



Serial Number: \_\_\_\_\_  
Model Number: \_\_\_\_\_  
Fulton Order Number: \_\_\_\_\_  
Sold To: \_\_\_\_\_  
Job Name: \_\_\_\_\_  
Date: \_\_\_\_\_

## **Instruction, Operation, and Maintenance Manual**

### **Fulton Oil Fired Steam Boilers**

4 HP to 60 HP





# Product Bulletin

**Date:** January 22, 2010

**Subject:** Water Chemistry Requirements for Fulton Steam Products

**Products:** ICS/ICX, FB-A, FB-F, FB-S, VMP, PVLP, PHP, Electric Steam Boilers and Unfired Steam Generators

Please note that the water chemistry is different for carbon steel vs. stainless steel pressure vessels and vertical vs. horizontal orientation.

Effective immediately, please use the limits below. Should you have any questions, please do not hesitate to contact Fulton at 315-298-5121.

## Water Chemistry Requirements for Fulton Steam Products (to 300 psig MAWP)

Parameter	Carbon Steel			Stainless Steel		
	Feedwater	Vertical Boiler/Steam Pac Water	Horizontal Boiler/Steam Pac Water	Feedwater	Vertical Boiler/Steam Pac Water	Horizontal Boiler/Steam Pac Water
<i>pH</i>	7.5-9.5	8.5-10.5	8.5-10.5	6.0-9.5	8.5-10.5	8.5-10.5
<i>Feedwater Temperature</i>	140F*	---	---	140F*	---	---
<i>Hardness as CaCO<sub>3</sub></i>	<2ppm	<10 ppm	<15 ppm	<2 ppm	<10 ppm	<15 ppm
<i>Chlorides</i>	---	---	---	---	50 ppm	50 ppm
<i>Total Alkalinity</i>	---	<300 ppm	<500 ppm	---	<300 ppm	<500 ppm
<i>Total Dissolved Solids</i>	---	<2000 ppm	<3000 ppm	---	<2000 ppm	<3000 ppm
<i>Suspended Solids</i>	No visual turbidity**	No visual turbidity**	No visual turbidity**	No visual turbidity**	No visual turbidity**	No visual turbidity**
<i>Total Organic Carbon</i>	No sheen No foam+	No sheen No foam+	No sheen No foam+	No sheen No foam+	No sheen No foam+	No sheen No foam+
<i>Iron</i>	Colorless liquid++	Colorless liquid++	Colorless liquid++	Colorless liquid++	Colorless liquid++	Colorless liquid++
<i>Dissolved Oxygen</i>	<1ppm*	ND	ND	<5ppm	ND	ND
<i>Visual Oil</i>	ND	ND	ND	ND	ND	ND
<i>Conducivity (uS/cm)</i>	---	<2985	<4477	---	<2985	<4477

### NOTES:

\*This is a minimum temperature. Feedwater temperatures below 200F will require an oxygen scavenger.

\*\* Suspended solids: Take a water sample. After the sample sits for 10 minutes, no solids should be visible.

+ Total Organic Carbon: Take a water sample. Shake vigorously for 30 seconds. No sheen or foam should be visible.

++ Iron: Take a water sample. Hold the sample against a white background. The water should have no visible yellow, red or orange tinge.

ND: None Detected.



# Introduction

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This manual is provided as a guide to the correct operation and maintenance of your Fulton Oil Fired Steam Boiler, and should be permanently available to the staff responsible for the operation of the boiler.

These instructions must not be considered as a complete code of practice, nor should they replace existing codes or standards which may be applicable.

The requirements and instructions contained in this section generally relate to the standard Fulton Oil Fired Steam Boiler. When installing a packaged unit, this entire section should be read to ensure that the installation work is carried out correctly.

Prior to shipment the following tests are made to assure the customer

the highest standards of manufacturing:

- a) Material inspections.
- b) Manufacturing process inspections.
- c) ASME welding inspections.
- d) ASME hydrostatic test inspection.
- e) Electrical components inspection.
- f) Operating test.
- g) Final Engineering Inspection
- h) Crating inspection.

## NOTE

**The installation of the Fulton oil fired Steam Boiler should be carried out by competent personnel in accordance with the standards of the National Fire Protection Association, National or Canadian Electrical Code. All**

**state and jurisdictional codes beyond the scope of the applicable ASME boiler and pressure vessel codes, for its corresponding classification, should be followed in all cases. Jurisdictional authorities must be consulted prior to installation.**

All units are crated for fork lift transport. Once uncrated, all units can be transported with a forklift. Under no circumstances should weight be allowed to bear on the jacket, control panel, or fan housing of any Fulton Boiler.

The customer should examine the boiler for any damage, especially the refractories.

Rigging your boiler into position should be handled by a competent rigger experienced in handling heavy equipment.



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# 1

# Safety Warnings/Precautions

## Safety Warnings, Cautions & Notes

The following **WARNINGS**, **CAUTIONS**, and **NOTES** appear in various chapters of this manual. They are repeated on these safety summary pages as an example and for emphasis.

**WARNINGS** must be observed to prevent serious injury, or death to personnel.

**CAUTIONS** must be observed to prevent damage or destruction of equipment or loss of operating effectiveness.

**NOTES** must be observed for essential and effective operating procedures, conditions, and as a statement to be highlighted.

It is the responsibility and duty of all personnel involved in the operation and maintenance of this equipment to fully understand the **WARNINGS**, **CAUTIONS**, and **NOTES** by which hazards are to be reduced or eliminated. Personnel must become thoroughly familiar with all aspects of safety and equipment prior to operation or maintenance of the equipment.

### NOTE

Where a condensate return tank is to be fitted, this should:

1. Be vented and
2. Have a capacity sufficient to satisfy boiler consumption as well as maintain proper return tank temperature.
3. Vent pipe should not be downsized (This may cause pressure build up in the condensate tank.)
4. Return pipes must not be insulated. This can cause overheating the return system, causing a vapor lock in the pump.
5. See Return System Instruction Manual for detailed instructions.

### NOTE

Care should be taken to ensure that the blow off receptacle used meets the regulations covering such vessels. If in doubt consult a Fulton Representative for advice.

### WARNING

Blow down and return system vents and drains must be piped in accordance with local codes. Failure to do so could result in severe personal injury.

### NOTE

Only properly trained personnel should install and maintain water gauge glass and connections. Wear safety glasses during installation. Before installing, make sure all parts are free of chips and debris.

### NOTE

Keep gauge glass in original packaging until ready to install.

### WARNING

Improper installation or maintenance of gauge glass and connections can cause immediate or delayed breakage resulting in bodily injury and/or property damage.

### NOTE

After installation is complete and prior to operation the pressure vessel should be cleaned.

### CAUTION

Do not store halogenated hydrocarbons near or in the boiler room.

### NOTE

a) The fused disconnect switch that controls the feed water pump should be kept in the "on" position at all times during the boiler operation as well as during the non-operating period of the boiler.

b) This switch should be turned "off" only when repairs or adjustments should be made.

### NOTE

The pump will continue to operate until the water reaches the correct level in the boiler. This level is approximately the center of the water gauge glass.

### CAUTION

Do not tamper with the safety features of the low water safety cut out.

### WARNING

Before switching on the boiler:

- a) Check that all electrical connections in the boiler control panel are tight.
- b) Ensure that all sections of this manual have been read and understood.

### CAUTION

Do not store halogenated hydrocarbons (perchloroethylene) muck near or in boiler room.

### NOTE

Check the installation's utilities, including the following:

- a) Wiring and voltage required.
- b) Make-up air supply.
- c) Fuel piping and supply.

### NOTE

The pump will continue to operate until the water reaches the correct level in the boiler. This level is approximately the center of the water gauge.

### CAUTION

Do not tamper with the safety features of the low water safety cut out.

### WARNING

When stopping the boiler for any extensive repairs, shut off main disconnect switches on both the boiler side as well as the feed water side.

### NOTE

To ensure that your Fulton Steam Boiler is kept operating safely and efficiently, follow the maintenance procedures set forth in Section 4 of this manual.

### NOTES:

1. The scanner is located on the outside edge of the burner top plate for 20-60 HP.
2. For New York City installations only: a non-adjustable oil pressure regulator and gauge are supplied upstream from the oil valves.

### NOTE

If only the top refractory is to be changed, the bottom refractory need not be broken.

### NOTE

If the boiler is being operated automatically on a time clock, the blow off operation may be done once during the working day and once at the end of the day when at 10 PSIG or less.

### NOTE

Fulton recommends that the feedwater treatment should be added between the pump and the boiler.

### WARNING

Make sure main power switch is off before starting work.

### CAUTION

Do not clean the gauge or glass while pressurized or in operation.

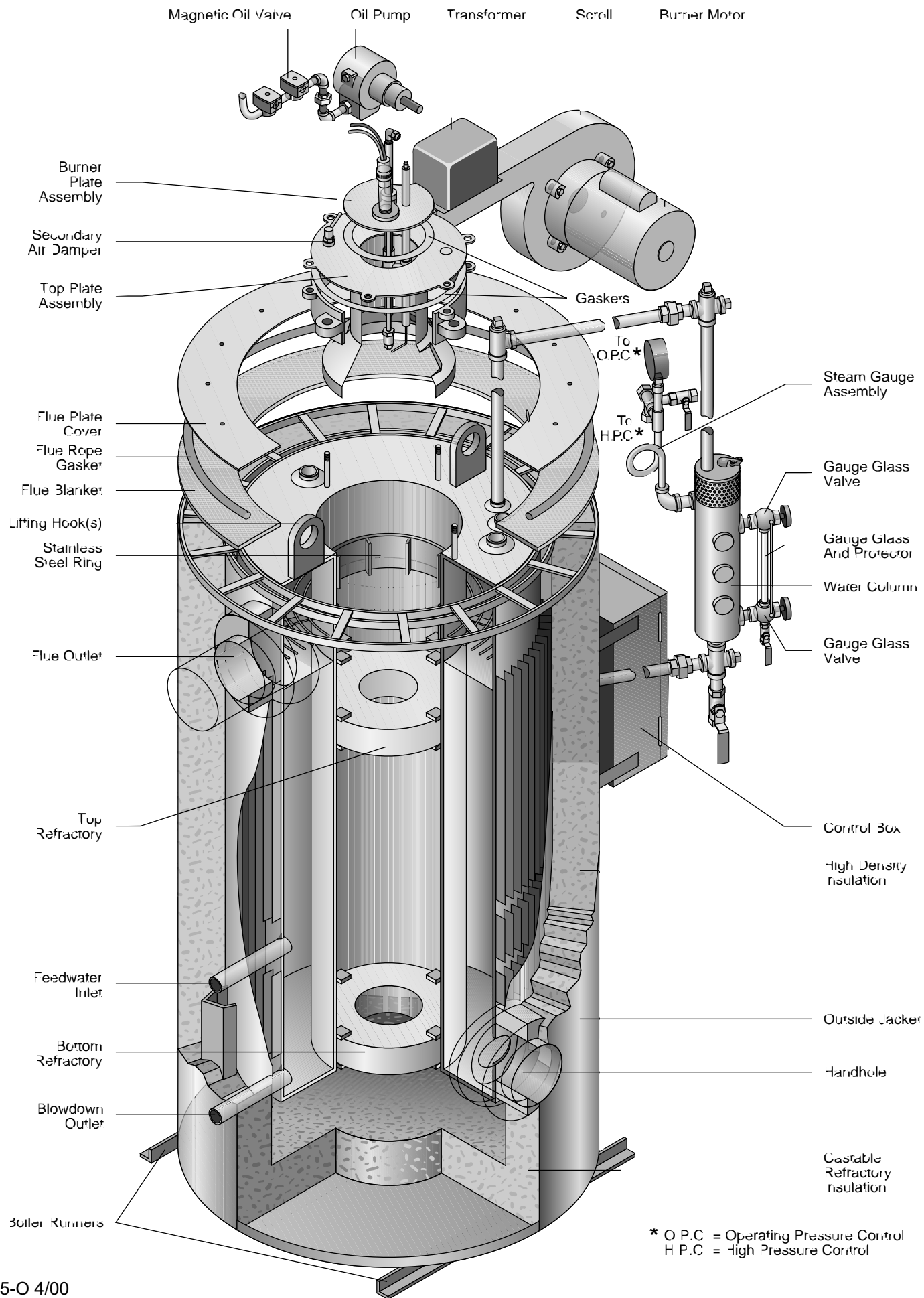
### NOTE

After a new Fulton Boiler has been in operation for several months, pieces of burned metal will be found in the space at the bottom of the boiler. These pieces of metal are the remains of a light gauge metal form which was used during manufacture for forming the boiler insulation. This is a normal condition and does not affect the efficiency or the life of the boiler in any way.

# 2



# Description/Instructions





## Product Data Submittal

Fulton Models: ICS/FB-A and ICX/FB-F

## Fulton Gas & Oil Fired Vertical Tubeless Steam Boilers

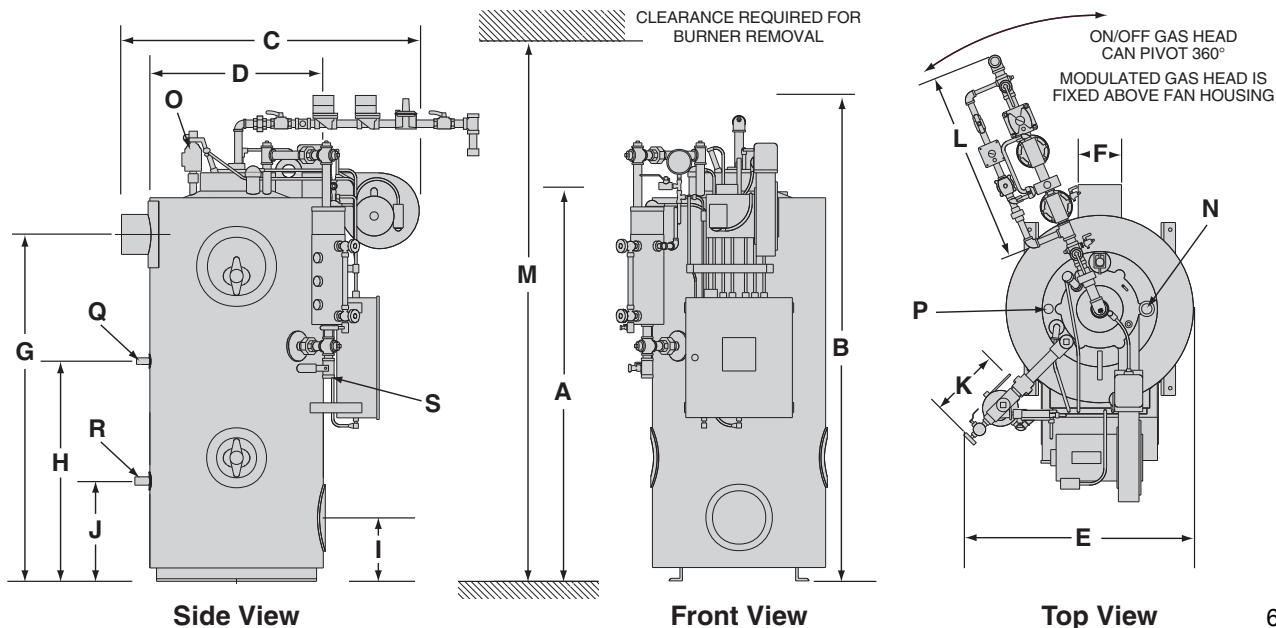
(Standard Burner)

### Dimensions

Standard Models ICS/FB-A Models ICX/FB-F		4	6	9.5	10	15	20	25	30	50	60
Unit Size:	BHP	4	6	9.5	10	15	20	25	30	50	60
A. Boiler Height	IN	47.5	57.5	67.5	63.5	69.5	72.5	75	82.5	87.5	93.5
	MM	1207	1461	1715	1613	1765	1842	1905	2069	2223	2375
B. Boiler Height With Trim* & Fuel Train Assembly	IN	65	75	85	80.5	86.5	92.5	95	102	106.5	120
	MM	1651	1905	2159	2045	2197	2350	2413	2591	2705	3048
C. Overall Depth Stack to Burner Fan Housing	IN	44	44	44	46	47	58	59	67	78	78
	MM	1118	1118	1118	1168	1194	1474	1499	1702	1981	1981
D. Boiler Diameter	IN	26	26	26	28	30	39	39	46	55	55
	MM	660	660	660	710	760	990	990	1170	1400	1400
E. Overall Width with Water Column	IN	33	33	33	33.5	35.5	43	43	49	57	57
	MM	838	838	838	851	902	1091	1091	1244	1448	1448
F. Flue Outlet Diameter	IN	6	6	6	6	8	10	10	12	12	12
	MM	152	152	152	152	203	254	245	305	305	305
G. To Center of Flue Outlet	IN	42	52	62	58	63	66	68	73.5	79	85
	MM	1070	1320	1575	1473	1600	1675	1728	1867	2007	2159
H. Feedwater Inlet	IN	27	33	33.5	33	33.5	34	34	34	35	35
	MM	685	840	851	840	851	865	865	865	890	890
I. Handholes	IN	19	19	19	19	19	19	19	19	20	20
	MM	485	485	485	485	485	485	485	485	510	510
J. Blowdown Outlet	IN	15	15	15.5	15.5	15.5	16.5	16.5	16.5	17.5	17.5
	MM	380	380	394	394	394	420	420	420	445	445
K. Water Column Extension	IN	14	14	14	14	14	14	14	14	14	14
	MM	355	355	355	355	355	355	355	355	355	355
L. Gas Train Extension (CSD-1)	IN	22.5	22.5	25	21.5	20.5	25	25	27	22.5	34
	MM	572	572	635	546	521	635	635	686	572	867
M. Clearance Required for Burner Removal*	IN	72	82	92	86	92	96	98	106	114	124
	MM	1828	2083	2337	2184	2337	2438	2490	2692	2896	3150
<b>Weights</b>											
Approx. Shipping Weight	LB	1400	1700	1900	2000	2280	3400	3500	4780	6526	7280
	KG	635	773	862	910	1036	1545	1591	2173	2966	330
Approx. Operating Weight	LB	1516	1833	2200	2200	2605	4042	4184	6197	8569	9531
	KG	688	831	998	998	1182	1833	1898	2811	3887	4323

\*This dimension is 6" less for oil fired units 4-50 HP and 12" less for oil fired units 60 HP.

