	1,966	5.9	179	24.1	.247	1293	14
PFA-511	53.1	1,776,000	5,728	1,374,600	1,544,300	15.55	2,177	5.7	198	26.8	.247	1412	14
PFA-512	58.1	1,944,000	6,289	1,509,300	1,690,400	16.95	2,373	6.8	217	29.4	.248	1530	14
PFA-513	63.0	2,108,000	6,819	1,636,600	1,833,000	18.40	2,576	6.4	236	32.0	.248	1649	14
PFA-514	67.9	2,272,000	7,350	1,764,000	1,975,700	19.85	2,779	6.3	255	34.6	.249	1768	14
PFA-515	72.9	2,440,000	7,893	1,894,400	2,121,700	21.25	2,975	6.2	274	37.2	.249	1886	14
PFA-516	77.8	2,604,000	8,424	2,021,700	2,264,300	22.70	3,178	6.1	293	39.8	.250	2005	18
PFA-517	82.7	2,768,000	8,954	2,149,100	2,407,000	24.15	3,381	5.6	312	42.4	.250	2123	18
PFA-518	87.7	2,936,000	9,498	2,279,500	2,553,000	25.60	3,584	6.2	330	45.0	.251	2242	18
PFA-519	92.6	3,100,000	10,028	2,406,800	2,695,700	27.00	3,780	6.3	349	47.6	.251	2361	18
PFA-520	97.4	3,260,000	10,546	2,531,100	2,834,800	28.45	3,983	6.9	368	50.2	.252	2479	18
PFA-521	102.5	3,430,000	11,096	2,663,000	2,982,600	29.90	4,186	7.6	387	52.8	.252	2598	18

■ Suffix "S" indicates steam boiler, "W" indicates water boiler.

Suffix "G" indicates gas-fired, "O" indicates oil-fired, "GO" indicates combination gas-oil fired.

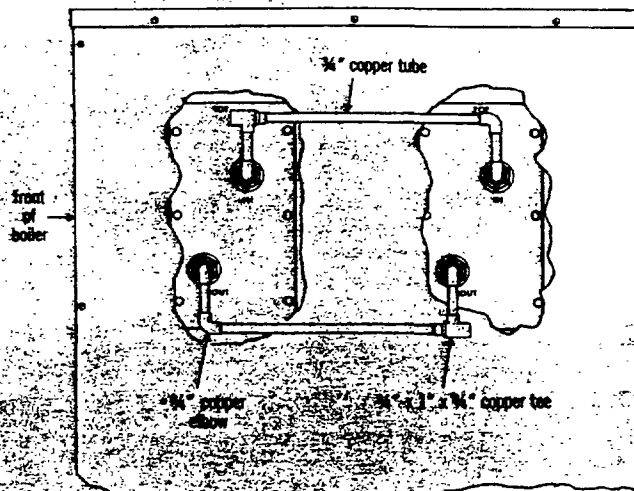
● Minimum gas pressure required at std. gas train inlet for maximum burner input based on 1000 Btu/cu. ft. 0.60 specific gravity gas.

▼ With positive pressure of 0.10 inches water column in boiler flue outlet.

tankless water heater ratings for PFA-5 boilers (steam and water)