**NOTE:** Recommended minimum clearance is 24" to the side and back of unit; 36" in front



# Specifications

Models ICS/ICX/FB		4	6	9.5	10	15	20	25	30	50	60
<b>Boiler Connections</b>											
N. Steam Outlet 15 PSI		1" 25	1" NPT	N/A	1.5" NPT	2" NPT	3" CL150# Flange	3" CL150# Flange	3" CL150# Flange	4" CL150# Flange	4" CL150#
N. Steam Outlet 150 PSI		0.75" 19	0.75" NPT	1" NPT	1" NPT	1.25" NPT	1.5" NPT	2" NPT	2" NPT Flange	3" CL150# Flange	3" CL150#
O. Safety Valve Outlet 15 PSI	IN MM	0.75 19	0.75 19	N/A	0.75 19	1 32	1.5 38	1.5 38	1.5 38	2 38	2 38
O. Safety Valve Outlet 150 PSI+ (9.5 HP 100 PSI)	IN MM	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1.25 32	1.25 32
P. Safety Valve Inlet 15 PSI++	IN MM	0.75 19	0.75 19	N/A	0.75 19	1 25	1.25 32	1.25 32	1.25 32	1.5 32	2 32
P. Safety Valve Inlet 150 PSI (9.5 HP 100 PSI)	IN MM	0.75 19	0.75 19	0.75 19	0.75 19	0.75 19	0.75 19	0.75 19	0.75 19	1 25	1 25
Q. Feedwater Inlet	IN MM	0.75 19	0.75 19	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1 25
R. Blowdown Outlet	IN MM	1 25	1 25	1 25	1 25	1 25	1.25 32	1.25 32	1.25 32	1.5 38	1.5 38
S. Water Column Blowdown	IN MM	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1 25
Ratings* (Sea level to 3000 ft.)											
Output	1000 BTU/HR	134.40	201	318	335	503	670	838	1005	1674	2009
	1000 KCAL/HR	33.8	50.7	80.1	84.4	127	169	211	253	422	506
Steam Output	LB/HR	138	207	328	345	518	690	863	1035	1725	2070
	KG/HR	63	94	149	157	235	313	392	470	785	942
Approximate Fuel Consumption at Rated Capacity+++											
Light Oil	GPH	1.2	1.8	2.8	3.0	4.5	6.0	7.5	9.0	15.0	17.9
	LPH	4.5	6.8	10.6	11.4	17	22.7	28.4	34.1	56.8	67.8
Propane Gas (ICS)	FT3/HR	67.2	100	159	168	251	335	419	502	837	1004
(14" w.c. req'd)	M3/HR	1.9	2.8	4.5	4.8	7.1	9.5	11.9	14.2	23.7	28.4
Propane Gas (ICX)	FT3/HR	63	97		161	242	323	404	484		
(14" w.c. req'd)	M3/HR	2.2	2.7	N/A	4.6	6.9	9.1	11.4	13.7		
Natural Gas (ICS)	FT3/HR	168	257	398	419	628	837	1047	1256	2093	2511
(7" - 11" w.c. req'd)	M3/HR	4.8	7.1	11.3	11.9	17.8	23.7	29.7	35.4	59.3	71.1
Natural Gas (ICX)	FT3/HR	159	242	384	403	606	807	1009	1210		
(7" - 11" w.c. req'd)	M3/HR	5.6	6.9	10.8	11.4	17.2	22.9	28.6	34.3		
Natural Gas Boiler	IN	1	1	1	1	1	1.25	1.25	1.5	1.5	2
Connection Size (Std CSD-1)	MM	25	25	25	25	25	32	32	38	38	51
Oil Inlet Size	IN	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	MM	6	6	6	6	6	6	6	6	6	6
Burner	3450 RPM/60 CY						1/3 gas	1/3 gas		1.5 gas	1.5 gas
Motor HP	2850 RPM/50 CY	1/3	1/3	1/3	1/3	1/3	3/4 oil	3/4 oil	3/4	2 oil	2 oil
Electric Power Requirements - Burner Only (in Amps) ***											
120V, 60 CY, 1 Phase		5.2	5.2	5.2	5.2	5.2 9.2 oil	5.2 gas 9.2 oil	5.2 gas	9.2	--	--
240V, 50/60 CY, 1 Phase		2.6	2.6	2.6	2.6	2.6 4.6 oil	2.6 gas 4.6 oil	2.6 gas	4.6 9.5 oil	8.9 gas 9.5 oil	8.9 gas
208V, 50/60 CY, 3 Phase		1.9	1.9	1.9	1.9	1.9 3.1 oil	1.9 gas 3.1 oil	1.9 gas	3.1 5.7 oil	4.4 gas 5.7 oil	4.4 gas
240V, 50/60 CY, 3 Phase		1.6	1.6	1.6	1.6	1.6 2.8 oil	1.6 gas 2.8 oil	1.6 gas	2.8 5.4 oil	4.2 gas 5.4 oil	4.2 gas
480V, 50/60 CY, 3 Phase		0.8	0.8	0.8	0.8 1	0.8 .4 oil	0.8 gas 1.4 oil	0.8 gas	1.4 2.7 oil	2.1 gas 2.7 oil	2.1 gas
Water Content											
	U.S. GAL	14	16	16	24	39	77	82	170	245	270
	LITERS	53	61	61	91	148	292	310	644	927	1022

Specifications and Dimensions are approximate. We reserve the right to change specifications and/or dimensions. \* High pressure boilers purchased with low pressure openings may have larger than specified opening sizes, consult factory for correct opening sizes. \*\* 50 and 60 HP have two safety valves on low pressure.

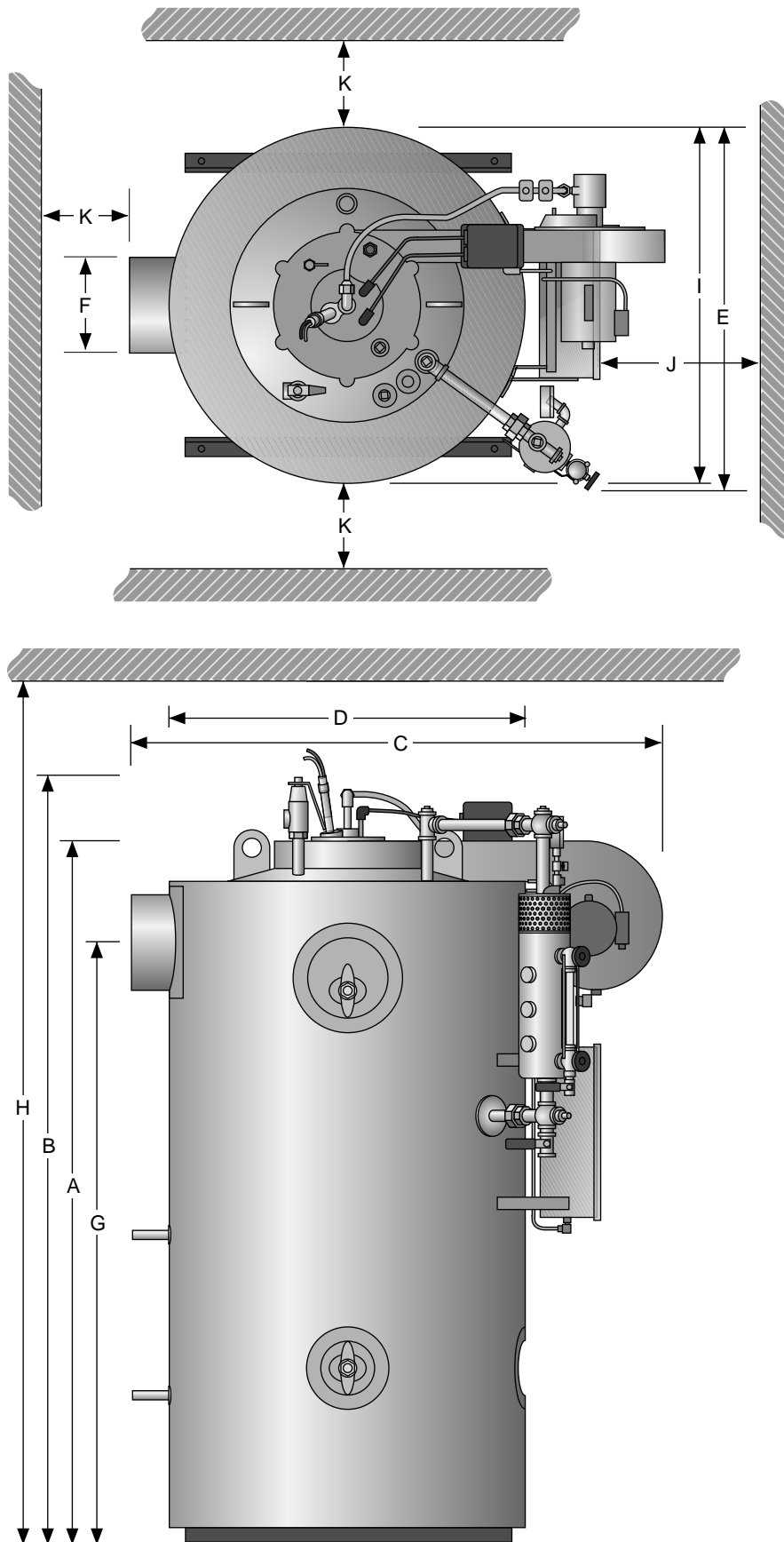
+++Consumption based on light Oil 140,000 BTU/G; Natural Gas 1000 BTU/ft.<sup>3</sup>; Propane 2500 BTU/ft.<sup>3</sup>. \*All ratings from 0 PSIG and at 212 degrees F. \*\*\* Control circuit electrical requirement will vary with the system voltage, please consult factory. --Consult factory.



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ffsstd-pds-2011-1222

## Description/Instructions



PLEASE SEE DATA SHEETS ON PREVIOUS PAGES

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# Description/Instructions

## Basic Boiler, Condensate Tank, and Blow off Separator

### Note

Where a condensate return tank is to be fitted, this should:

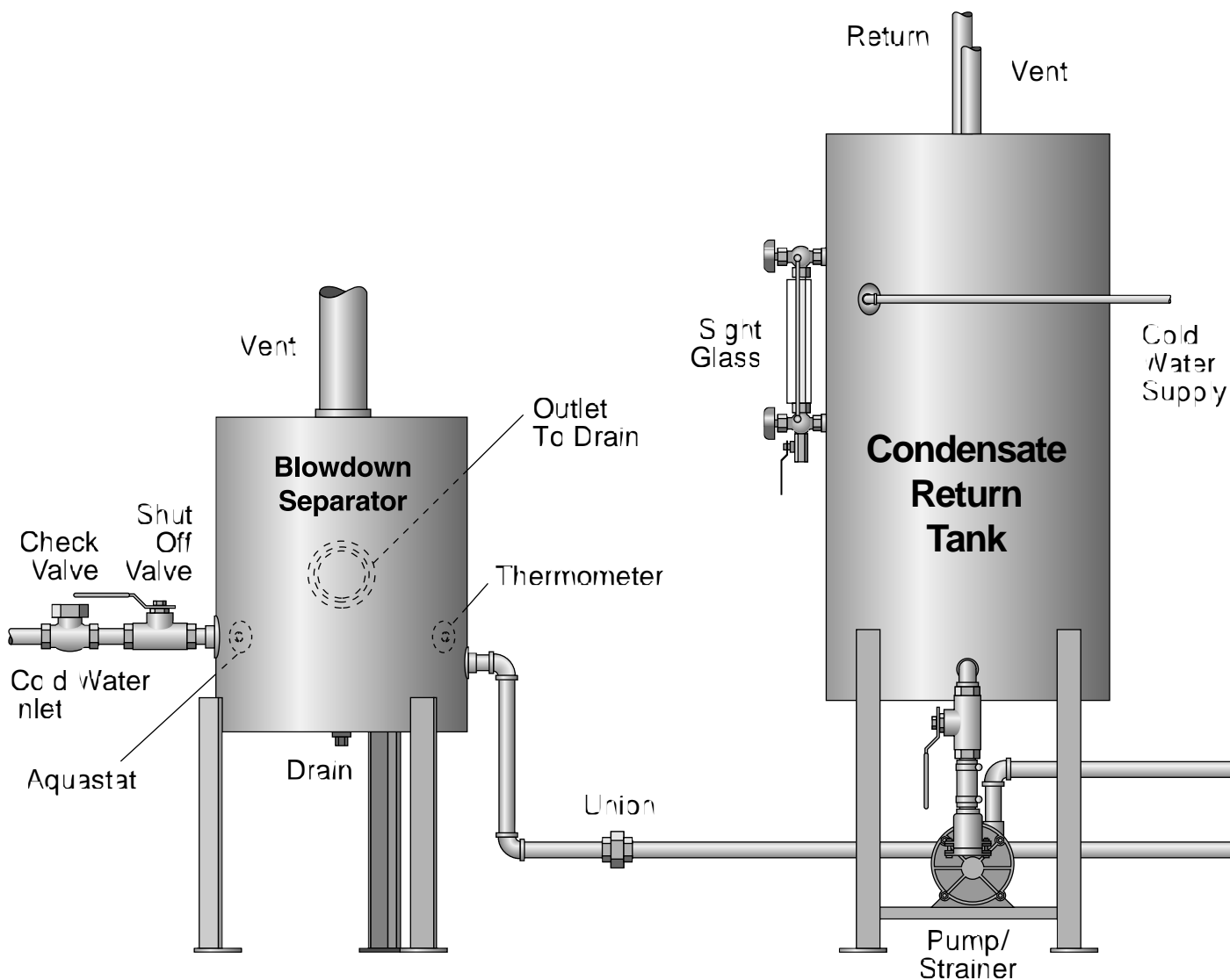
- 1) Be vented and
- 2) Have a capacity sufficient to satisfy boiler consumption as well as maintain proper return tank temperature.
- 3) Vent pipe should not be down-sized (This may cause pressure build up in the condensate tank.)

4) Return pipes must not be insulated. This can cause overheating the return system, causing a vapor lock in the pump.

5) See Return System Instruction Manual for detailed instructions.

### Note

Care should be taken to ensure that the blow off receptacle used meets the regulations covering such vessels. If in doubt consult a Fulton Representative for advice.



# Description/Instructions

## Warning

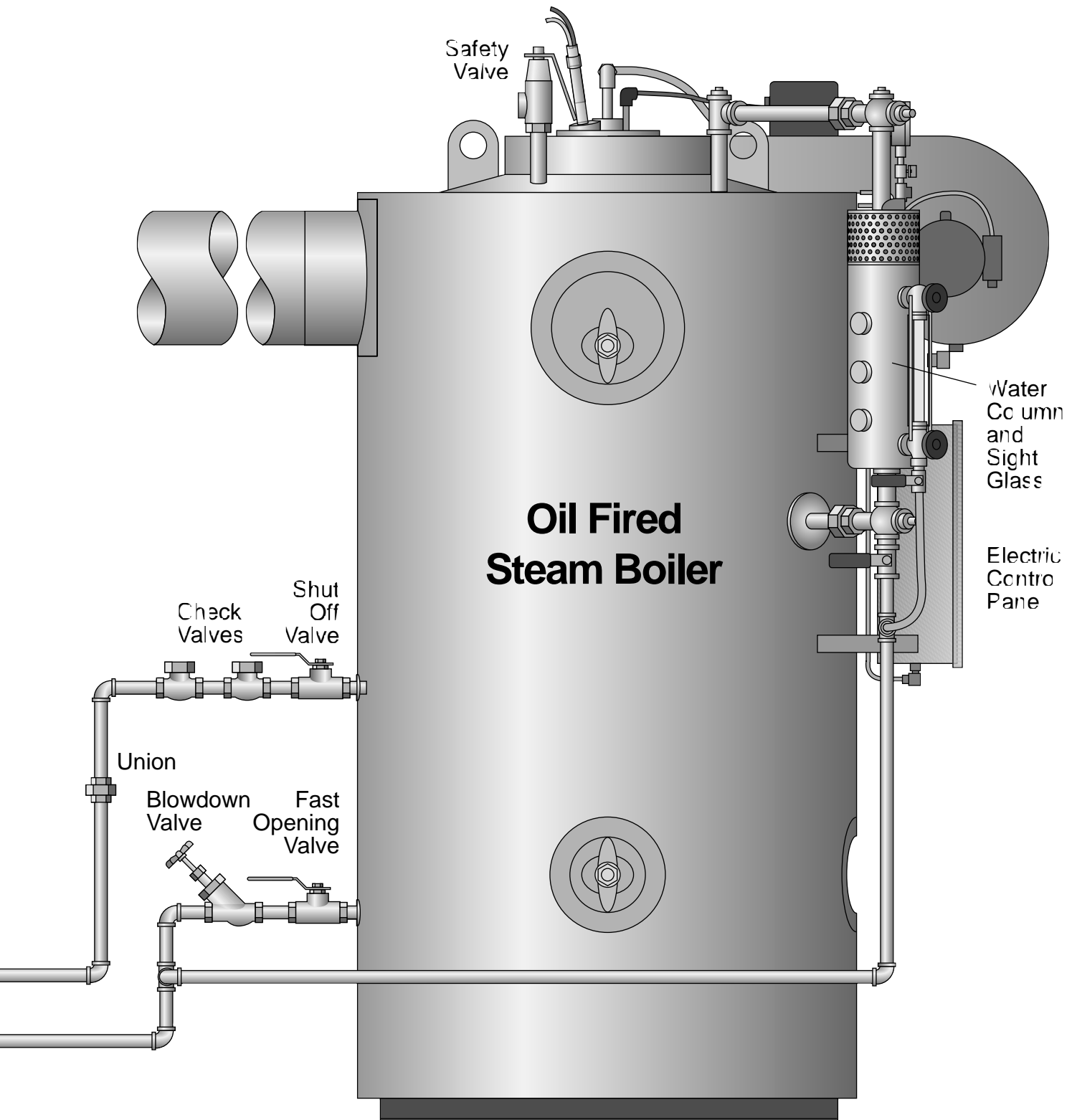
**Blow down and return system vents and drains must be piped in accordance with local codes. Failure to do so could result in severe personal injury.**

a) Make sure two check valves are installed between the boiler and pump (one check valve is supplied with the unit).

b) In a closed system an end of the line trap should be installed.

c) There are two blow off valves on the boiler; the main valve at the rear of the boiler and the water gauge glass blow off valve. The boiler blow off valve supplied with the boiler should be screwed to the blow off pipe at the rear of the boiler and

connected to a blow off receptacle of approved design piping. All these procedures should be done in accordance with state and/or local codes. The water gauge blow off valve should be connected to the main blow off line.



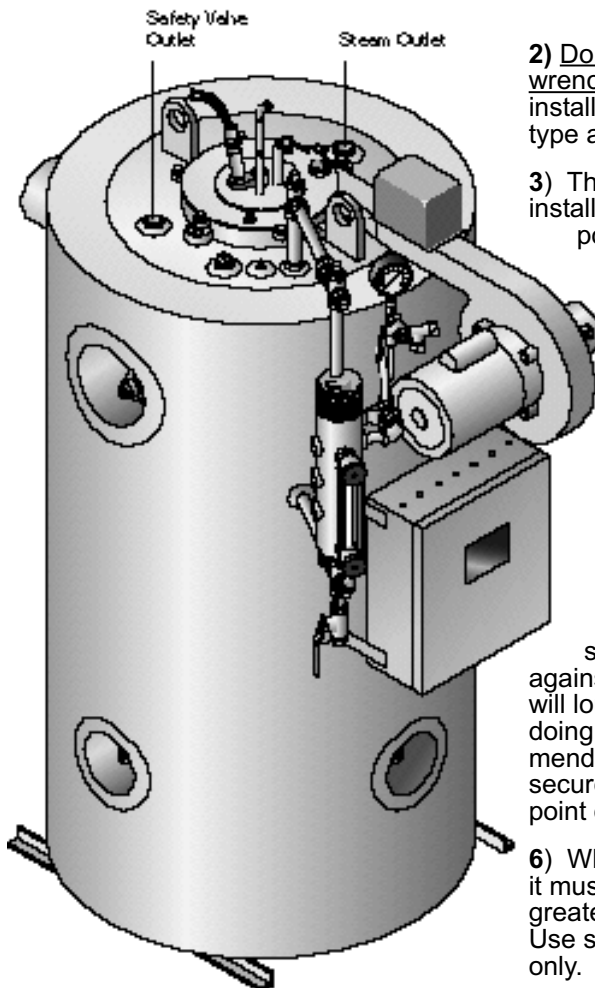
# Description/Instructions

## Boiler Installation

**The Steam Supply** — Pipe the steam supply line from the top right side of the boiler.

### The Steam Safety Valve

1) Before installing, be sure that all pipes and connections have been blown clean. Pipe compound or dope is used on external threads only. Be sure inlet of valve is free of any foreign material.



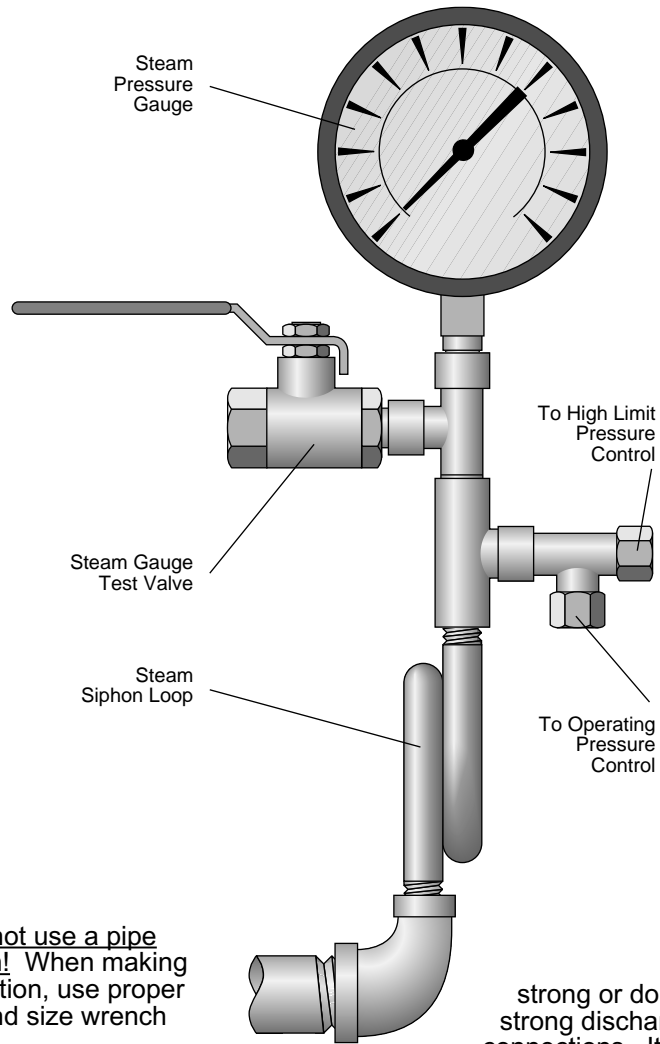
2) Do not use a pipe wrench! When making installation, use proper type and size wrench

3) The valve should be installed in a vertical upright position in the connection provided on the top left side of the boiler with no unnecessary intervening pipe. Under no circumstances should there be a shut off valve or restriction of any kind between the safety valve and the connection provided.

4) Do not cap or plug drain hole in the side of valve body.

5) Since the purpose of this safety valve is to protect against an overpressure situation, it will loudly discharge hot steam in doing so. Therefore, it is recommended that a discharge pipe be securely installed and run to a safe point of disposal.

6) When a discharge pipe is used, it must be of a pipe size equal to or greater than that of the valve outlet. Use schedule 40 discharge pipe only. Do not use schedule 80, extra



strong or double extra strong discharge pipe or connections. It must be as short and straight as possible and so arranged as to avoid undue stress on the valve. It must have an ample provision for draining condensate at or near the valve outlet. It must terminate freely to atmosphere with no intervening valve of any description and it must be securely anchored and supported.

### The Steam Pressure Gauge

**Assembly** — The gauge should be facing front towards the panel box and/or operator of the boiler. Except as noted, each assembly or any of its component parts may be oriented, other than as shown to provide improved operating clearances and/or view of gauge. Before installing steam gauge on the siphon, add a small amount of water to the siphon to create a water seal to buffer the gauge element. This must be done to prevent inaccurate pressure readings and/or premature failure of the gauge. Install the steam gauge into the siphon on the water column.

# Description/Instructions

**The Blow-Off Valve**— There are two blow off valves on the boiler; the main valve at the rear of the boiler and the water gauge glass blow off valve. The boiler blow off valve supplied with the boiler should be screwed to the blow off pipe at the rear of the boiler and connected to a blow off receptacle of approved design. This should be done in accordance with state and local codes.



## The Feed Water Piping--

1) Provisions must be made for adequate water supply and properly sized piping. Piping must be done in compliance with all local codes. The following chart may be used as a guideline for sizing.

BHP	Minimum Water Supply Piping Size	
	Inches	Millimeters
4	1/2	12.5
6	1/2	12.5
9.5	1/2	12.5
10	1/2	12.5
15	3/4	19
20	3/4	19
30	1	25
40	1	25
50	1	25
60	1	25

2) When feeding the boiler using a return system the city water pressure should not exceed 40 PSI. A pressure reducing valve should be installed ahead of the return tank above this pressure.

3) It is important that all piping be lined up and not forced into place. It is recommended that you begin piping at the pump. If the lines are ended at the pump, particularly if the last piece is cut too short or long, the pump will be forced to meet the pipe and strain or distortion will result.

4) Do not use the pump as a piping support. It is critical that the pipe be independently supported near the pump so no strain will be transmitted to the unit.

5) Connect the feed water stop valve to the feed water pipe at the rear of the boiler and pipe it to the return system.

## The Water Column

Install the piping from the water column and water gauge glass to a safe blow-off point.



# Description/Instructions

## Water Gauge & Gauge Glass Installation instructions

### Note

Only properly trained personnel should install and maintain water gauge glass and connections. Wear safety glasses during installation. Before installing, make sure all parts are free of chips and debris.

### Note

Keep gauge glass in original packaging until ready to install.

- 1) Verify the proper gauge has been supplied.
- 2) Examine the gauge glass and packings carefully for damage before installation. Do not use the glass if it contains any scratches, chips, or any other visible signs of damage.
- 3) Do not subject the gauge glass to bending or torsional stresses.
4. Apply Teflon tape or pipe dope to pipe threads. Install top gauge fitting (fitting without a drain valve) into the uppermost tapping. Wrench tighten the fitting until it is snug and the glass outlet is pointing at five o'clock (about 1/8 turn from its final downward vertical position).
- 5) Install the bottom gauge fitting (the fitting with a drain valve) until it is snug and the glass outlet is pointing directly upward. Verify top and bottom fittings are threaded into the tapings the same number of turns (distance A=distance B).
- 6) Remove glass packing nut, friction washer and glass packing from the fittings, and place them, in the same order, on to both ends of the gauge glass. Push both packings about an inch up the gauge glass.
- 7) Gently insert one end of the glass into the top gauge fitting. Keeping the glass inside the top fitting, gently rotate the top gauge fitting clockwise until vertically aligned with the bottom gauge fitting, then inset glass into bottom fitting until glass bottoms out on the shoulder inside the bottom fitting.
- 8) Carefully raise glass about 1/16" and slide lower glass packing down until the glass packing contacts the lower gauge fitting. **DO NOT** allow the glass to remain in contact with any metal!

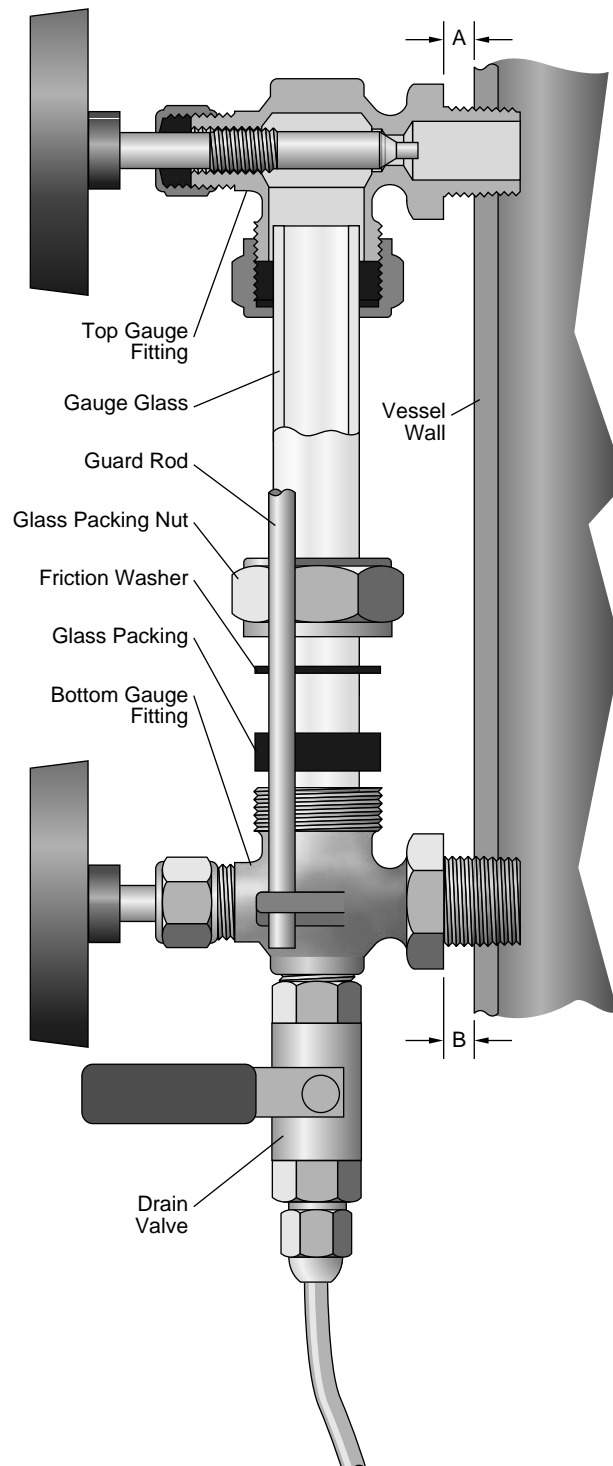
9) Carefully slide upper glass packing up as far as possible.

10) Hand tighten both glass packing nuts, then tighten 1/2 turn more by wrench. Tighten only enough to prevent leakage. **DO NOT OVER TIGHTEN!** If any leakage should occur, tighten slightly, a quarter turn at a time, checking for leakage after each turn.

11) Install the protective guard. Gauge glass valves utilize automatic ball checks to help prevent injury in case of glass breakage.

### Warning

Improper installation or maintenance of gauge glass and connections can cause immediate or delayed breakage resulting in bodily injury and/or property damage.



# Description/Instructions

## Water Supply

a) Feed water contains solids and dissolved gases. These may promote incrustation of scale; foaming, priming, surging, and solids in steam; corrosion and pitting; or caustic embrittlement. To prevent this, feedwater must be studied individually and treated accordingly by reputable professionals specializing in this field. It is strongly recommended that a competent water treatment company be consulted prior to the installation of the boiler.

b) The purpose of this treatment should be to provide quality feedwater to the boiler such that corrosion and deposition in the boiler will be minimized. Dissolved oxygen, high chloride levels and low pH can all be major causes of corrosion. Untreated hardness is the major cause of deposits. Poor quality feedwater requires increased blow off and increased chemical treatment costs to prevent boiler corrosion and scaling.

c) One way to lower the amount of dissolved oxygen in the boiler feed water is the sparge tube option. This option injects live steam into the feedwater to increase the water temperature to 180 degrees F (82 degrees C) which removes oxygen from the water.

d) Chlorides can be controlled by increasing the number of blow-downs per day from one to four.

e) **The Fulton Warranty does not cover damage or failure that can be attributed to corrosion, scale or dirt accumulations. Oxygen is a corrosive.** See the Warranty Section of this manual for full details.

## Recommended Water Treatment

a) Following are recommendations for feed water and boiler water. **Contact your local water treatment professional for testing and treatment recommendations. It is very important that a strict water treatment program be followed.**

### Feedwater:

Dissolved Oxygen.....less than 0.05 ppm  
pH Value .....9-11  
\*Hardness.....less than 70 ppm  
in terms of calcium carbonate  
Oil .....none  
Suspended Solids.....none  
Organic Matter.....less than 5.0 ppm  
Chloride .....less than 50.0 ppm  
Total Dissolved Solids.....less than 300 ppm

### Boiler Water:

Phosphate .....30 to 50 ppm  
expressed as PO<sub>4</sub> (Phosphate)  
Alkalinity .....less than 300 ppm as  
CaCO<sub>3</sub> (Calcium Carbonate)  
Chloride .....less than 500 ppm  
pH Value .....9 to 11 (measured at  
room temperature)  
Total Dissolved Solids ..400 to 2,000 ppm  
Iron .....1 ppm maximum  
Silica .....180 ppm max. as SiO<sub>2</sub>  
Hardness .....less than 50.0 ppm  
Dissolved Oxygen .....none

ppm = parts per million

\* 1 Grain Hardness = 17.118 ppm

Therefore: 70 ppm = 4.10 grains hardness

b) It is critical that the boiler pH be alkaline (9-11) whenever water is in the boiler. Solids that enter in with the feed water concentrate in the boiler. Daily boiler blowdown is recommended to prevent corrosion and/or deposits from forming .

### Glossary of Water Supply Corrosives and Inhibitors

**Dissolved Oxygen:** Oxygen that is dissolved in the feedwater will cause the steel in the boiler and the feedwater system to be attacked by the water in a manner described as "pitting". The pits that are produced can vary from tiny depressions to holes large enough to penetrate the boiler metal and are usually covered with tubercles of iron oxide. Once pitting starts, it may be extremely hard to arrest. Pitting can proceed at a surprisingly rapid rate and can occur not only in the boiler proper, but also in pre-boiler equipment such as economizers, feedwater heaters, and feedwater lines.

**Sodium Sulfite** Its purpose is to chemically remove the dissolved oxygen left in the feedwater.

Sodium Sulfite reacts chemically with dissolved oxygen, producing sodium sulfate. Since it is desirable to remove dissolved oxygen from the feedwater before it reaches a boiler. Sodium sulfite is best introduced continuously at some suitable point in the feedwater system (the storage section of the feedwater heater, six inches below the water line). Chemical residual control is based on the maintenance of a specific excess of sodium sulfite in the boiler water. The essential requirement being to maintain in the feedwater at all times slightly more than enough sodium sulfite to

consume all of the dissolved oxygen. When sodium sulfite is not fed continuously, protection of the boiler against oxygen attack must depend on the reserve of sodium sulfite that is present in the boiler water. In this case, it is important that the feedwater and the boiler water are mixed thoroughly and as quickly as possible so that boiler water sodium sulfite may consume feedwater oxygen before the latter can cause damage to the boiler.

Sulfite as a treatment represents a second line of defense against oxygen corrosion. A vigorous maintenance program to safe guard against oxygen leakage into the pre-boiler system should be followed.

**Suspended Solids:**Suspended solids are the undissolved matter in water, including dirt, silt vegetation, and any other insoluble organic matter. Normally suspended solids are expressed in terms of turbidity. The presence of suspended solids in cooling water can increase impingement type corrosion. Suspended solids may also deposit in low velocity areas and create differential aeration cells. Pitting can result. The most common cause of high suspended solids is high hardness feedwater. Of the agents which cause foaming, suspended solids probably have the least effect. Reasons for the increased hardness or other suspended solids should be determined.

In line filters, or various types of pretreatment can be used to lower the suspended solids level. Various polymers assist in holding solids in suspension.

**Alkalinity:** Alkalinity is the capacity of a water to neutralize acids. Common water alkalinites consist of bicarbonate, carbonates, hydroxide, phosphate, and silicate. These alkalinites, especially bicarbonates and carbonates, break down to form carbon dioxide in steam, which is a major factor in the corrosion on condensate lines. High alkalinity also causes foaming and carry over in boilers.

# Description/Instructions

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Both foaming and carry over cause erratic boiler operation. When foaming occurs an anti-foam should be added or increased. The reason for the high alkalinity should be determined. It may result from lack of sufficient blow off. Pretreated makeup water and condensate should also be checked. Quite often the source of alkalinity is an overdose of alkaline internal water treatment chemical.

**pH:** pH is a measure of the degree of acid or base of solution. Normal pH ranges of 6.5-9.0 will have little influence on the corrosion rate of cooling waters. If for some reason—pollution, etc.—the pH is lowered into the acid range, increased corrosion can be expected. The solution lies in determining the cause of the low pH and correcting that condition. A low pH can result in corrosion of metals, while a high pH can result in scale formation.

In order to control boilers and equipment used for the external treatment of make up water, it is essential that reliable pH measurements be made.

**Phosphates:** Ground or surface waters seldom contain large amounts of phosphates. If present, it generally indicates fertilizer runoff or pollution. Phosphate from raw water can be the cause of scale problems in open recirculating cooling water systems after the water is concentrated.

**Chlorides:** Chlorides are involved in most cooling water corrosion cells. Other factors being equal, it can be assumed the higher the chloride content, the more corrosive the water. When pits or cracks occur on stainless steel or other metals, chlorides are always suspect.

High chloride levels can cause severe corrosion. Corrosion from chlorides can be controlled by increasing the amount of corrosion inhibitor or changing to a more effective inhibitor.

**Oil:** Oil is not a natural constituent of boiler water; still it can frequently enter a system through leaks in a condenser or other heat exchanger. Oil can also enter a system through the lubrication of steam driven reciprocating equipment. Whatever the source, the presence of oil in boiler water is undesirable. Oil can act as a binder to form scale. In high heat-transfer areas oil can carbonize and further contribute to the formation of scale.

Foaming is one indication of oil in boiler water. Its presence can also be confirmed by first shaking a bottle containing boiler water. If oil is present foam will result. To ensure the foaming is being caused by oil, add a small amount of powdered activated carbon to the bottle containing the boiler water and shake. Little or no foam will appear if the foaming is caused by oil.

Often oil in boiler water will originate in the condensate. This contaminated condensate should be directed to the sewer until the source of the oil is determined and corrective steps taken.

**Silica:** Silica in boiler deposits is usually combined with other constituents. Silicates form a number of different scale complexes with calcium, magnesium, aluminum, sodium, and iron. Since there is at present no effective dispersant for silicate deposits, the scale problem can be alleviated by maintaining close control of calcium, aluminum, and iron as well as silica.

**Iron (oxides):** Iron in any of its oxide or complex forms is undesirable in boiler water. It is very difficult to disperse so that it can be removed the bottom blowoff lines.

Iron in its various forms can originate in the raw water makeup, condensate return water, or form directly in the boiler as a result of corrosion. Most iron oxide originates outside the boiler. It does not concentrate in the boiler and it tends to collect in stagnant areas. If a boiler is using raw water makeup, iron is almost certain to be a major component of developing scale.

**Water Hardness:** Water hardness is the measure of calcium and magnesium content as calcium carbonate equivalents. Water hardness is a primary source of scale in boiler equipment.

**Feedwater:** Feedwater is the combination of fresh makeup and returning condensate that is pumped to the boiler.

**Condensate:** Condensate is condensed steam that is normally low in dissolved solids. Hence, it does not contribute to the dissolved solid content of the feedwater. In addition, condensate is very expensive to waste. It's been chemically treated, heated, pumped, converted to steam, and condensed. This costs money and when condensate is returned to the boiler, money is saved.

# Description/Instructions

## Electrical Requirements

a) Connect wiring as shown in the wiring diagram which is furnished inside the electrical control panel box.

b) Be sure to install a fused disconnect for the blower and/or pump.. The disconnect should be installed in compliance with the NEC (National Electric Code) and all local codes.

c) Connections for an optional audible alarm are provided in the control panel and are clearly indicated on the diagram.

## Make Up Air Supply for Boiler Room

a) It is most important to provide free access of air to the boiler. To burn fuel properly, it requires one square inch opening of fresh air for every 3,000 BTU input of fuel. (6.4cm<sup>2</sup> for every 56 Kcal).

b) Proper ventilation of the boiler room is essential for good combustion. **Install two make up air openings**, one at a low level (24" or 610mm from floor) and one at a higher level in the boiler room wall. This will provide a flow of air to exhaust the hot air from the boiler room.

c) The following openings are recommended for each size boiler:

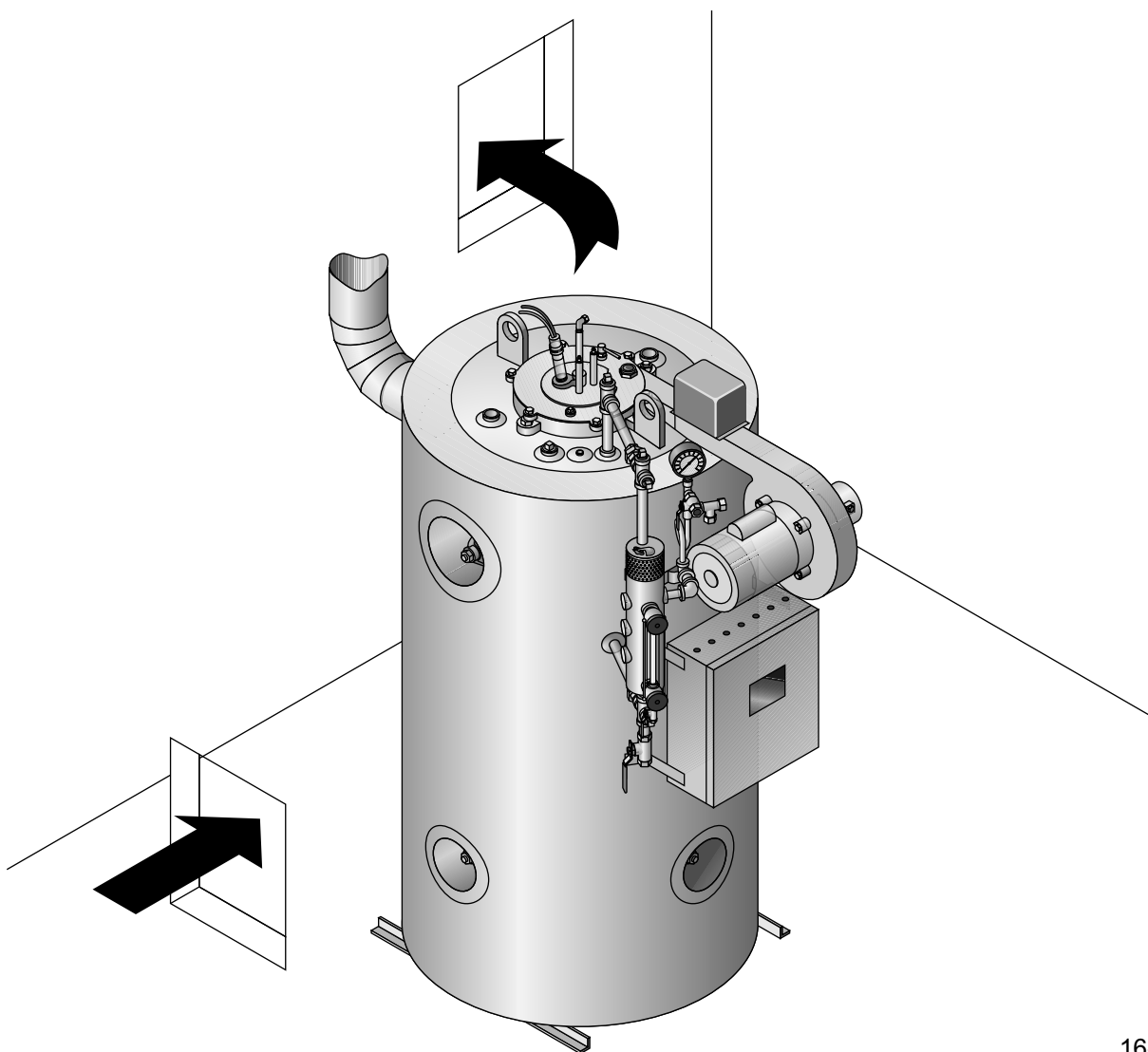
**Make Up Air Openings**

BHP	FT <sup>2</sup>	M <sup>2</sup>
4	1	.09
6	1	.09
10	1	.09
15	1.5	.14
20	4	.37
30	4	.37
40	5	.46
50	5	.46
60	7.5	.69

**Be sure total BHP = proper make up air opening size. For instance if you have three 10 BHP boilers, it is a total BHP of 30, and the 30 BHP make up air opening size is recommended.**

## NOTE

These measurements are subject to state and local regulations. The installation of exhaust fans in a boiler room is not recommended. An exhaust fan, or similar equipment can create down draft in the stack or restrict the burner's air supply which will result in poor combustion. It is essential that only fresh air is allowed to enter the combustion air system. Foreign substances, such as combustible volatiles and lint, in the combustion system can create hazardous conditions.