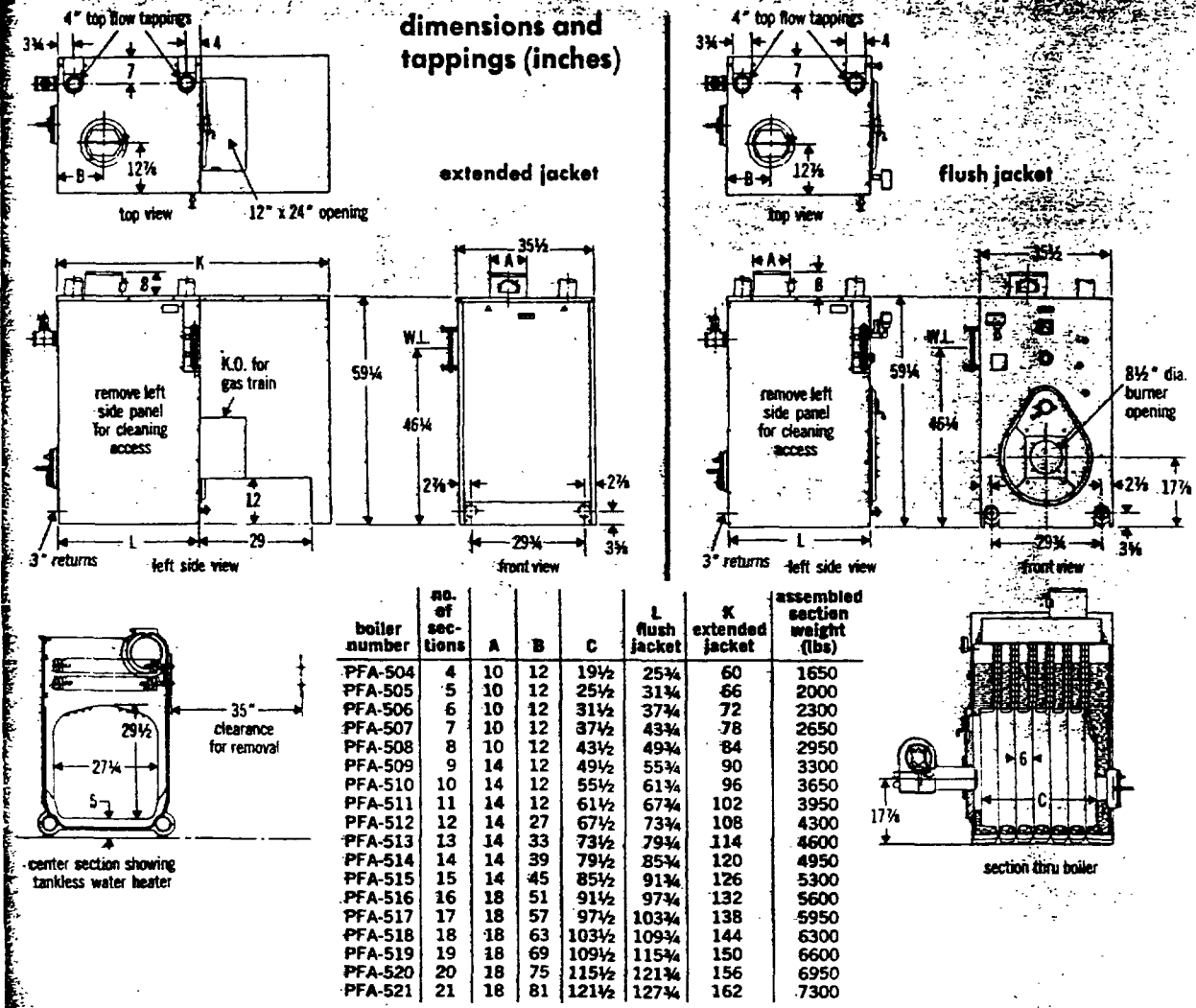
boiler number	number of #548 Heaters Installed							
	1	2	3	4	5	6	7	8
PFA-504	8.0	—	—	—	—	—	—	—
PFA-505	8.0	16.0	—	—	—	—	—	—
PFA-506	8.0	16.0	—	—	—	—	—	—
PFA-507	8.0	16.0	24.0	—	—	—	—	—
PFA-508	8.0	16.0	24.0	—	—	—	—	—
PFA-509	8.0	16.0	24.0	32.0	—	—	—	—
PFA-510	8.0	16.0	24.0	32.0	—	—	—	—
PFA-511	8.0	16.0	24.0	32.0	—	—	—	—
PFA-512	8.0	16.0	24.0	32.0	40.0	—	—	—
PFA-513	8.0	16.0	24.0	32.0	40.0	—	—	—
PFA-514	8.0	16.0	24.0	32.0	40.0	—	—	—
PFA-515	8.0	16.0	24.0	32.0	40.0	48.0	—	—
PFA-516	8.0	16.0	24.0	32.0	40.0	48.0	—	—
PFA-517	8.0	16.0	24.0	32.0	40.0	48.0	—	—
PFA-518	8.0	16.0	24.0	32.0	40.0	48.0	56.0	—
PFA-519	8.0	16.0	24.0	32.0	40.0	48.0	56.0	—
PFA-520	8.0	16.0	24.0	32.0	40.0	48.0	56.0	64.0
PFA-521	8.0	16.0	24.0	32.0	40.0	48.0	56.0	64.0

■ Ratings are given in gallons per minute continuous draw of water heated from 40°F to 140°F with 200°F boiler water.