# Description/Instructions

## Conventional Venting

**a)** The stack should rise continuously to the connection with the chimney, and should contain no more than two bends at 45 angles or less. If required as the result of space limitations, one 90 elbow can be fitted at the back of the boiler. There should be two feet of straight, horizontal flue before any bends or turns. Any alternative stack arrangement must supply  $-.02$   $-.04$ " W.C. pressure ( $-0.508$  to  $-1.016$  mm) with the burner off.

**b)** The total horizontal run of the boiler stack should not exceed 25% of the total vertical rise.

**c)** The stack and chimney material shall comply with all local codes.

**d)** Adequate provision must be made for the support of the weight of the chimney and stack to avoid having too great a load imparted to the flue outlet connection of the boiler.

**e)** The proper flue size and draft control is most important for proper burner operation. The flue must be as large or larger than the outlet on the boiler. Avoid flue piping and elbows by placing the boiler as close as possible to the chimney.

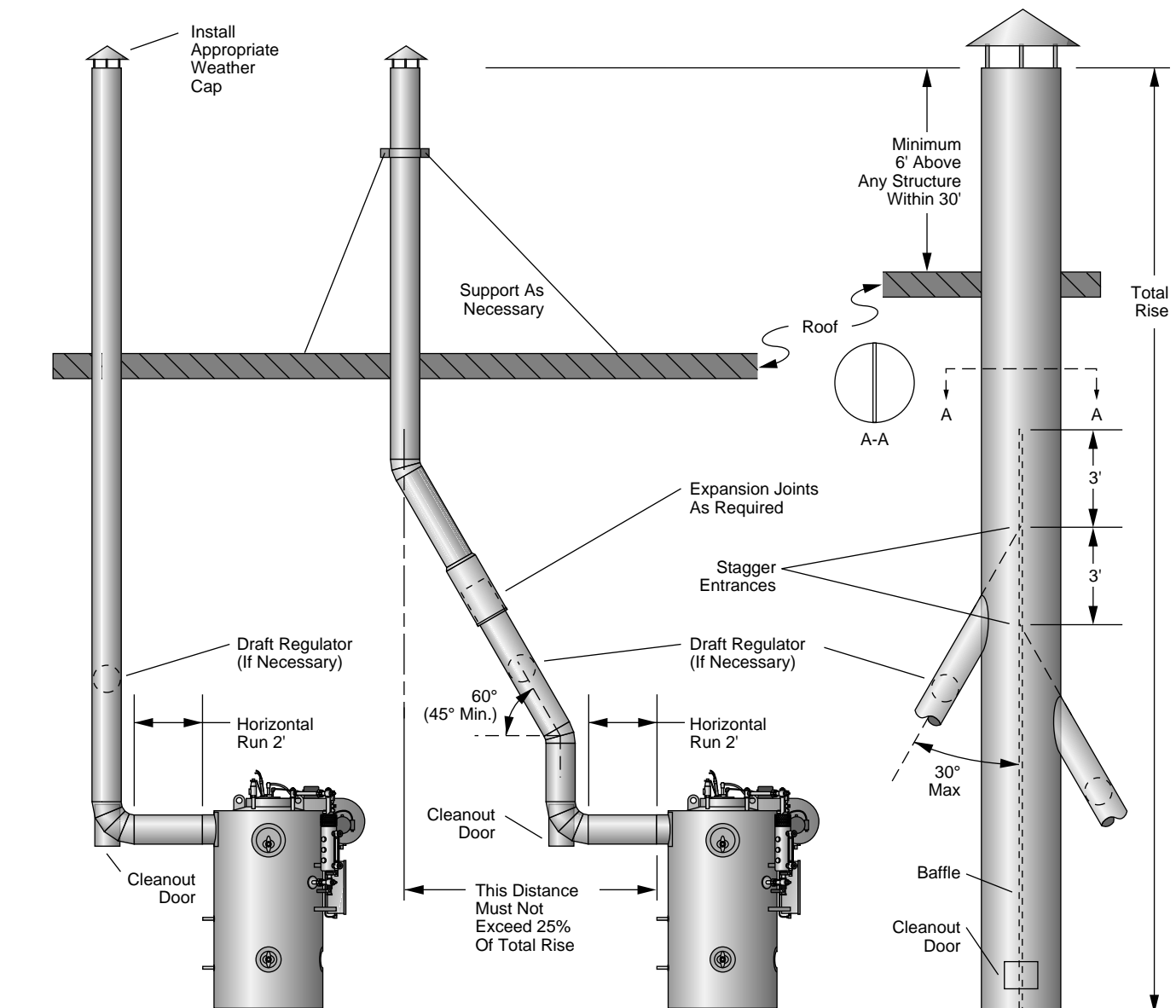
**f)** A mechanical draft regulator may need to be installed in the flue outlet. Do not install the draft regulator prior to the first turn of the flue.

## BHP

## Boiler Flue Size

	Inches	Millimeters
4	6	152
6	6	152
9.5	6	152
10	6	152
15	8	203
20	10	254
30	12	305
40	12	305
50	12	305
60	12	305

**g)** The installer should check the draft with a meter at  $-.02$   $-.04$ " W.C. pressure ( $-0.508$  to  $-1.016$  mm) with the burner off, and  $-.04$  to  $-.06$ " W.C. pressure ( $-1.016$  to  $-1.524$  mm) with the burner on.



# Description/Instructions

## Exhaust Side Wall Venting (UL and MEA Approved- MEA File Number 68-79-E Vol. 2 )

a) Boilers for which sidewall venting may be utilized are No. 2 oil, natural gas, or combination No. 2 oil and natural gas, sizes 4 to 30 H.P. The following criteria is required for installations using sidewall venting:

- 1) Flue vent piping shall be pitched upward at 1/4" per foot of length.
- 2) A U.L. Approved draft fan must be installed to provide sufficient draft (-.02 and -.04 " W.C. pressure -0.508 to -1.016 mm) to safely vent the products of combustion.
- 3) The draft fan should be located as close to the flue outlet as possible.
- 4) Draft regulation sufficient to lower the draft to between -.02 and -.04 " W.C. pressure (-0.508 to -1.016 mm) may be required. The draft regulator(s) must be between the boiler and draft fan.

5) The draft fan shall have an air flow proving switch wired in series with the boiler air safety switch.

6) The sidewall vent total length from boiler exhaust to termination shall not exceed 35 feet (10.7 m) with 4 elbows maximum.

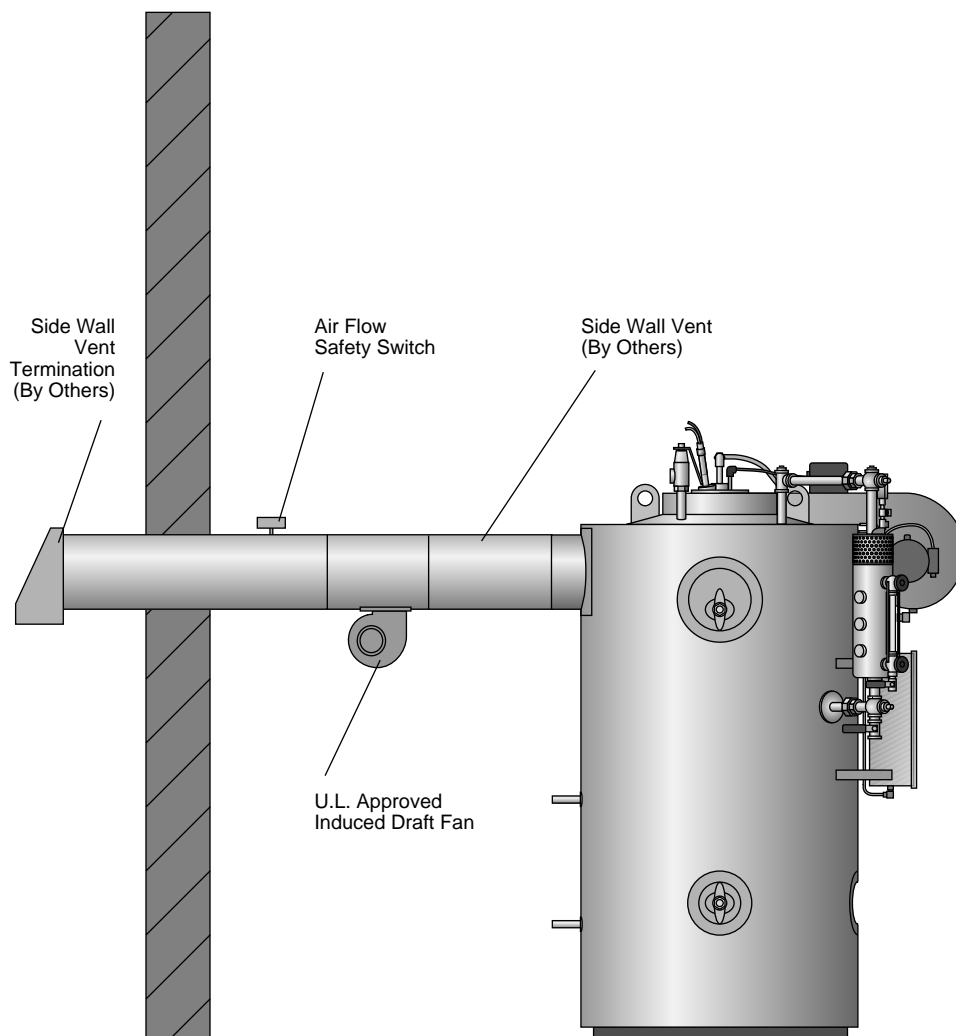
### Corrosion of flue pipe

a) In the case of a combustion flue pipe, acid may develop over a long period of time per the following process. Chlorine containing gases, such as halocarbon refrigerants, carbon tetrachloride, trichlorethylene, or perchlorethylene, when drawn into combustion air are broken down into elemental chlorine gas which exits up the flue pipe. If the flue pipe is cold, as it would be if the combustion process had been off for some time, the water vapor condenses in the flue pipe during the first few minutes of ignition and the chlorine in the combustion gas dissolves in the water --forming hydrochloric acid. As the combustion system flue line increases in temperature, the water vapor no

longer condenses because the flue temperature is above the dew point of the combustion gas. The combustion gas then dries out (dehydrates) the hydrochloric acid solution leaving behind dry chloride salt.

b) When the next cold start-up occurs, the process repeats except that more and more chloride collects and concentrates along the flue. As the quantity of chloride increases it does not dehydrate completely as the flue heats up and a corrosive poultice develops which attacks the steel and will also attack the boiler.

c) Concentration levels of only a few ppm of chlorine containing compounds in combustion air can produce serious corrosion over long periods of time. High chlorine containing compounds such as carbon tetrachloride or perchlorethylene would be prime suspects.



# Description/Instructions

## Installation Check Points

- 1) Make sure all piping connections are complete and tight.
- 2) Make sure the pressure controls are adjusted properly.
- 3) Make sure all electrical connections in the control panel box, the water column, and elsewhere are secure.
- 4) Make sure the door in the boiler room is closed. Combustion air contaminants can cause damage to the boiler jacket and stack.

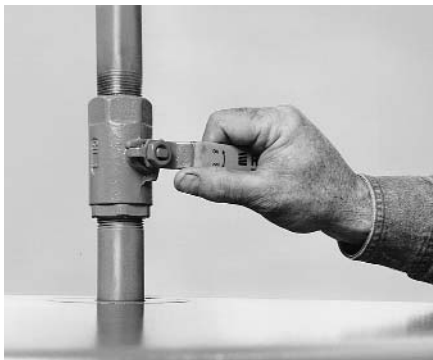
### Note

**After installation is complete and prior to operation the pressure vessel should be cleaned.**

## Cleaning the Pressure Vessel

a) After the boiler has been installed and before it is placed in service it is advisable to purge the pressure vessel of any oil film, dirt, or other impurities. Clean the pressure vessel as follows:

- 1) Isolate the boiler from the system by shutting off the main steam valve.



- 2) Remove the steam safety valve.



- 3) Mix washing soda with water in a one-gallon container and pour it into the boiler through the steam safety valve opening.

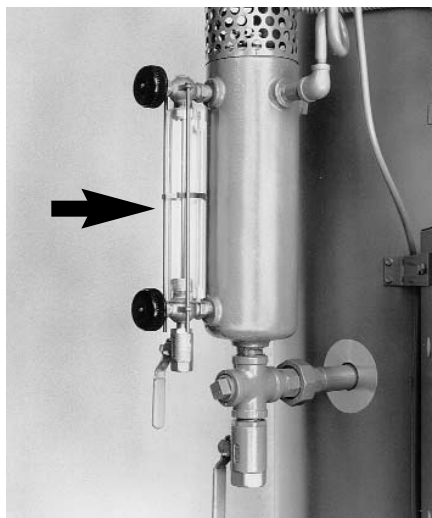


- 4) The mixture of washing soda to water is as follows:

Boiler Size	Soda
4 - 6	1 lb. (454g)
10 - 15	2 lb (908g)
20 - 30	3 lb (1362g)
40 - 50	3-1/2 lb (1589g)
60	4 lb (1816g)

- 5) Replace the steam safety valve.

- 6) Fill the boiler with water. Water level is about center in the water gauge glass.



- 7) Generate 15 PSI (1.054 kg/cm<sup>2</sup>) of steam and shut off the boiler. Allow this hot solution to remain in the boiler for 10 minutes.



- 8) Drain and flush the boiler twice with fresh water.

- 9) To remove all the oil and dirt from the main steam and the condensate return lines, allow the returns to go into a floor drain or a safe discharge point for the first week of operation.

### CAUTION

**Do not store halogenated hydrocarbons near or in the boiler room.**

In general, ensure that the boiler area is in conformance with established boiler room requirements. Review national and local codes.

**As a final checkpoint, again,**

### Water Treatment

**We cannot emphasize enough the importance of proper water treatment: Water analysis should be made by a competent water treatment concern and their recommendations should be followed.**



# 3



# Operation

## Starting the Oil Fired Boiler

**Stop! Make sure you have read any followed all previous safety information.**

Check with local authorities where approval for start-up is required. In some localities, final inspection of services may be required.

In general, ensure that the boiler area is in conformance with established boiler room requirements. Review national and local codes.

Carry out the following procedure on the initial start up of the boiler and on every subsequent occasion when restarting the boiler after a shut down.

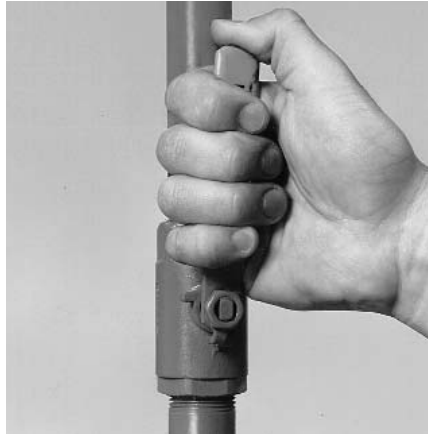
1. Close the blow-off valve.



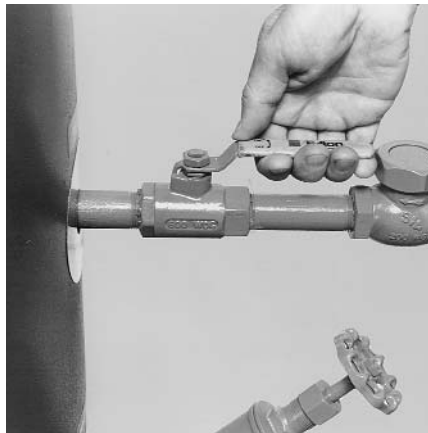
2. Close the water gauge drain valve.



3. Open main steam stop valve at the top of the boiler.



4. Open the water feed valve on the boiler.



5. Open valves on makeup water line to return if return system is used.

6. Place feedwater pump fused switch in the "on" position.



## Note

a) The fused disconnect switch that controls the feed water pump should be kept in the "on" position at all times during the boiler operation as well as during the non-operating period of the boiler.

b) This switch should be turned "off" only when repairs or adjustments should be made.

## NOTE

The pump will continue to operate until the water reaches the correct level in the boiler. This level is approximately the center of the water gauge glass.

7 Activate the boiler power on switch, located on the side of the panel box.

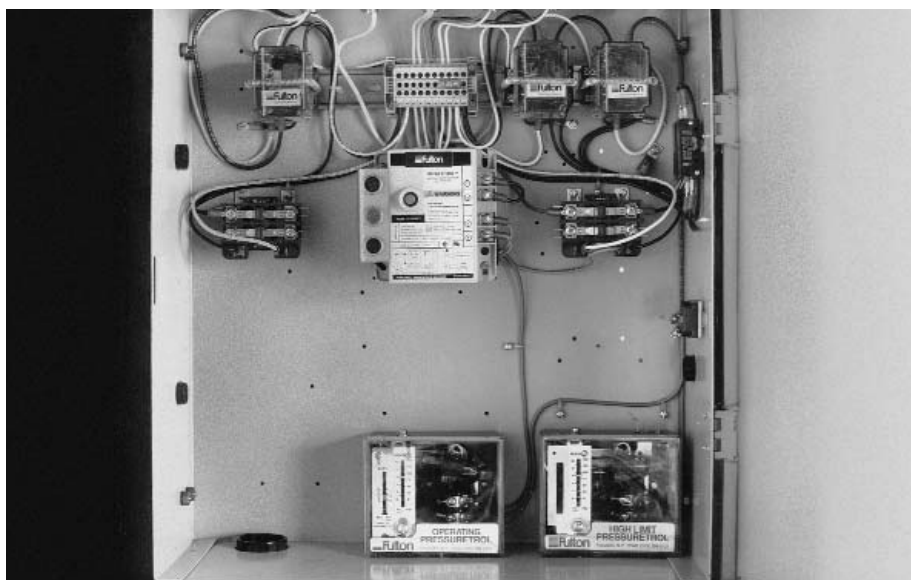
8. With the unit full of water the low water safety relay(s) will be in a lock-out mode. Press the low water safety relay manual reset button located on the side of the control panel box.



# Operation

## Oil Burner Set Up

- a) Open the oil line shut off valves.
- b) Switch on the main power to the burner. Depress the manual reset button on the panel box.
- c) To start the burner, turn on the switch located on the panel box. The blower motor will now start to deliver the air into the furnace. As the blower starts, the magnetic oil valve is energized allowing the oil pump to deliver fuel to the furnace where it is ignited.
- d) On Fulton 4-15 h.p. oil fired boilers, the burner control sights the fire from a cadmium sulfide photocell located on top of the burner. If it does not detect the flame in approximately 15 seconds, it will go out on safety lockout and shut down the burner.
- e) On Fulton 20-60 h.p. oil fired boilers, the flame safeguard control sights the fire from an ultraviolet scanner located on top of the burner. There will be a first stage pilot before the main oil valve is energized. After flame is proven the main oil valve will come on. If flame is not proven, it goes into safety shut down. Note: 20 BHP has only one stage. 60-100 BHP come standardly with display module.
- f) Reset by depressing the button on the flame safeguard control. If boiler does not respond after 3 attempts, contact your authorized Fulton Representative.
- g) The main air control shutter is adjacent to the oil pump and should be adjusted so as to give a clean burning fire without excess air being delivered to the burner.
- h) The secondary air control is an L type handle located on the top of the burner scroll which controls the amount of the air that is delivered over the oil nozzle. This should be adjusted to keep the fire from backing up into the blast tube.
- i) Make sure the secondary air damper is locked.
- j) Lock into position the main air control shutter.
- k) After the oil has been ignited in the burner, it will be controlled through an on/off cycle by the pressure control in the panel box which should be adjusted to suit the boiler application.