PFA-5

pressure fired (forced draft)
for light oil, gas/light oil, and gas burners



assemblage of sections

boiler number	arrangement of sections from front to back of boiler																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
PFA-504	FX	CT	C	BX	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PFA-505	FX	CT	C	CT	BX	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PFA-506	FX	CT	C	CT	C	BX	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PFA-507	FX	CT	C	CT	C	CT	BX	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PFA-508	FX	CT	C	CT	C	CT	C	BX	—	—	—	—	—	—	—	—	—	—	—	—	—
PFA-509	FX	CT	C	CT	C	CT	C	CT	BX	—	—	—	—	—	—	—	—	—	—	—	—
PFA-510	FX	CT	C	CT	CX	CT	C	CT	C	BX	—	—	—	—	—	—	—	—	—	—	—
PFA-511	FX	CT	C	CT	C	CT	CX	CT	C	C	BX	—	—	—	—	—	—	—	—	—	—
PFA-512	FX	CT	C	CT	C	CT	CX	CT	C	CT	C	BX	—	—	—	—	—	—	—	—	—
PFA-513	FX	CT	C	CT	C	CT	CX	CT	C	CT	C	C	BX	—	—	—	—	—	—	—	—
PFA-514	FX	C	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	BX	—	—	—	—	—	—	—
PFA-515	FX	C	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	CT	BX	—	—	—	—	—	—
PFA-516	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	C	BX	—	—	—	—	—
PFA-517	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	C	C	BX	—	—	—	—
PFA-518	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	BX	—	—	—
PFA-519	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	C	BX	—	—
PFA-520	FX	C	C	CT	C	CT	CX	CT	C	CT	C	CT	C	CT	C	CT	CX	CT	C	BX	—
PFA-521	FX	C	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	C	BX

Legend:

FX—front section with 4" top tapping
C—center section
CX—center section with 4" top tapping
CT—center section with T.W.H. opening
BX—back section with 4" top tapping

Note:
For boilers less tankless water heaters replace the "CT" sections with "C" sections.

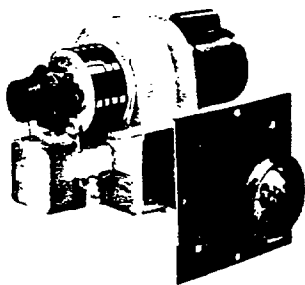
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standard PFA-5 controls

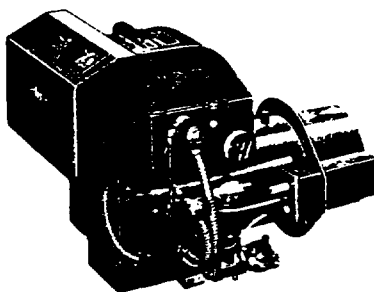
steam boiler
less tankless heater—pressuretrol
with tankless heater—pressuretrol and an
aquastat operating control

water boiler
less tankless heater—aquastat limit control
with tankless heater—aquastat limit control and
aquastat operating control