4-15 HP with 8184 relay



20-50 HP with 7895



60 HP with 7800 with display module

# Operation

## Primary Air Adjustment Procedure

a) The primary air adjustment or main air control is located at the fan housing face. This control is used to supply the burner with excess air to facilitate good combustion. Too much or too little air will result in poor combustion. It is important to make sure the lowest level of excess oxygen is present while still maintaining a high level of carbon dioxide and negligible carbon monoxide. Using a CO<sub>2</sub> or O<sub>2</sub> tester it is possible to determine the percent of excess air in the combustion mixture.

b) On a No. 2 oil fired boiler the oxygen should be 4 percent with 11 percent carbon dioxide. A smoke test is the best means to check for combustibles in the flue gases. A smoke test of 0-2 is an acceptable level. It is best to measure the flue gas with the stack in excess of 420°F (216 degrees C). To increase the oxygen in the burner open the air adjustment to the right. To close or reduce the secondary air, move it to the left.

## Secondary Air Adjustment Procedure for Fulton Oil Fired Steam Boilers

a) The secondary air control adjustment is located on the top, right-hand side of the burner assembly. This damper type air controller is used to introduce air to and through the blast tube of the burner. The purpose of the secondary air adjustment is to proportionately divide the air to the center or outer fire chamber.

By moving the damper closed, the air is forced to the outside of the fire chamber with less air going down the blast tube area. By pulling the damper open more air is forced down the blast tube and less on the outside wall of the deflector face and fire chamber.



Secondary Air Adjustment 4-30 HP



Primary Air Adjustment is located at the fan housing face

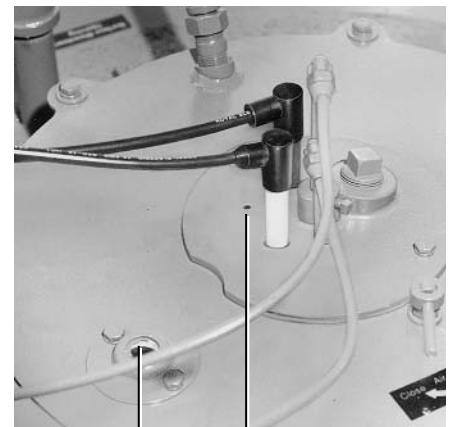


Secondary Air Adjustment 40-60 HP

It is important in the combustion process to maintain proper air mixtures between the outer surface and center of the blast tube area. On most boilers the damper is locked in a wide open position. However, if it is necessary to close the damper, care should be taken to close the damper slowly and no more than 1/4 of the distance of the swing of the damper assembly.

b) A visual examination down into the blast tube area should reveal that no heat, flames or fumes are backing up through the burner plate area. If they are, the secondary damper must be opened up once again. Failure to remove the flame or gases from the blast tube area can cause a backfire as well as cause premature failure of electrodes, flame rods, and other burner components.

c) A visual inspection down the view port should also show the fire completely covering the furnace walls. If the fire is tunneling down or is not to the outside wall of the furnace, the efficiency will drop off. Close the secondary air damper until tunneling stops.



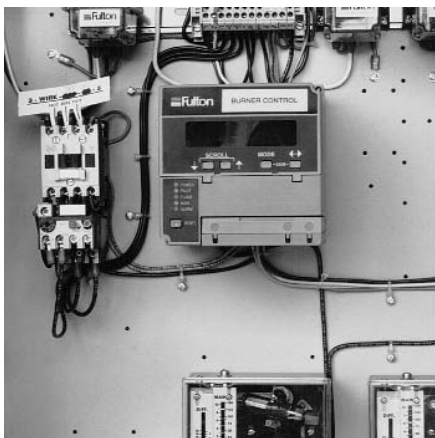
Blast Tube Viewing Port

Burner Viewing Port

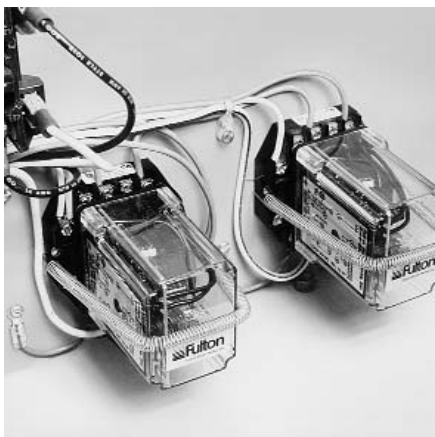
# Operation

## Boiler Controls

**a) Flame Safeguard/Burner Control** – this is the main control in the panel box. The programmer in conjunction with a sensing device, either a cad cell (4-15 h.p.) or an ultra violet scanner (20-60 h.p.), "supervises" the ignition sequence - proves the flame is satisfactory - and finally "monitors" the established flame. Should any fault occur, either during the ignition sequence or during normal running, the programmer will immediately go to "lock-out" and the burner will shut down.



**b) Low Water Cut-Off** – probe type--cuts off the unit when water level is too low. As a standard feature, Fulton boilers are equipped with CSD-1 controls which include a manual reset feature on the burner low water cut off relay and CSD-1 controls also feature a second low water cut off relay.



### CAUTION

**Do not tamper with the safety features of the low water safety cut out.**

**c) Pressure Relief Valve** – limits maximum operating pressure of the boiler.

**d) Operating Steam Pressure Control** – located in the control panel box and connected to the steam pressure gauge assembly by means of a copper tube. The pressure control regulates the on/off cycle of the burner, shutting the burner off when maximum pressure is reached and switching on when the steam pressure falls below a predetermined level.



**e) Sight Glass Isolation Valves** – The brass sight glass isolation valves are equipped with an internal ball check. In the event that a sight glass should break, the ball will seat, preventing the discharge of steam and water. The brass valve stem must be opened fully to arm this capability. If the valve is in any



other position than full open, the ball will not seat. For added safety all Fulton boilers are equipped with gauge glass protectors.

**f) High Limit Pressure Control** – located in the control panel box and connected to the steam pressure gauge assembly by means of a copper tube. The pressure is usually set 10 to 15 PSI (.703 - 1.054 kg/cm<sup>2</sup>) above the operating pressure, but below the maximum pressure of the pressure relief valve. If the pressure exceeds the high limit pressure control setting, the boiler will automatically shut off. The high limit pressure control must be manually reset by depressing the plunger located on top of the control.



### WARNING

**When stopping the boiler for any extensive repairs, shut off main disconnect switches on both the boiler side as well as the feed water side.**

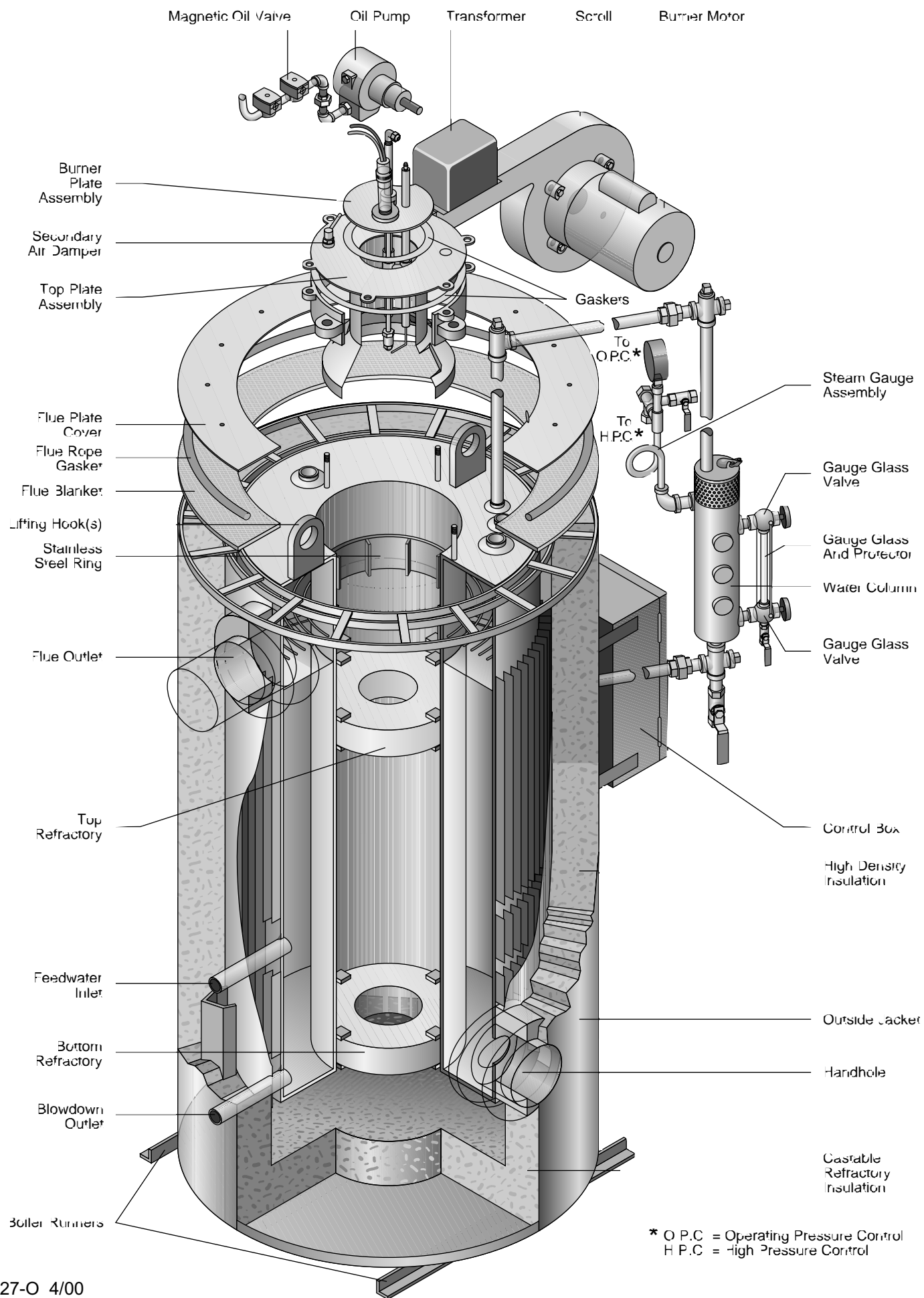
### NOTE

**To ensure that your Fulton Steam Boiler is kept operating safely and efficiently, follow the maintenance procedures set forth in Section 4 of this manual.**

# 4



# Maintenance



# Maintenance

## Procedure for Cleaning Water Probes - (Recommended as Annual Maintenance)

Clean probe on top of boiler shell and probes in water column. Make sure there is no pressure on the boiler during the removal of the probes. Remove one probe, clean with very fine emory cloth and replace it before removing another to assure no probe mix ups that would change the control functions.



For replacement purposes, installed probe lengths are indicated in the chart below. For a universally adaptable plug and probe which can be cut to length in the field to fit all boilers, order Part No. 2-20-017.

\*A = 7-1/4" -- 184 mm

\*B = 9-1/4" -- 235 mm

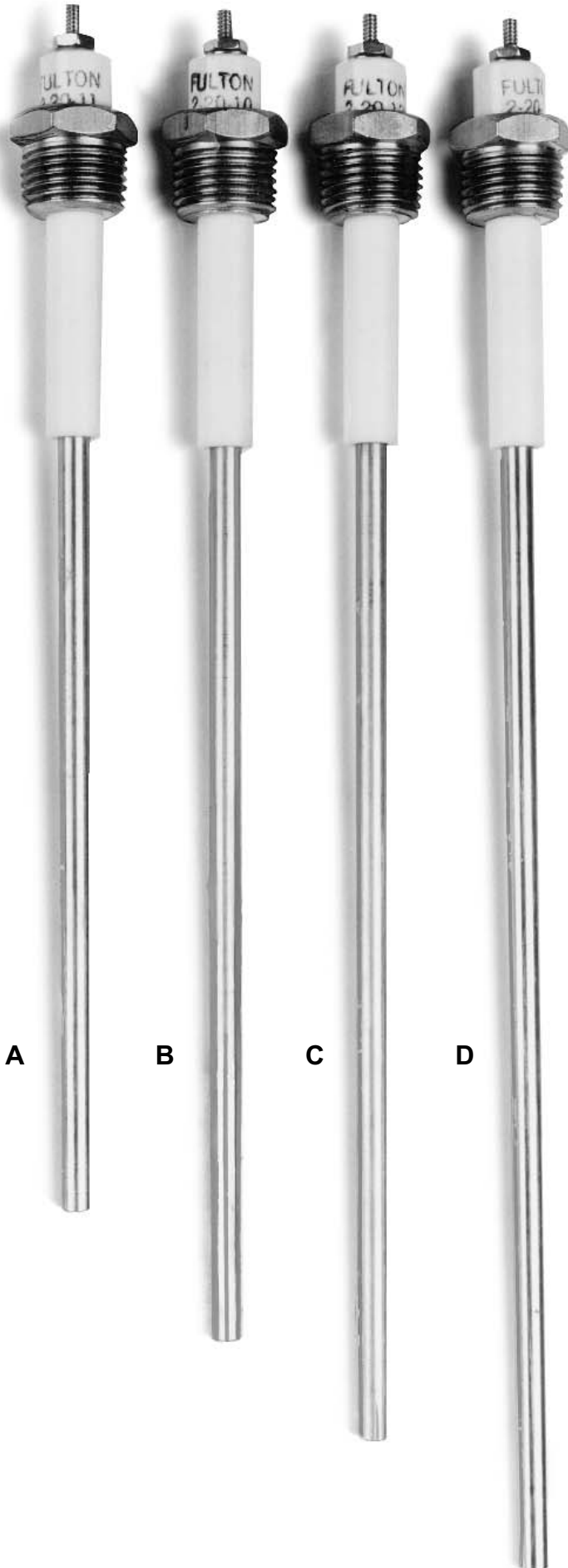
\*C = 11-1/2" -- 286 mm

D = 17-1/8" -- 435 mm

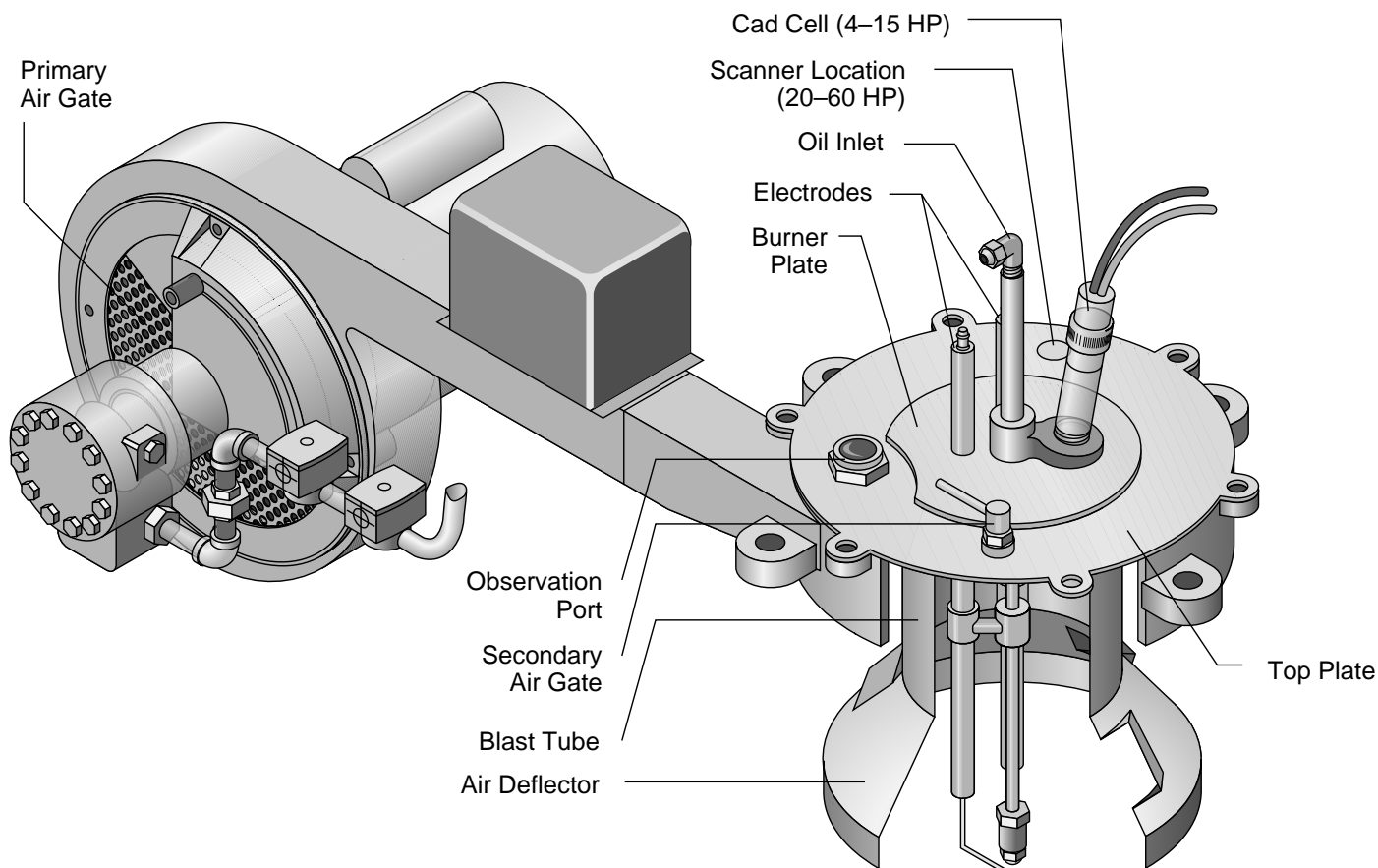
\*For 4 HP boilers only, water column probes are 2" (51 mm) shorter.

### NOTE

**For proper removal use 7/8" socket.**



# Maintenance



## Flame Signal Detection for Fulton Oil Fired Steam Boilers

- a) It is essential to obtain optimum flame signal detection for safe and continual operation of the combustion control relay.
- b) If a scanner or cad cell is inoperable, it may prove the detector is working and only an adjustment to the pilot flame is needed to improve the signal.
- c) If the scanner or cad cell is found to be defective, replace .

### Notes:

- 1) The scanner is located on the outside edge of the burner top plate for 20-60 HP.
- 2) For New York City installations only: a non-adjustable oil pressure regulator and gauge are supplied upstream from the oil valves.
- d) For the RM7800 Series use a keyboard display module or volt meter, the flame safeguard will

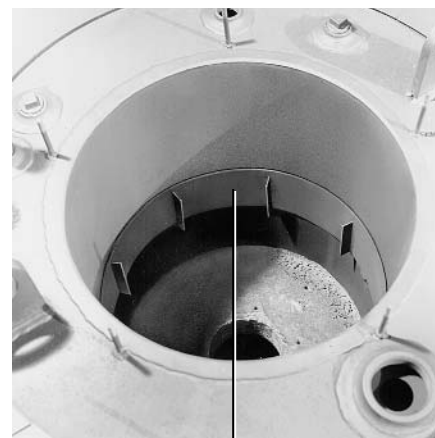
require a 1.25 VDC signal to pull in the main flame. Then a maximum signal should be obtained on main flame (5.0 VDC).

e) Adjustments to establish a good signal may include the following items:

- 1) Primary and secondary air adjustments.
- 2) Realignment of the ignition electrode.

## Checking the Stainless Steel Combustion Ring on Fulton Oil Fired Steam Boilers

- a) The stainless steel combustion ring in Fulton oil fired boilers are designed to bring quick and effective flame transfer to the fire wall. The ring should fit securely and tight against the furnace wall for best results.
- b) The ring should be inspected for distortion in the event of poor combustion which could result in flame failures.



Stainless Steel Combustion Ring

# Maintenance

## Furnace Refractory Replacement Procedure

a) Remove the burner plate and top plate assembly up and out of the scroll assembly.

b) Remove the stainless steel combustion ring from the furnace.

c) Remove the clean-out plugs from the bottom sides of the boiler.

4-15 HP boilers have one cleanout plug located at the bottom of the boiler directly below the panel box. 20-60 HP boilers have one cleanout plug located at the bottom of the boiler to the right side of the panel box.

d) Break off the top holding clips that were used to keep the refractory in position during shipping. The 4-50 HP boilers also have holding clips beneath the top refractory. There is no need to cut the holding clips located beneath the top refractory as the refractory may be rotated to avoid these clips during installation of the lower refractory. The 60 HP boiler has welded flat bars beneath the top refractory. These bars will have to be cut to change the lower refractory. Rewelding of the bars will be required prior to installation of the top refractory. For the lower refractory you will also need to break off the top holding clips that were used to keep the refractory in position during shipment.

e) Break up the top and/or bottom refractories and remove the pieces from the boiler through the clean-out plugs.

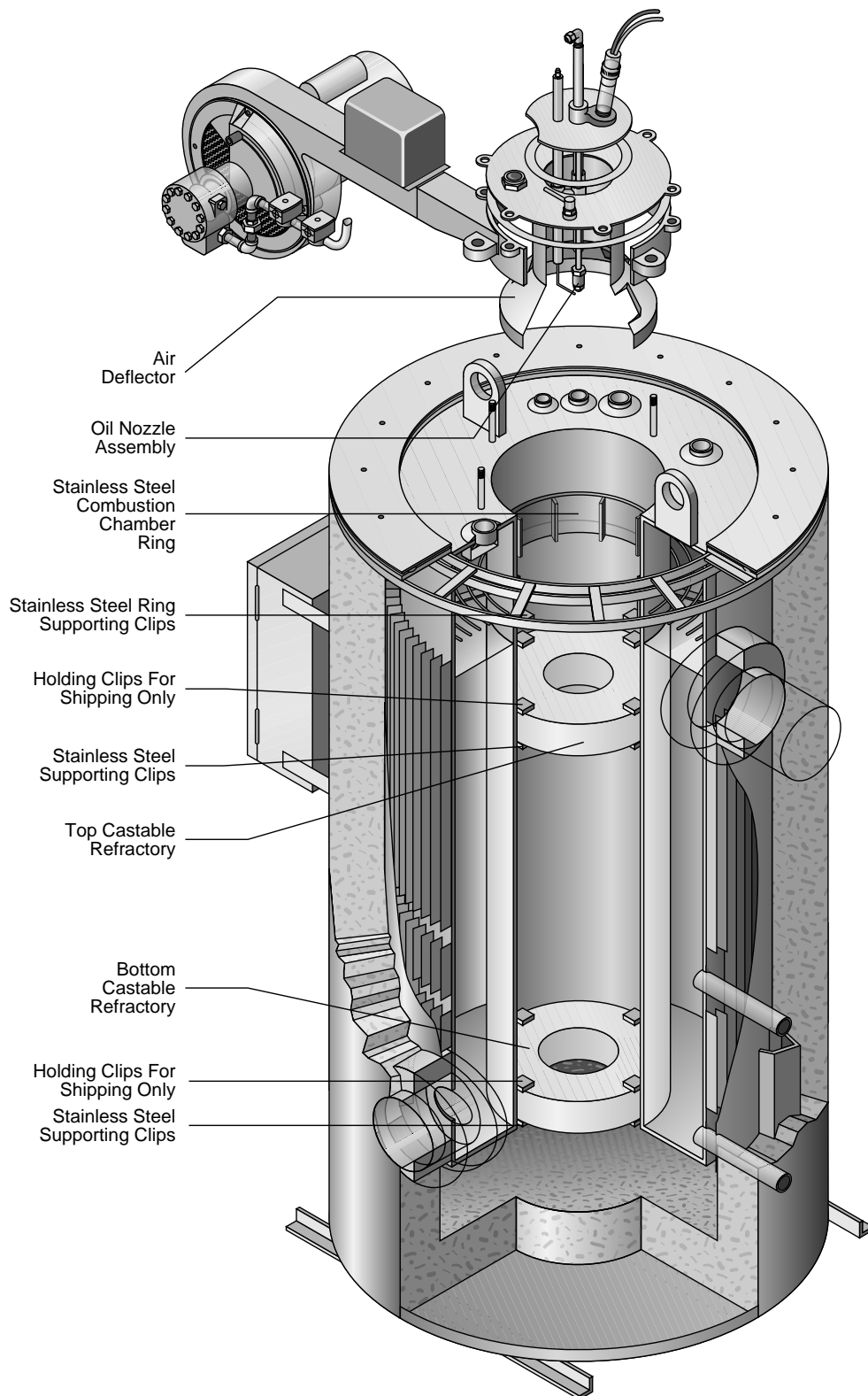
### NOTE

**If only the top refractory is to be changed, the bottom refractory need not be broken.**

f) Round and bevel the outer edges of the new refractories.

g) The bottom refractory has the largest hole, while the top refractory has the smallest.

h) Lower the bottom refractory down the furnace with wire fastened around the refractory in three positions. When the refractory is close to position, it can be tipped maneuvering the wire to drop it flat on the holding clips. If the refractory will not tip, it may have to be removed and again rounded and beveled.



i) Install the top refractory in the same manner as the bottom refractory. When installed the outer edges must be sealed with insulcrete - a castable refractory mix available from the Fulton factory. It is not necessary to reinstall the shipping clips.

j) Install the stainless steel combustion ring, burner assembly, and clean out plug.

k) normal operation can be resumed immediately.

# Maintenance

## Recommended Daily Maintenance Schedule

a) The following procedures should be carried out daily. They are designed to prevent the build up of scale, silt, or sludge in the bottom of the boiler and in the pipes leading to the water gauge. In addition to these procedures, the advice of a water treatment supplier should be sought and followed. An ASME Section VIII blow off receptacle must be provided for the appropriate pressure.

b) Blow down the boiler each morning by starting the boiler and generating not more than 10 PSI (.703 kg/cm<sup>2</sup>) of steam, then shut off burner. Turn on tap water to blow-off separator, then open the boiler blow off valve for approximately 10 seconds, then close the valve. Shut off tap water to blow-off separator.



Blow down boiler daily; shown is the blow down "Y" valve

### NOTE

**If the boiler is being operated automatically on a time clock, the blow off operation may be done once during the working day and once at the end of the day when at 10 PSIG or less.**

c) Blow down water column each morning when boiler is at 10 PSIG by opening the water column and the water gauge blow off valves for approximately 5 seconds, then close the valves.



**Blow down water column each morning by opening the water column and the water gauge blow-off valves**

d) If the feed water is being treated by compounds, make sure that this treatment is carried out carefully and according to the specific manufacturer's instructions.

### NOTE

**Fulton recommends that the feedwater treatment should be added between the pump and the boiler.**

e) When first starting the boiler each day, make sure ignition and burner are working properly.

f) Check water level in sight glass.

g) Check to be sure feed water pump is working.

h) For float type water level control, blow-down float chamber.

## Recommended Weekly Maintenance Schedule

a) Check that the low water cut-off relay is operating correctly in the following manner:

1) Make sure that the boiler is cool with little or no pressure showing on the steam pressure gauge.

2) With the burner operating, open the boiler blow off valve. When the water drops below the required level (note the level in the water gauge glass) the burner should shut off; this is when the water level falls below the low water electrode in the water column assembly and/or the boiler shell. Manual reset of low water relay is required.

## Recommended Monthly Maintenance Schedule

### WARNING

**Make sure main power switch is off before starting work.**

a) Clean the water gauge glass.

### Caution

**Do not clean the gauge or gauge glass while pressurized or in operation.**

1) Clean the water gauge glass using a commercial non-abrasive glass cleaner. Use diluted acids such as hydrochloric (muriatic) acid when regular cleaners do not seem to work. Do not use wire brushes or any other abrasive materials which could scratch the glass. If any leakage is evident, replace the



gaskets.

**Clean glass; replace gaskets if leaking**

2) Always replace the gauge glass protector which is standard on all Fulton Boilers.

b) Clean water pump strainers.

c) Check scanner.

d) Check starter contacts. Burned or pitted contacts should be replaced. Do not use sand paper or file to clean.

e) Clean water traps and strainers in fuel lines.

f) Check operation of all steam traps on condensate return system.

# Maintenance

**g)** Remove pipe plug at the cross connection below water column and clean nipple into boiler. Boiler must be cold and water level below pipe.



Remove cap at cross section; clean nipple to boiler

## Recommended Semi-Annual Maintenance Schedule

### a) Clean the oil burner assembly-

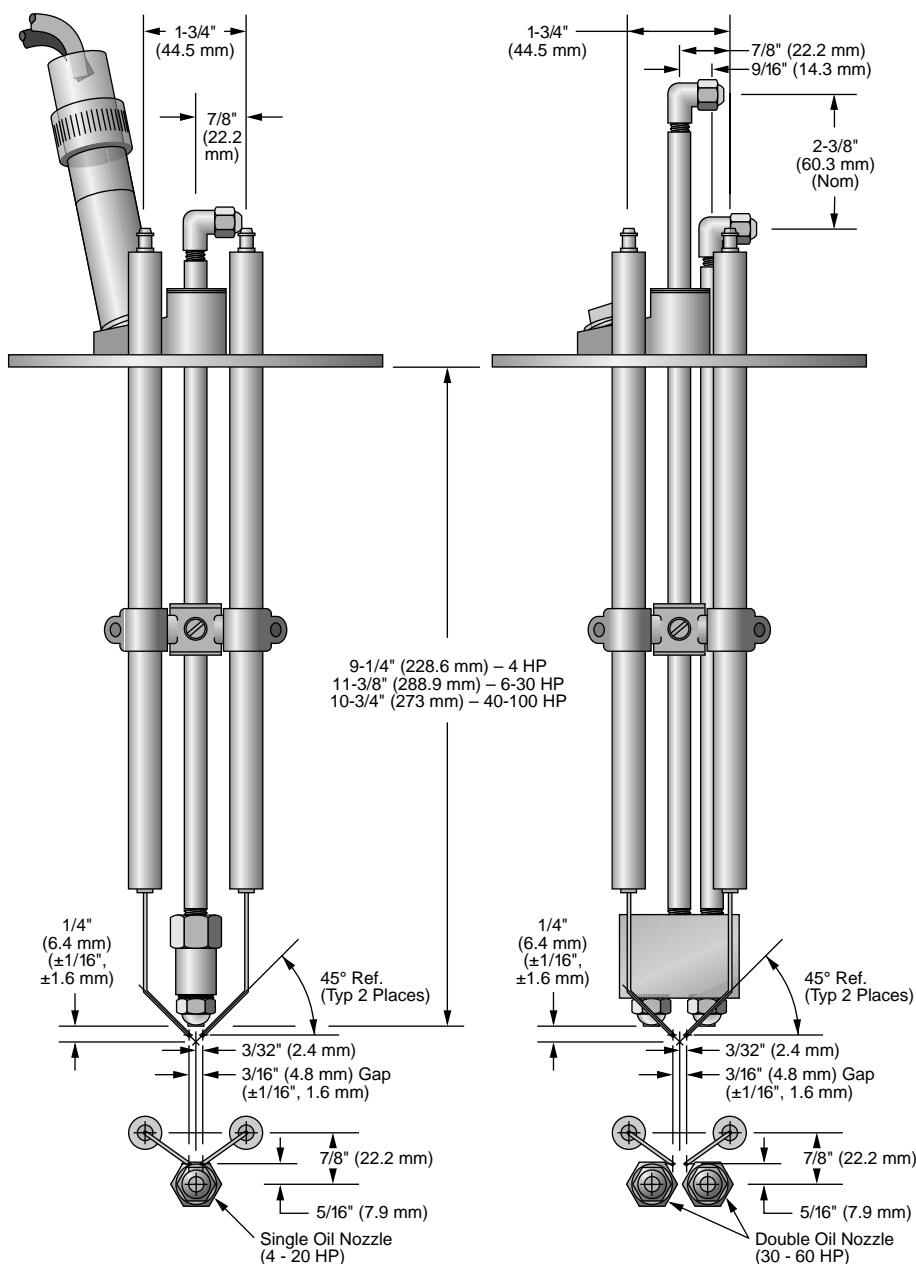
- 1) Clean fan blades; oil the motor. Replace the fuel oil filter and clean the oil pump strainer.
- 2) Remove, clean, and adjust the oil nozzle and the electrode assembly. Make sure the settings correspond to those in the illustration to the right.
- 3) Check the combustion efficiency of the burner and adjust if necessary.
- 4) Clean probe on top of boiler shell and probes in water column. There must be no pressure on the boiler during the removal of the probes.
- 5) Check refractories for soot or breakage and inspect the stainless steel ring.

**b) Drain condensate tank** and clean tank by flushing with hose. Check float valve operation.

**c)** Check electrical controls and motors for correct operation.

**d)** Check water and fuel pump for correct operation.

**e)** Shut off the boiler completely and drain.



**f) Remove the handholes and inspect the interior of the vessel for scale or sludge deposits.** The amount of deposits will indicate the efficiency of the water treatment being used. The frequency of the inspection will depend on the condition of the water side of the boiler.



Inspect handholes for scale or sludge build-up

# Maintenance

## g) Replace handhole gaskets using the following procedure:

- 1) Remove the handhole assembly using a 1-1/4" tee handle wrench or 1-1/4" socket wrench.



Removing handhole assembly with a Tee Handle Wrench

- 2) Remove the old gasket and thoroughly clean the surface on the boiler and the plate.

- 3) Fit the handhole assembly as follows:

a) Place the gasket on the handhole plate and ensure that it is seating correctly. **Do not use any grease, lubricant, or adhesive.**

b) Position the plate in the boiler. Set the yoke and tighten the securing nut sufficiently enough to provide a snug fit. Verify the position of the plate in the boiler, then make it hand tight and then snug with wrench about 1/4 turn. Do not compress excessively.

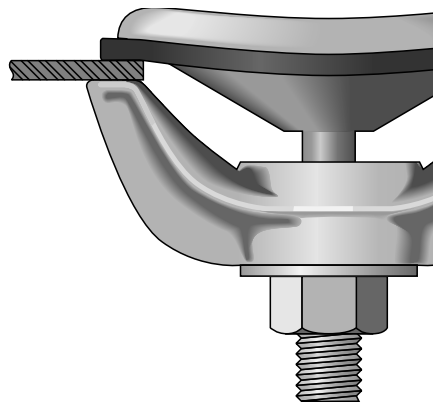


Illustration shows correct pressure on gasket

c) If the gasket leaks while pressure is being built up, tighten only enough to stop leakage. Never tighten more than necessary to

prevent leakage. Excessive tightening may shorten the life of the gasket.

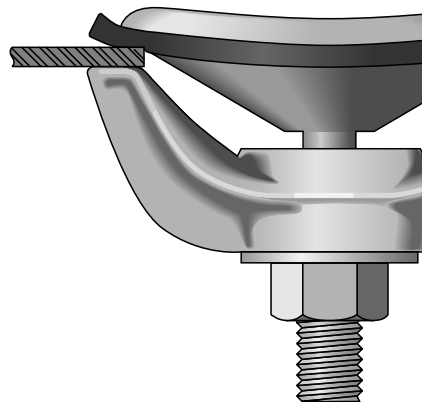


Illustration shows over compressed gasket

- d) Refill the boiler with fresh water.

### NOTE

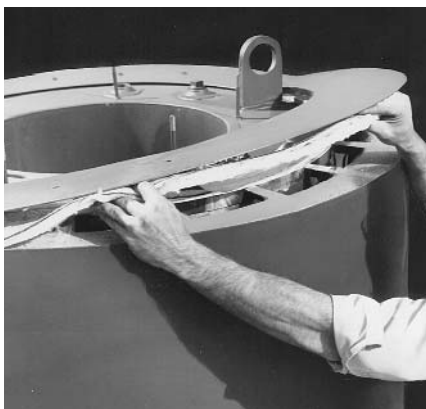
After a new Fulton Boiler has been in operation for several months, pieces of burned metal will be found in the space at the bottom of the boiler. These pieces of metal are the remains of a light gauge metal form which was used during manufacture for forming the boiler insulation. This is a normal condition and does not affect the efficiency or the life of the boiler in any way.

## Recommended Annual Maintenance Schedule

- a) Have combustion ( $\text{CO}_2$ ,  $\text{O}_2$ ,  $\text{CO}$ ) and input checked by trained personnel.
- b) Dirty flues can cause air flow restrictions resulting in poor combustion and loss of efficiency.

### Clean flues as follows:

- 1) Remove the burner and flue cover plate.



Remove burner and flue cover plate

2. Wire brush flue passages.



Wire brush the flue passages.

- 3) Remove clean out plugs at lowest part of unit and clean the bottom of combustion chamber.



Removing clean out plugs

- 4) Remove all soot from the top, and from the cleanout plugs at the bottom with a vacuum cleaner.
- 5) Replace cleanout plugs carefully so as not to damage insulation and replace burner and flue cover plates.
- c) Flush boiler out if necessary. See Section 2 for proper procedure for "Cleaning the Pressure Vessel."
- d) Clean Water Probes - See Page 28 of this section for proper procedure.
- e) Provide annual inspection by a qualified ASME Boiler inspector.

# Maintenance

## Troubleshooting

a) The following trouble shooting guide will assist in the diagnosis and the correction of minor field problems. It contains instructions and information necessary to locate and isolate possible troubles which occur during normal operation. It

should be used in conjunction with the unit wiring diagram and the component literature provided in Section 7 of this manual.

b) The following lists cover the most common troubles that may occur on the Fulton oil fired boilers. Refer to left hand column of the

chart to locate the problem. Determine which cause, listed in the center column, that represents the problem by performing the corrective action as listed in the right hand column titled "REMEDY".

## Troubleshooting Oil-Fired Boilers

Problem	Cause	Remedy
<b>Ignition Failure</b>	1. Power Supply	Check fuse or circuit breaker. Reset or replace, as necessary.
	2. Ignition Electrodes	Check electrodes for carbon buildup and clean if necessary. Check for proper adjustment. Readjust if necessary. Check for cracks in porcelain. If found, replace.
	3. Transformer	Check voltage between transformer leads at terminal block to be sure transformer is being powered.
	4. Cad Cell/UV Scanner	Check for ignition interference.
	5. Flame Safeguard/Burner Control	Check voltage between pilot terminal neutral and ignition terminal neutral. Check must be made before control locks out on safety. If no power, replace control. (See component data section in instruction manual.)
	6. Oil Nozzle Clogging	Check oil nozzle(s) and clean or replace as necessary.
	7. No Oil	Check to be sure there is oil in the tank.
	8. Faulty Oil Pump	Check to see if oil is being pumped to the boiler nozzle. Repair or replace as necessary.
<b>Flame Failure</b>	1. Oil Supply	Check oil level in supply tank to be sure it is not below intake line. Fill tank with oil. Check for clogged nozzle. Clean or replace. Check oil filter and replace if necessary.
	2. Ignition Electrodes	Check electrodes for carbon buildup and clean if necessary. Check for proper adjustment. Readjust if necessary. Check for cracks in porcelain; if found, replace.
	3. Primary Air Adjustment	Check air adjustment. Air may be blowing flame away from flame sensor.

# Maintenance

Problem	Cause	Remedy
<b>Flame Failure</b>	4. Oil Valve	Check voltage between oil valve lead neutral at terminal block to be sure oil valve is getting power.
	5. Oil Pump	Check for clogged strainer or filter. Remove and clean. Check for slipping or broken coupling. Tighten or replace. Check for frozen pump shaft. Replace.
	6. Loss of Oil Prime	Check all lines for possible air leak in intake line and tighten. Check for possible restricted intake line. Replace.
<b>Boiler Fails to Start</b>	1. Pressuretrol	Disconnect all power to the controller. Disconnect the wires from the controller. Connect an ohmmeter between the switch terminals. Lower the set point of the controller. Switch should make. Raise the set point and re-check ohmmeter. Switch should break. If the controller operates improperly, replace it.
	2. No Power	Check fuse or circuit breaker. Reset or replace as necessary.
<b>Burner Cut-Off</b>	1. Oil Supply	Check oil level in supply tank to be sure it is not below intake line. Fill tank with oil.
	2. Ignition Electrodes	Check electrodes for carbon buildup and clean if necessary. Check for proper adjustment. Readjust if necessary. Check for cracks in porcelain; if found replace.
	3. Oil Nozzle	Check for clogged nozzle; clean or replace.
	4. Transformer	Check voltage between transformer neutral at terminal block to be sure transformer is being powered.
	5. Cad Cell	Check for too small of an orifice in scanner nipple. Check for ignition interference.
	6. Flame Safeguard	Check voltage between pilot terminal neutral and ignition terminal neutral. Check must be made before control locks out on safety. If no power replace control. (See component data section in instruction manual)
	7. Pressuretrol	Disconnect all power to the controller. Disconnect the wires from the controller. Connect an ohmmeter between the switch terminals. Lower the set point of the controller. Switch should make. Raise the set point and re-check ohmmeter. Switch should break. If the controller operates improperly, replace it.
	8. No Power	Check fuse or circuit breaker. Reset or replace as necessary.
	9. Too small an orifice in Scanner Nipple	Contact representative or Fulton service department.