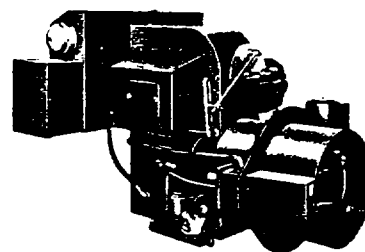
burners



light oil burner



gas/light oil burner



gas burner

burner schedule

boiler number	I=B=R burner capacity		burner number		
	GPH oil	MBH gas	light oil	gas/light oil	gas
PFA-504	5.45	763	95A-1	R6.2-GO-03	R6.2-G-03
PFA-505	6.90	966	96A-1	R6.2-GO-03	R6.2-G-03
PFA-506	8.35	1169	96A-1	R6.2-GO-03	R6.2-G-03
PFA-507	9.80	1372	96A-B	R8-GO-05	R8-G-05
PFA-508	11.20	1568	96A-B	R8-GO-05	R8-G-05
PFA-509	12.65	1771	96A-B	R8-GO-05	R8-G-05
PFA-510	14.00	1960	96A-T-A	R8.1-GO-05	R8.1-G-05
PFA-511	15.55	2177	97A-T-A	R8.2-GO-07	R8.2-G-05
PFA-512	16.95	2373	97A-T-A	R8.3-GO-10	R8.3-G-10
PFA-513	18.90	2576	97A-T-A	R10.9-GO-10	R10.9-G-10
PFA-514	19.85	2779	97A-T-A	R10.9-GO-10	R10.9-G-10
PFA-515	21.25	2975	97A-T-2	R10.9-GO-10	R10.9-G-10
PFA-516	22.70	3178	97A-Hi Lo-2	R10-GO-15	R10-G-15
PFA-517	24.15	3381	97A-Hi Lo-2	R10-GO-15	R10-G-15
PFA-518	25.60	3584	98A-Hi Lo-2	R10.1-GO-20	R10.1-G-15
PFA-519	27.00	3780	98A-Hi Lo-2	R10.1-GO-20	R10.1-G-20
PFA-520	28.45	3983	98A-Hi Lo-2	R10.1-GO-30	R10.1-G-20
PFA-521	29.90	4186	98A-Hi Lo-2	R10.1-GO-30	R10.1-G-20

PFA-5

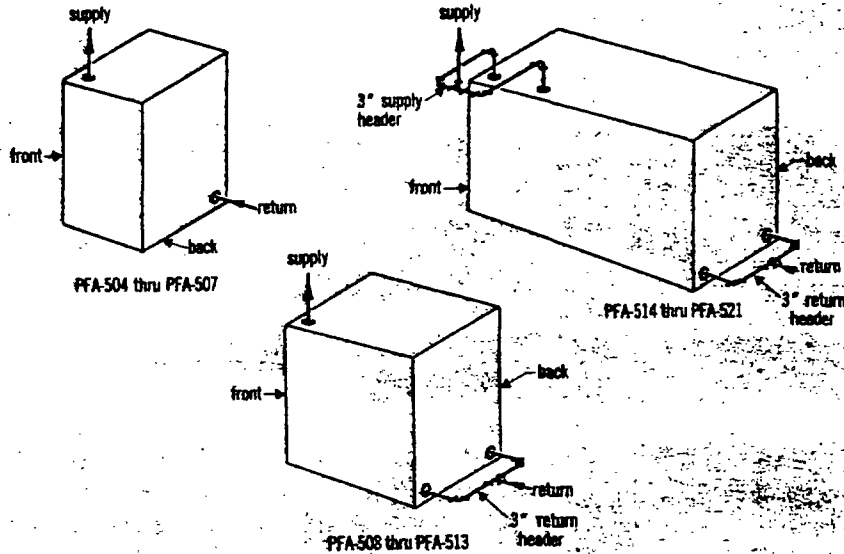
pressure fired (forced draft)
for light oil, gas/light oil, and gas burners

minimum piping recommendations

Note: These schematic drawings are intended solely to show recommended tapping locations and general piping arrangements. Actual piping details should be designed in accordance with standard engineering practice.