# Maintenance

Problem	Cause	Remedy
<b>Burner Cut-Off (cont.)</b>	10. Dirty Scanner/Cad Cell	Check scanner/cad cell and clean as necessary.
	11. Low Water Cut Off Relay failure	Make sure relay is plugged in tightly. If so, and still inoperative, replace.
<b>Poor Combustion</b>	1. Refractories	Check refractories to see if they are plugged with soot or broken in pieces. Clean or replace as necessary.
	2. S.S. Ring	Check to be sure ring is present and fits tight against the furnace wall.
	3. Oil Nozzle	Check for clogged nozzle. Clean or replace.
	4. Primary Air Adjustment	Check air adjustment. Air may be blowing fire away from flame sensor.
	5. Secondary Air Adjustment	Check main air adjustment to see if it is loosened up. Adjust as necessary and tighten in position. Check CO <sub>2</sub> and O <sub>2</sub> level.
	6. Oil Pump	Check for clogged strainer or filter. Remove and clean. Check for slipping or broken coupling. Tighten or replace. Check for frozen pump shaft. Replace.
	7. Draft	Check draft with a gauge. Draft should be a -.02 " to -.04" W.C. with burner off or -.04" to -.06" when operating. May need to install a barometric damper.
	8. Dirty Flue	Check flue for carbon buildup or blockage. Clean flue passages with brush.
	9. Negative Room Pressure	Make sure no exhaust fans are running in the boiler room.
<b>Burner back fires</b>	1. Refractories	Check refractories to see if they are cracked or broken in pieces. Replace as necessary.
	2. Ignition Electrodes	Check electrodes for carbon buildup and clean if necessary. Check for proper adjustment Readjust if necessary. Check for cracks in porcelain; if found replace.
	3. Primary Air Adjustment	Check air adjustment. Air may be blowing fire away from flame sensor.
	4. Oil Valve(s)	Check for leaking oil valve(s) and replace.
	5. Draft	Check draft with a gauge. Draft should be a -.02 " to -.04" W.C. with burner off or -.04" to -.06" when operating. May need to install a barometric damper.
	6. Negative Room Pressure	Make sure no exhaust fans are running in the boiler room.
	7. Loss of Prime	Check all lines for possible air leak in intake line and tighten. Check for possible restricted intake line. Replace.

# Maintenance

Problem	Cause	Remedy
<b>Burner backfires (cont.)</b>	8. Loose Oil Fittings	Check all fittings and tighten.
	9. Plugged Oil Filter	Check and clean or replace.
	10. Plugged screen in oil pump	Check and clean or replace.
	11. Plugged Flue	Check flue to see if it is plugged. Check draft at flue. Clean.
	12. Vacuum on pump	Check for too high a vacuum on the pump. Check oil lines and distance from tank to boiler. Repair or replace as necessary.
	13. Hole in suction line	Check and replace as necessary.
<b>Boiler will not maintain pressure</b>	1. Oil Supply	Check oil level in supply tank to be sure it is not below intake line. Fill tank with oil. Check for clogged nozzle. Clean or replace. Check oil filter and replace if necessary.
	2. Oil Nozzle	Check for clogged nozzle. Clean or replace.
	3. Oil Valve	Check voltage between oil valve leads at terminal block to be sure oil valve is getting power.
	4. Oil Pump	Check for clogged strainer or filter. Remove and clean. Check for slipping or broken coupling. tighten or replace. Check for frozen pump shaft. Replace.
	5. Pressuretrol	Disconnect all power to the controller. Disconnect the wires from the controller. Connect an ohmmeter between the switch terminals. Lower the set point of the controller. Switch should make. Raise the set point and re-check ohmmeter. Switch should break. If the controller operates improperly, replace it.
	6. Scale built-up in boiler	Call water treatment professional and consult factory.
	7. Refractories	Check refractories to see if they are cracked or broken in pieces. Replace as necessary.
	8. Steam traps blowing through	Check traps to see if they are clean or replace as necessary.
<b>Boiler is Surging</b>	1. Steam traps blowing through	Check traps to see if they are clean or replace as necessary.
	2. Perc (cleaning solvent in Boiler)	Clean boiler with washing soda per instruction manual.
	3. Scale build-up or lime deposits	Call water treatment professional and consult factory.

# Maintenance

Problem	Cause	Remedy
<b>Boiler is Surging (cont.)</b>	4. Too much compound in system (water treatment)	Dump return tank and flush system. Have water tested by water treatment company.
	5. Too much water softener (high PH)	Have water tested by water treatment company.
	6. Too much of a load	Check total equipment horsepower required against horsepower of boiler being used. Decrease amount of equipment being used at one time.
	7. Boiler new (not cleaned)	Clean per instructions in instruction manual.
<b>Boiler Rumbles and Pulsates</b>	1. Draft problem	Check draft with a gauge. Draft should be a $-.02''$ to $-.04''$ ( $-0.508$ to $-1.016$ mm) W.C. with burner off or $-.04''$ to $-.06''$ ( $-1.016$ to $-1.524$ mm) W.C. when operating. May need to install a barometric damper.
	2. Too much primary air	(See primary air adjustment)
	3. Air or water in the oil	Check tank and lines for water or leaks.
<b>Boiler pushing water with the steam</b>	1. Steam Traps	Check traps. Clean or replace as necessary.
	2. Too much boiler compound	Dump return tank and flush system. Have water tested by water treatment company.
<b>Pump will not cut off</b>	1. Dirty Probes	Clean or replace as necessary.
	2. Relay failed	Make sure relay is plugged in tightly. If so, replace water level relay.
	3. Ground Connection	Check for tightness and clean.
<b>Pump runs but does not put water into boiler</b>	1. Vapor locking of Pump.	Allow system to cool down, check steam traps and check to be sure return lines are not insulated. Check return tank temp. If it is above 180 deg. F (82 deg. C) vapor locking of pump will occur. Inspect check valves. Clean and replace as needed. Replace pump with multistage centrifugal good for 250 degrees F (121 deg. C).
	2. Impeller adjustment	Check for impeller wear and adjust per component information in instruction manual.
	3. Plugged Feed Water Nipple	Check and clean or replace as necessary.

# Maintenance

Problem	Cause	Remedy
<b>Water pump will not come on at times</b>	1. Scale on Probes	Check and clean or replace as necessary.
	2. Bad Pump Contactor	Check to see if contactor is being powered. Check to see if contactor coil is pulling in. Replace if necessary.
	3. Bad Pump Motor	Check the incoming power to the pump to be sure it is receiving power. If power is present but motor does not run, replace it.
<b>Boiler has after burn when boiler shuts down</b>	1. Bad Oil Valve	Check to see if something is holding oil valve open after it is to be closed. Clean or replace.
<b>Oil fumes coming out around the oil pump housing on shut down</b>	1. Bad draft condition	Check draft with a gauge. Draft should be a $-.02''$ to $-.04''$ ( $-0.508$ to $-1.016$ mm) W.C. with burner off or $-.04''$ to $-.06''$ ( $-1.016$ to $-1.524$ mm) W.C. when operating. May need to install a barometric damper.
	2. Venting of room	Check to see that doors to boiler room are closed to prevent air from being pulled out of the boiler area. Make sure proper openings are available as described in the manual.
<b>Boiler Flooding</b>	1. Pump does not shut off	Dirty Probes. Clean or replace as necessary.
	2. Relay failed	Make sure relay is plugged in tightly. If so, replace water level relay.
	3. Ground connection	Check for tightness and clean.
	4. Vacuum created with boiler off	As the boiler cools off, it pulls water from the system piping. To prevent this, add a $1/4''$ (6 mm) check valve on the steam gauge assembly piping, which closes under pressure and opens under vacuum.



5



# Parts

## Spare Parts

a) It is important that the correct replacement part is fitted to your Fulton Oil Fired Steam Boiler.

b) When ordering replacement or spare parts, make sure that the full information given in the Parts List is supplied, together with the following details as shown on your boiler identification plate:

1. Boiler Number
2. Boiler Type
3. Electrical Specifications

### Note:

The policy of Fulton Boiler Works, Inc. is one of continuous improvement, and therefore, we reserve the right to change prices, specifications, and equipment without notice.

# Fulton Fuel-Fired Steam Boiler

Boiler No.

National Board No.

Model

Year

MD Lbs Steam/Hr

SH

HD

HS

MWP



Fulton Boiler Works, Inc.  
Pulaski, NY 13142



# Parts

## Replacement Parts Listing (available from authorized Fulton Representative)

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
5-60-100	Instruction Manual, Fuel-Fired	2	0.91
5-60-165	Certification Papers		
5-60-164	Boiler Documentation for Export Boilers		
<b>Boiler Shell Parts</b>			
5-12-005	Furnace Refractory 8" OD x 21/2" ID (4 HP Gas Top - Old Style)	10	4.55
5-12-007	Furnace Refractory 10" OD x 3" ID (4-10 HP Top)	18	8.18
5-12-008	Furnace Refractory 10" OD x 31/2" ID (15 HP Top)	18	8.18
5-12-009	Furnace Refractory 10" OD x 5" ID (4-15 HP Bottom)	18	8.18
5-12-010	Furnace Refractory 15" OD x 51/2" ID (20 HP Top)	35	15.91
5-12-011	Furnace Refractory 15" OD x 6" ID (30 HP Top)	35	15.91
5-12-012	Furnace Refractory 15" OD x 7" ID (20 & 30 HP Bottom)	35	15.91
5-12-015	Furnace Refractory 24" OD x 8" ID (40 - 60 HP Top)	125	56.82
5-12-016	Furnace Refractory 24" OD X 10" ID (40- 60 HP Bottom)	125	56.82
2-12-000	Furnace Cement- 2 lb. can	2	0.91
2-12-001	Furnace Cement - 8 lb. can	8	3.64
2-12-002	Furnace Cement - 15 lb. can	15	6.82
5-10-353	Flue Cover Ring - 4 & 6 HP	19	8.64
5-10-354	Flue Cover Ring -10 HP	20	9.09
5-10-355	Flue Cover Ring - 15 HP	20.5	9.32
5-10-357	Flue Cover Ring - 20 HP	21	9.55
5-10-359	Flue Cover Ring - 30 HP	25	11.36
5-10-360	Flue Cover Ring - 40-60 HP	40	18.18
5-12-001	Bottom Cleanout Access Plate with Plug 4-30 HP	10	4.55
5-12-002	Bottom Cleanout Access Plate with Plug 40-100 HP	20	9.09
2-12-064	Flexitalic (HHG) Extra Heavy High Pressure	0.5	0.23
2-12-088	Blue Max HHG	0.05	0.02
5-10-800	Handhole Welding Patch 4-100 HP	1.1	0.5
2-12-004	Handhole Gasket 4-100 HP	0.05	0.02
2-11-TIL-100	3 x 4 Handhole Cover 4-10 HP (White)	2	0.91
2-11-TIL-101	3 x 4 Handhole Cover 15 HP (Red) .	2	0.91
2-11-TIL-102	3 x 4 Handhole Cover 20 HP (Green)	2	0.91
2-11-TIL-103	3 x 4 Handhole Cover 30 HP (Yellow)	2	0.91
2-11-TIL-104	3 x 4 Handhole Cover 40-100 HP (Blue)	2	0.91
2-11-TIL-105	HandholeYoke	1.5	0.68
4-11-010	10 HP Handhole Assembly (White)	7	3.18
4-11-012	15 HP Handhole Assembly (Red)	7	3.18
4-11-014	20 HP Handhole Assembly (Green)	7	3.18
4-11-016	30 HP Handhole Assembly (Yellow)	7	3.18
4-11-018	40 -100 HP Handhole Assembly (Blue)	7	3.18

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
5-21-300	Steel Jacket 4 HP - No Holes Cut	80	36.36
5-21-301	Steel Jacket 6 HP - No Holes Cut	80	36.36
5-21-302	Steel Jacket 10 HP - No Holes Cut	100	45.45
5-21-303	Steel Jacket 15 HP - No Holes Cut	115	52.27
5-21-304	Steel Jacket 20 HP - No Holes Cut	125	56.82
5-21-305	Steel Jacket 30 HP - No Holes Cut	125	56.82
5-21-306	Steel Jacket 40-60 HP - No Holes Cut	125	56.82
5-21-5066	Bottom Handhole Funnel 4-10 HP	6.5	2.95
5-21-5068	Bottom Handhole Funnel 15 HP	6.5	2.95
5-21-5070	Bottom Handhole Funnel 20 HP	6.5	2.95
5-21-5072	Bottom Handhole Funnel 30 HP	6.5	2.95
5-21-5074	Bottom Handhole Funnel 40 & 60 HP	6.5	2.95
5-21-5065	Top Handhole Funnel 4-10 HP	6.5	2.95
5-21-5067	Top Handhole Funnel 15 HP	6.5	2.95
5-21-5069	Top Handhole Funnel 20 HP	6.5	2.95
5-21-5071	Top Handhole Funnel 30 HP	6.5	2.95
5-21-5073	Top Handhole Funnel 40 - 60 HP	6.5	2.95
4-21-066	Bottom Funnel Repair Kits 4-10 HP	9.5	4.32
4-21-068	Bottom Funnel Repair Kits 15 HP	9.5	4.32
4-21-070	Bottom Funnel Repair Kits 20 HP	9.5	4.32
4-21-072	Bottom Funnel Repair Kits 30 HP	9.5	4.32
4-21-208	Bottom Funnel Repair Kits 40-60 HP	9.5	4.32
4-21-065	Top Funnel Repair Kits 4-10 HP	9.5	4.32
4-21-067	Top Funnel Repair Kits 15 HP	9.5	4.32
4-21-069	Top Funnel Repair Kits 20 HP	9.5	4.32
4-21-071	Top Funnel Repair Kits 30 HP	9.5	4.32
4-21-207	Top Funnel Repair Kits 40-60 HP	9.5	4.32
5-10-000193	6" Stack Connection 4-10 HP	6.5	2.95
5-10-000191	8" Stack Connection 15 HP	7	3.18
5-10-000189	10" Stack Connection 20 HP	7.5	3.41
5-10-000187	12" Stack Connection 30-60 HP	8	3.64
5-10-000194	6" Stack to Pipe Adaptor 4-10 HP	6.5	2.95
5-10-000192	8" Stack to Pipe Adaptor 15 HP	7	3.18
5-10-000190	10" Stack to Pipe Adaptor 20 HP	8	3.64
5-10-000188	12" Stack to Pipe Adaptor 30-60 HP	9	4.09
2-12-501	Castable Block Mix - per lb. (10 lbs. min.)-Use for top of bottom handhole up		
2-12-498	Castable Block Mix - 25 lb. bag -Use for top of bottom handhole up		
2-12-502	Kast Set - per lb. (10 lbs. minimum) - Use for making refractories		
2-12-500	Insulcrete - per lb. (10 lbs. min.) - Use for top of bottom handhole down		
2-12-497	Insulcrete - 50 lb. bag - Use for top of bottom handhole down		
5-12-020	Kaowool Sleeve for Bottom Funnel	0.9	0.41
4-12-018	Kaowool Insulation per sq. ft.		
2-12-507	Kaowool (panels) 7"		
2-21-015	Buckeye Stamping for Bottom Handhole 4-100 HP	1	0.45
2-21-092	Buckeye Stamping for Upper Handhole 4-15 HP	1	0.45
2-21-093	Buckeye Stamping for Upper Handhole 20-100 HP	1	0.45

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
2-23-171	Touch Up Paint - MICA Spray	1	0.45
4-23-014	Mica Paint - Quart	2	0.91
4-23-044	Mica Paint - Gallon	7.8	3.55
2-12-504	TIW Filler Insulation per sq ft		
<b>Burner Assembly - Parts (Common)</b>			
2-40-605	1/3 HP 115/230/60/1 Burner Motor 3450 RPM	21	9.55
2-40-606	1/3 HP 230/460/60/3 Burner Motor 3450 RPM	20	9.09
2-40-603	1/3 HP 110/220/50/1 Burner Motor 2850 RPM	25	11.36
2-40-770	1/3 HP 380/50/3 Burner Motor 2850 RPM	28	12.73
2-40-608	3/4 HP 115/230/60/1 Burner Motor 3450 RPM	25	11.36
2-40-611	3/4 HP 230/460/60/3 Burner Motor 3450 RPM	22	10
2-40-609	3/4 HP 110/220/50/1 Burner Motor 2850 RPM	28	12.73
2-40-610	3/4 HP 380/50/3 Burner Motor 2850 RPM	22	10
2-40-613	1.5 HP 115/230/60/1 Burner Motor 3450 RPM	40	18.18
2-40-614	1.5 HP 110/220/50/1 Burner Motor 2850 RPM	45	20.45
2-40-615	1.5 HP 230/460/60/3 Burner Motor 2850/3450 RPM	31	14.09
2-40-771	1.5 HP 380/50/3 Burner Motor 2850 RPM	48	21.82
2-40-773	2.0 HP 380/50/3 Burner Motor 2850 RPM	48	21.82
2-40-616	2.0 HP 115/230/60/1 Burner Motor 3450 RPM	43	19.55
2-40-618	2.0 HP 230/460/60/3 Burner Motor 3450 RPM	33	15
2-40-617	2.0 HP 110/220/50/1 Burner Motor 2850 RPM	48	21.82
2-12-014	Pyrex Plate Glass 1" - 4 -100 HP	0.1	0.05
2-45-025	Bakelite Terminal 90° for Electrode	0.05	0.02
2-45-026	Bakelite Terminal Straight for Electrode	0.05	0.02
2-45-017	Ignition Wire - per foot	0.01	0
5-20-055	Burner Scroll Casting - 4-15 HP	30	13.64
5-20-059	Burner Scroll Casting - 20 HP	35	15.91
5-20-060	Burner Scroll Casting - 30 HP	40	18.18
5-20-061	Burner Scroll Casting - 40, 50 & 60 HP	50	22.73

# Parts

Part No.	Description				Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
<b>Burner Fans:</b>						
	<b>Size</b>	<b>HP</b>	<b>Applicable Fuel</b>	<b>Hz.</b>		
2-30-407	5-1/2 x 1 1/2 x 5/8	4	#2 Oil	60	1.25	0.57
2-30-410	6-1/4 x 1-1/2 x 5/8	6	#2 Oil	50/60	1.6	0.73
2-30-412	7 x 1-1/2 x 5/8	10	#2 Oil or Comb.	60	2	0.91
2-30-413	7 x 2 x 5/8	10	#2 Oil or Comb.	50	2.2	1.00
2-30-414	7-11/16 X 1-1/2 x 5/8	15	#2 Oil or Comb.	60	2.3	1.05
2-30-417	8-3/8 x 1-1/2 x 5/8	15-20	#2 Oil or Comb.	50	2.6	1.18
2-30-418	8-3/8 x 2 x 5/8 -	30	#2 Oil or Comb.	60	3.15	1.43
2-30-431	9-15/16 X 1-1/2 x 5/8	30	#2 Oil or Comb.	50	3.75	1.70
2-30-415	7-11/16 x 2 x 5/8	20	#2 Oil or Comb.	60	2.5	1.14
2-30-559	9-15/16 x 3 x LO75	40-60	#2 Oil or Comb.	50	4	1.82
2-30-565	9-3/16 x 2-1/2 x 1	40	#2 Oil or Comb.	60	3.5	1.59
2-30-825	9-15/16 x 2-1/2 x 1	60	#2 Oil or Comb	60	4	1.82
2-30-559	9-15/16 x 3 x 1	60	#2 Oil or Comb	60	4	1.82
<b>Burner Assembly - Oil</b>						
4-45-010	Ignition Cable with Bakelite Terminal				0.5	0.23
2-40-086	Ignition Transformer- Oil 120/60/1				9.3	4.23
2-40-087	Ignition Transformer - Oil 240/60/1				9.3	4.23
2-40-088	IgnitionTransformer- Oil 120/50/1				10.6	4.82
2-40-089	Ignition Transformer - Oil 240/50/1				10.6	4.82
5-30-025	Air Deflector - Oil - 4-6 HP				11	5
5-30-020	Air Deflector - Oil - 10-15 HP				18	8.18
7-30-722	Air Deflector - Oil - 20-30 HP				24	10.91
7-30-724	Air Deflector - Oil - 40-60 HP				24	10.91
5-20-021	Ignition Electrode Holder- 4-60 HP				1	0.45
2-20-021	11" Ignition Electrode				0.2	0.09
5-10-321	10" x 4-1/2" Stainless Steel Ring - 6-15 HP - Oil				12	5.45
5-10-322	15" x 6" Stainless Steel Ring - 20 & 30 HP - Oil				18	8.18
5-10-323	24" x 6" Stainless Steel Ring - 40 & 60 HP - Oil				35	15.91
2-30-325	Oil Pressure Gauge				0.5	0.23
2-30-128	NYC Oil Regulator				2.2	1
2-30-132	Strainer for Pump				0.1	0.05
2-30-133	Seal for Oil Pump				0.1	0.05
2-30-134	Oil Pump 4-30 HP				8	3.64
2-30-135	Oil Pump 40-100 HP				8.4	3.82
2-20-080	Oil Pump Hub 4-60 HP				1	0.4
5-20-065	UK Mounting Air Gate - 4-15 HP				5	2.27
5-20-066	Damper for UK MountingPlate - 4-15 HP				1	0.4
5-20-066	UK Mounting Air Gate - 20-60 HP				5	2.27
5-20-069	Damper for UK Mounting Plate20-60 HP				1	0.4
211-070	Air Backer Plate 4-10 HP				0.5	0.2
211-069	Air Backer Plate 15 HP				0.5	0.2
211-071	Air Backer Plate 20-30 HP				0.5	0.2
211-072	Air Backer Plate 40-60 HP				0.5	0.2