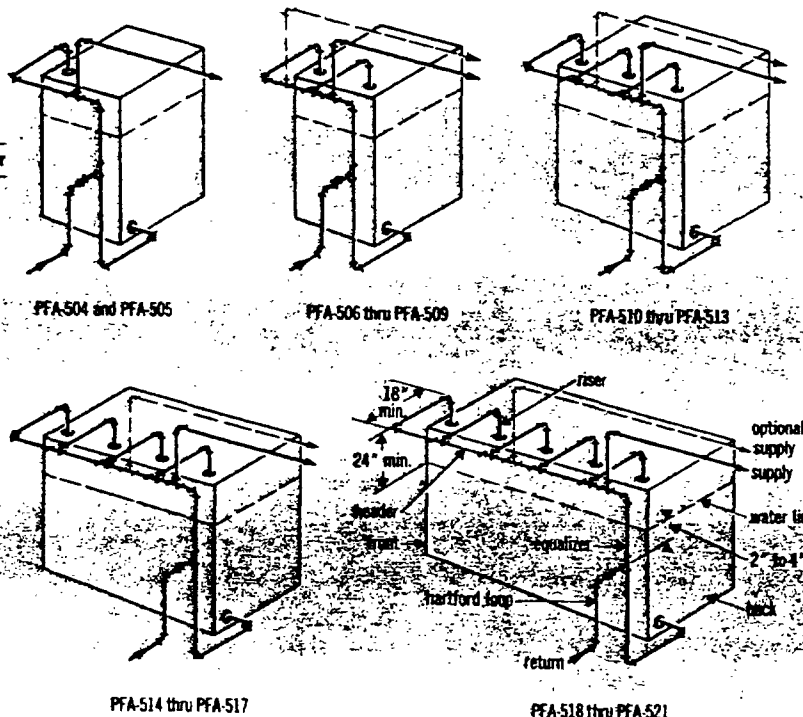
water boiler

boiler number	supply and return (inches)
PFA-504	2½
PFA-505	2½
PFA-506	3
PFA-507	3
PFA-508	4
PFA-509	4
PFA-510	4
PFA-511	4
PFA-512	4
PFA-513	4
PFA-514	5
PFA-515	5
PFA-516	5
PFA-517	5
PFA-518	5
PFA-519	5
PFA-520	5
PFA-521	5



steam boiler

boiler number	pipe size (inches)			
	riser	return	header	equalizer
PFA-504	(1) 4	2	4	2½
PFA-505	(1) 4	2	4	2½
PFA-506	(2) 4	2½	6	2½
PFA-507	(2) 4	2½	6	2½
PFA-508	(2) 4	2½	6	2½
PFA-509	(2) 4	2½	6	2½
PFA-510	(3) 4	2½	8	2½
PFA-511	(3) 4	3	8	4
PFA-512	(3) 4	3	8	4
PFA-513	(3) 4	3	8	4
PFA-514	(4) 4	3	8	4
PFA-515	(4) 4	3	8	4
PFA-516	(4) 4	3	8	4
PFA-517	(4) 4	3	8	4
PFA-518	(5) 4	3	8	4
PFA-519	(5) 4	3	8	4
PFA-520	(5) 4	3	8	4
PFA-521	(5) 4	3	10	4



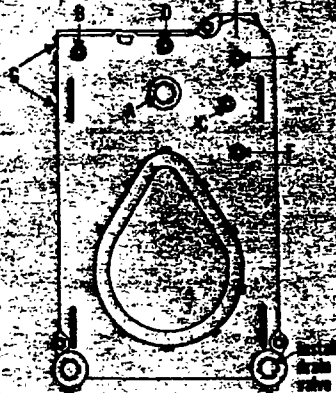
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PFA-5

pressure fired (forced draft)
for light oil, gas/light oil, and gas burners

control tappings

location	size of tappings	steam	water
A	2 1/2"	low water cut-off	not used
B	3/4"	pressure limit control	temperature limit control
C	3/4"	operating cont. tankless heater	operating cont. tankless heater
D	1/2"	pressure gauge	comb. altitude gauge and thermometer
E	3/4"	not used	not used
F	3/4"	not used	reverse acting control
G	1/2"	gauge glass	not used



NOTE—2 1/2" blow off on back of back section safety or relief valve piped in connection with blow off.

APPROVAL: American Standard flame retention gas, gas/oil and oil burners 1115 and 230 volt/60 cycle are listed with Underwriters Laboratories, Inc. for all gases and No. 1 and No. 2 grades of fuel oil, whether obtained by distillation or catalytic cracking process. They are approved by the New York City Board of Standards and Appeals, the State Fire Marshal of the Commonwealth of Massachusetts, and the Department of State Police, State of Connecticut.

sample specifications for PFA-5

Contractor shall furnish and install, as indicated on plans (light oil, gas/light oil or gas)-fired, forced draft boilers having an input of _____ (GPH OR BTUH) and an _____ BTUH. Boiler(s) shall be constructed of cast iron in accordance with A.S.M.E. requirements for low pressure heating boilers and bear the A.S.M.E. symbol. Each section shall be factory tested at 2 1/2 times maximum working pressure of _____ (PSI) for water. Boiler(s) shall have _____ ratings. Boiler sections shall be constructed so that the water line for steam boilers shall be above the bottom of _____ 150 lbs. working pressure standard, 80 lbs. available on special order.

top nipple ports to insure proper water circulation between sections. Boiler flue passages shall be vertical with pinched surfaces. To insure gas tight integrity, all boiler sections shall be sealed with elastic sealant compound. Boiler shall be constructed so as not to require a combustion chamber. Boiler shall be equipped with tankless heater(s) having a rating of _____ GPM. Burners shall include controls as herein described. (Note: include description of controls as required and other burner features as desired.)



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