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
2-40-221	Cad Cell with Holder	0.1	0.05
2-40-222	Cad Cell Only	0.1	0.05
2-20-007	Cad Cell Adaptor	0.4	0.18
2-30-130	Magnetic Oil Valve 115V	1.2	0.55
2-30-129	Magnetic Oil Valve 230V	1.2	0.55
2-30-049	Oil Nozzle 1.35 GPH - 80° 4 HP	0.1	0.05
2-30-050	Oil Nozzle 1.65 GPH - 80° 6 HP	0.1	0.05
2-30-052	Oil Nozzle 2.25 GPH - 80° 10 HP	0.1	0.05
2-30-054	Oil Nozzle 3.50 GPH - 80° 15 HP (one) and 30 HP (two)	0.1	0.05
2-30-056	Oil Nozzle 5.00 GPH - 80° - 20 HP	0.1	0.05
2-30-057	Oil Nozzle 6.00 GPH - 80° 50 HP (two) 20 HP (one)	0.1	0.05
2-30-058	Oil Nozzle 7.00 GPH - 80° 60 HP (two)	0.1	0.05
2-20-003	Single Oil Nozzle Adaptor - 4-20 HP	0.1	0.05
2-20-004	Double Oil Nozzle Adaptor - 30-100 HP	0.1	0.05
5-20-008	Oil Burner Plate - 4-20 HP	2.5	1.14
5-20-009	Oil Burner Plate - 30-100 HP	3	1.36
2-30-041	Oil Filter Complete 4-15 HP	3.5	1.59
2-30-043	Oil Filter Complete 20 & 30 HP	3.5	1.59
2-30-045	Oil Filter Complete 40-100 HP	3.5	1.59
2-30-042	Oil Filter Refill Cartridge 4-15 HP	0.1	0.05
2-30-044	Oil Filter Refill Cartridge 20 & 30 HP	0.1	0.05
2-30-046	Oil Filter Refill Cartridge 40-100 HP	0.1	0.05
2-30-038	Coupling L)50 Half Coupling	0.1	0.05
2-30-191	Coupling 40-100 L075 (1990 & After)	0.5	0.23
2-30-190	Rubber Spider for Coupling L075 - 40-60 HP	0.05	0.02
2-30-039	Rubber Spider for Coupling LO50 4-30 HP	0.05	0.02
7-30-009	Top Plate Assembly 4-15 HP- #2 Oil	15	6.82
7-30-010	Top Plate Assembly 20 HP - #2 Oil	35	15.91
7-30-011	Top Plate Assembly 30 HP - #2 Oil	35	15.91
7-30-012	Top Plate Assembly 40 - 60 HP - #2 Oil	65	29.55
7-30-035	Burner Plate Assembly 4 HP- #2 Oil	4	1.82
7-30-036	Burner Plate Assembly 6HP- #2 Oil	4	1.82
7-30-037	Burner Plate Assembly 10 HP - #2 Oil	4	1.82
7-30-038	Burner Plate Assembly 15 HP - #2 Oil	4	1.82
7-30-039	Burner Plate Assembly 20 HP - #2 Oil	4	1.82
7-30-040	Burner Plate Assembly 30 HP - #2 Oil	4	1.82
7-30-041	Burner Plate Assembly 40 & 50 HP - #2 Oil	5	2.27
7-30-042	Burner Plate Assembly 60 HP - #2 Oil	5	2.27

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
<b>Water Column</b>			
5-20-022	Fulton Water Column Bottle Casting -4-60 HP	20	9.09
2-30-151	MM 150 Pump Control	25	11.36
2-30-193	MM 150 - M/R Control	25	11.36
2-30-152	MM 150 HD Assembly	25	11.36
2-30-192	MM 150-M-HD M/R Head	25	11.36
2-12-125	MM 150-14 Gasket	0.05	0.02
2-30-136	MM 157 Pump Control and Low Water Cutoff	39.7	18.05
2-30-137	MM 53-2 Boiler Feeder and Low Water Cutoff	38.5	17.5
2-45-144	MM Mercury Switch - 2 Wire	1	0.45
2-45-143	MM Mercury Switch - 3 Wire	1	0.45
2-30-149	Water Gauge Glass Valves w/Ball Checks	1.5	0.68
2-30-047	Try Cocks	0.4	0.18
2-12-007	9-1/4" Extra Heavy Gauge Glass	0.1	0.05
2-12-017	9-1/4" Water Gauge Glass -Corning	0.05	0.02
2-12-018	10" Water Gauge Glass- MM	0.06	0.03
2-12-020	Brass Water Gauge Glass Gasket	0.0018	0
2-12-019	Rubber Water Gauge Glass Gasket	0.004	0
2-35-514	Brass Packing Nut for Gauge Glass Valve	0.1	0.05
2-30-330	Gauge Glass Protector Rods	0.04	0.02
2-12-022	Lucite Gauge Glass Guard for 9-1/4" Glass	0.4	0.18
2-12-023	Lucite Gauge Glass Guard for 10" Glass	0.5	0.23
2-12-021	Lucite Gauge Glass Guard for 12" Glass (53MM)	0.06	0.03
4-30-052	Set of four (4) Water Level Probes & Plugs - 4-60 HP	1.3	0.59
4-30-042	Set of 3 Water Column Probes	0.8	0.36
2-20-010	Pump Off Probe - 7-1/4"	0.2	0.09
2-20-011	Pump On Probe - 9-1/4"	0.2	0.09
2-20-012	Low Water Probe in Water Column -11-1/4"	0.3	0.14
2-20-017	Low Water Probe in Boiler- 17-1/8"	0.5	0.23
2-21-021	Probe Cover - 4"	1	0.45
2-21-013	Probe Basket- 4"	1	0.45
2-30-398	1/4" Male-Female Ball Valve for Water Column	0.6	0.27
<b>Panel Box Parts</b>			
2-40-420	Fulton Pump Relay-120V	0.5	0.23
2-40-421	Fulton Burner Relay - 120V	0.5	0.23
2-40-422	Base for Fulton Pump Relay	0.25	0.11
2-40-423	Base for Fulton Burner Relay	0.25	0.11
2-40-405	Fulton Pump Relay - 220V	0.5	0.23
2-40-406	Fulton Burner Relay - 220V	0.5	0.23

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
2-12-090	Spring Retainer for burner/pump relay	0.001	0
2-40-403	IDIDO - 120V Relay	2	0.91
2-40-402	IGIDO - 120V Relay	2	0.91
2-40-400	IGIDO-A-120V Relay	2	0.91
2-40-401	ID2DO - 220V Relay	2	0.91
4-45-050	Set of three (3) Coils for ID or IG Type Relay	1	0.45
4-45-051	Set of three (3) Coils ID2D0 - 220V	1	0.45
2-40-131	General Purpose Relay (Ice Cube) - AB	0.8	0.36
2-40-096	Base for Ice Cube Relay	0.1	0.05
2-45-091	On/Off Switch	0.05	0.02
2-45-092	Manual Reset Switch	0.05	0.02
2-45-090	Night Switch for two (2) Pressuretrols	0.05	0.02
2-45-022	Combination Switch - 3 Position Selector Switch - AB- NEMA 4	0.7	0.32
2-40-657	Alarm Horn - 120V	1	0.45
2-45-412	AB Green Panel Light 120V - NEMA 4	0.02	0.01
2-45-413	AB Amber Panel Light 120V - NEMA 4	0.02	0.01
2-45-411	AB Red Panel Light 120V - NEMA 4	0.02	0.01
2-45-410	AB White Panel Light 120V - NEMA 4	0.02	0.01
2-40-567	Motor Contactor - AB - 100 - A09ND3- 120V - 4-60 HP	0.8	0.36
2-40-568	Motor Contactor - AB - 100 - A09NA3- 220V - 4-60 HP	0.8	0.36
2-40-642	3 Phase Motor Contactor - AB- 100 - A12ND3 - 120V- 80-100 HP	0.8	0.36
2-40-641	3 Phase Motor Contactor - AB- 100 - A12NA3 - 220V- 80-100 HP	0.8	0.36
2-40-565	Overload - 1.0-2.9 amps	0.45	0.2
2-40-648	Overload - 1.5-1.6 amps	0.45	0.2
2-40-573	Overload - 3-12 amps	0.45	0.2
2-40-566	Overload - .4-1.6 amps	0.45	0.2
2-40-651	Overload - .6-25 amps	0.45	0.2
2-40-200	Motor Starter Relay -120V - 20 AMP	0.6	0.27
2-40-202	Motor Starter Relay - 120V - 30 AMP	0.5	0.23

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
2-40-201	Motor Starter Relay - 220V - 20 AMP	0.4	0.18
2-40-203	Motor Starter Relay - 220V - 30 AMP	0.5	0.23
2-40-223	8184 Protectorelay - Oil - 120V	3.25	1.48
2-40-224	8184 Protectorelay - Oil - 220V	3.25	1.48
4-40-050	Night Heating Pressuretrol Set Up	3.5	1.59
2-40-227	Pressuretrol L404A - 2-15 PSI	1.7	0.77
2-40-228	Pressuretrol L404A - 5-50 PSI	2	0.91
2-40-229	Pressuretrol L404A - 10-150 PSI	2	0.91
2-40-230	Pressuretrol L404A - 20-300PSI	2.7	1.23
2-40-231	Pressuretrol L404C - 2-15 PSI	2	0.91
2-40-232	Pressuretrol L404C - 5-50 PSI	2	0.91
2-40-233	Pressuretrol L404C - 10-150 PSI	2	0.91
2-40-234	Pressuretrol L404C - 20-300 PSI	2.7	1.23
2-40-161	Flame Scanner (Mini-Peeper)	0.5	0.23
2-40-260	RM7895A Programmer 20-50 HP - 120V		
2-40-262	RM7800M Programmer 60 HP - 120V	2.5	1.14
2-40-265	7 Second Prepurge Timer	0.1	0.05
2-40-266	30 Second Prepurge Timer	0.1	0.05
2-40-268	RM7800 Amplifier - For Flame Rod	0.3	0.14
2-40-273	RM7800 Amplifier - For UV Amp	0.2	0.09
2-40-161	Mini Peeper For All 7800	0.5	0.23
2-40-270	Base For All 7800	0.5	0.23
2-40-272	Display Module for 7800 Controls English (Also Available in Spanish)	0.5	0.23
2-40-247	Remote Mounting Bracket for 7800	0.65	0.3
2-40-248	Extention Cable	0.005	0
2-40-261	EC7830A Programmer 220/50	2	0.91
2-40-276	Timer 7 for EC7830/50	0.1	0.05
2-40-273	Timer 30 for EC7830/50	0.1	0.05
2-40-274	UV - Amplifier for EC7830/50	0.2	0.09
<b>Boiler Trim</b>			
2-30-395	3/4" Spring Loaded Check Valve - 200#	1.75	0.8
2-30-396	1" Spring Loaded Check Valve - 200#	2.55	1.16
2-30-397	1-1/4" Spring Loaded Check Valve - 200#	3.8	1.73
2-30-019	1/4" Ball Valve - 200#	0.6	0.27
2-30-008	1/2" Ball Valve-200#	0.7	0.32
2-30-027	3/4" Ball Valve-200#	1.4	0.64
2-30-026	1" Ball Valve - 200#	1.75	0.8
2-30-001	1" MxF Ball Valve 200#	2	0.91
2-30-017	1-1/4" Ball Valve - 200#	3.1	1.41
2-30-018	1-1/2" Ball Valve - 200#	4.7	2.14
2-30-025	2" Ball Valve - 200#	6.35	2.89
2-30-208	3" Ball Valve - 200#	18	8.18

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
2-30-391	1" Y Type Blowdown Valve - 200#	4	1.82
2-30-392	1-1/4" Y Type Blowdown Valve - 200#	5.5	2.5
2-30-393	1-1/2" Y Type Blowdown Valve - 200#	8.4	3.82
2-30-007	1" Quick Action Blowdown Valve	13	5.91
2-30-014	1-1/4" Quick Action Blowdown Valve	14	6.36
2-30-023	1-1/2" Quick Action Blowdown Valve	23	10.45
2-40-133	Timer for Automatic Blowdown System	0.8	0.36
2-30-386	1" Motorized Valve for Automatic Blowoff	9.8	4.45
2-30-387	1-1/4" Motorized Valve for Automatic Blowoff	10.7	4.86
2-30-403	1-1/2" Motorized Valve for Automatic Blowoff	12.6	5.73
2-30-144	1/2" Hot Water Solenoid Valve - 120V	1.8	0.82
2-30-090	3/4" Hot Water Solenoid Valve - 120V	1.9	0.86
2-30-1080	1" Hot Water Solenoid Valve - 120V	4	1.82
2-30-1066	1/2" Steam Solenoid Valve - 120V	2.3	1.05
2-30-122	3/4" Steam Solenoid Valve - 120V	2.5	1.14
2-30-146	1" Steam Solenoid Valve - 120V	4.5	2.05
2-30-147	1-1/4" Steam Solenoid Valve - 120V	4.9	2.23
2-30-148	1-1/2" Steam Solenoid Valve - 120V	6.3	2.86
2-30-062	1/2"-100# Safety Valve	1.2	0.55
2-30-063	1/2"-125# Safety Valve	1.3	0.59
2-30-064	3/4"-15# Safety Valve	1	0.45
2-30-065	3/4"-30# Safety Valve	1.8	0.82
2-30-067	3/4"-75# Safety Valve	3.2	1.45
2-30-068	3/4"-100# Safety Valve	2	0.91
2-30-069	3/4"-125# Safety Valve	2	0.91
2-30-070	3/4"-150# Safety Valve	1.4	0.64
2-30-071	3/4"-200# Safety Valve	5.1	2.32
2-30-073	3/4"-300# Safety Valve	2.35	1.07
2-30-074	1"-15# Safety Valve	1.1	0.5
2-30-075	1"-75# Safety Valve	4	1.82
2-30-076	1"-100# Safety Valve	4.1	1.86
2-30-077	1"-125# Safety Valve	4.1	1.86
2-30-078	1"-150# Safety Valve	4.1	1.86
2-30-079	1"-200# Safety Valve	4	1.82
2-30-081	1"-300# Safety Valve	5	2.27
2-30-082	1-1/4"-15# Safety Valve	1.85	0.84
2-30-083	1-1/4"-100# Safety Valve	6.6	3

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
2-30-084	1-1/4"-125# Safety Valve	6.75	3.07
2-30-085	1-1/4"-150# Safety Valve	6.8	3.09
2-30-086	1-1/2"-15# Safety Valve	2	0.91
2-30-087	1-1/2"-100# Safety Valve	12.4	5.64
2-30-088	1 1/2"-125# Safety Valve	10.9	4.95
2-30-089	1-1/2"-150# Safety Valve	12.3	5.59
2-35-518	1/4" Steel Pigtail Syphon for Steam Gauge Assembly-	0.6	0.27
2-30-326	0-30 PSI Steam Pressure Gauge	0.5	0.23
2-30-334	0-60 PSI Steam Pressure Gauge	0.5	0.23
2-30-333	0-200 PSI Steam Pressure Gauge	0.5	0.23
2-30-332	0-300 PSI Steam Pressure Gauge	0.5	0.23
2-30-327	0-600 PSI Steam Pressure Gauge	0.5	0.23
2-12-025	Teflon Disc for 1" Y Valve	0.2	0.09
2-11-015	Brass Seat for 1" Y Valve	0.1	0.05
2-12-026	Teflon Disc for 1-1/4" Y Valve	0.5	0.23
2-11-016	Brass Seat for 1-1/4" Y Valve	0.1	0.05
2-12-027	Teflon Disc for 1-1/2" Y Valve	0.2	0.09
2-11-017	Brass Seat for 1-1/2" Y Valve	0.1	0.05
2-12-028	Teflon Disc for 2" Y Valve	0.2	0.09
2-11-018	Brass Seat for 2" Y Valve	0.1	0.05
<b>Test Equipment/Tools</b>			
2-40-090	Test Leads	0.6	0.27
2-40-215	Microampmeter - W136	2	0.91
2-60-100	Jr. Amprobe - Y25	1	0.45
2-60-102	Pocket Draft Meter	1	0.45
2-60-103	All Purpose Draft Meter	3	1.36
2-60-104	CO Tester-Gas	15	6.82
2-60-105	CO Tubes	0.25	0.11
2-60-106	Stack Thermometer	4	1.82
2-60-108	Smoke Tester-Oil	2	0.91
2-60-110	Fisher Gauge - 50 PZ	1	0.45
2-60-112	Flue Cleanout Brush	0.8	0.36
2-60-248	Flue Brush - Pipe Type - 2" - 60 HP	1	0.45
5-10-397	Tee Handle Wrench	2.7	1.23
2-20-110	Fan Puller - 5/8" Hub	2	0.91
2-20-115	Fan Puller - 1" Hub	2	0.91
<b>Barometric Controls</b>			
2-30-091	6" M 4, 6 & 10 HP - Oil	2	0.91
2-30-094	8" M 15 HP - Oil	5	2.27
2-30-097	10" M&MG2 20 HP - Oil	8	3.64
2-30-098	12" M&MG2 30 HP - Oil	12	5.45
2-30-099	14" M&MG2 50 - 100 HP - Oil	16	7.27
2-30-0415	16" M&MG2	25	11.36

# Parts

Part No.	Description	Approx. Net Weight (lbs.)	Approx. Net Weight (kgs.)
<b>Spare Parts Kit</b>			
4-50-000003	Spare Parts Kit No. 4-100 BHP Oil	5	2.27
6	2-12-000004 Handhole Gaskets		
1	2-12-000017 9-1/4" Gauge Glass		
2	2-12-000019 Water Gauge Glass Rubber		
2	2-12-000020 Water Gauge Glass Fiber		
2	2-20-000019 Ignition Electrodes		
1	5-10-000397 Tee Handle Wrench		
1	4-30-000052 Set of (4) Plugs and Probes		
2	2-30-00005x Oil Nozzles		
1	2-60-000112 Flue Cleanout Brush		
<b>Gaskets</b>			
2-12-513	Bottom Cleanout Gasket Only	0.5	0.23
2-12-514	Combination Gasket	0.05	0.02
4-12-100	Flue Cover Plate Gasket - 4 HP	1.5	0.68
4-12-102	Flue Cover Plate Gasket - 6 HP	1.5	0.68
4-12-104	Flue Cover Plate Gasket -10 HP	1.5	0.68
4-12-106	Flue Cover Plate Gasket -15 HP	1.8	0.82
4-12-108	Flue Cover Plate Gasket - 20 HP	2	0.91
4-12-110	Flue Cover Plate Gasket - 30 HP	2	0.91
4-12-112	Flue Cover Plate Gasket - 40-60 HP	2.5	1.14
2-12-210	1/4" Braided Rope Gasket 4-100 HP - price per foot	0.25	0.11
2-12-077	Handhole Funnel Gasket 20-100 HP Top	0.05	0.02
2-12-078	Handhole Funnel Gasket 4-15 HP Top	0.05	0.02
2-12-079	Handhole Funnel Gasket 4-100 HP Bottom	0.05	0.02
2-12-528	Scroll Gasket - 4 HP	1	0.45
2-12-529	Scroll Gasket - 6-15 HP	1	0.45
2-12-530	Scroll Gasket- 20-30 HP	1	0.45
2-12-531	Scroll Gasket- 40-60 HP	1	0.45
2-12-537	Stack Extension Gasket 6" 4-10 HP	1	0.45
2-12-538	Stack Extension Gasket 8" 15 HP	1	0.45
2-12-539	Stack Extension Gasket 10" 20 HP	1	0.45
2-12-540	Stack Extension Gasket 12" 30-60 HP	1	0.45
2-12-519	Top Plate Gasket - 4-15 HP	1	0.45
2-12-520	Top Plate Gasket - 20-30 HP	1	0.45
2-12-521	Top Plate Gasket - 40-60 HP	1	0.45

See the following component assembly drawings to assist with parts identification.

# Parts

## Panel Box Parts

Part No.	Relays	HP
2-40-420	Fulton Pump Relay - 120V	4-100
2-40-421	Fulton Burner Relay - 120V	4-100
2-40-422	Base for Fulton Pump Relay	4-100
2-40-423	Base for Fulton Burner Relay	4-100
2-40-405	Fulton Pump Relay 220V	4-100
2-40-406	Fulton Burner Relay 220V	4-100
2-40-403	IDIDO-120V Relay	4-100
2-40-402	IGIDO - 120V Relay (manual reset)	4-100
2-40-400	IGIDO-A-120V Relay	4-100
2-40-401	ID2DO - 220V Relay	4-100

Part No.	Switches	HP
2-45-091	On/Off Switch	4-100
2-45-092	Manual Reset Switch	4-100
2-45-090	Night Switch for two (2) Pressuretrols	4-100

Part No.	Motor Starter Relays (Single Phase)	HP
2-40-200	Motor Starter Relay - 120V - 20 AMP	4-50
2-40-202	Motor Starter Relay - 120V - 30 AMP	4-50
2-40-201	Motor Starter Relay - 220V - 20 AMP	4-50
2-40-203	Motor Starter Relay - 220V - 30 AMP	4-50

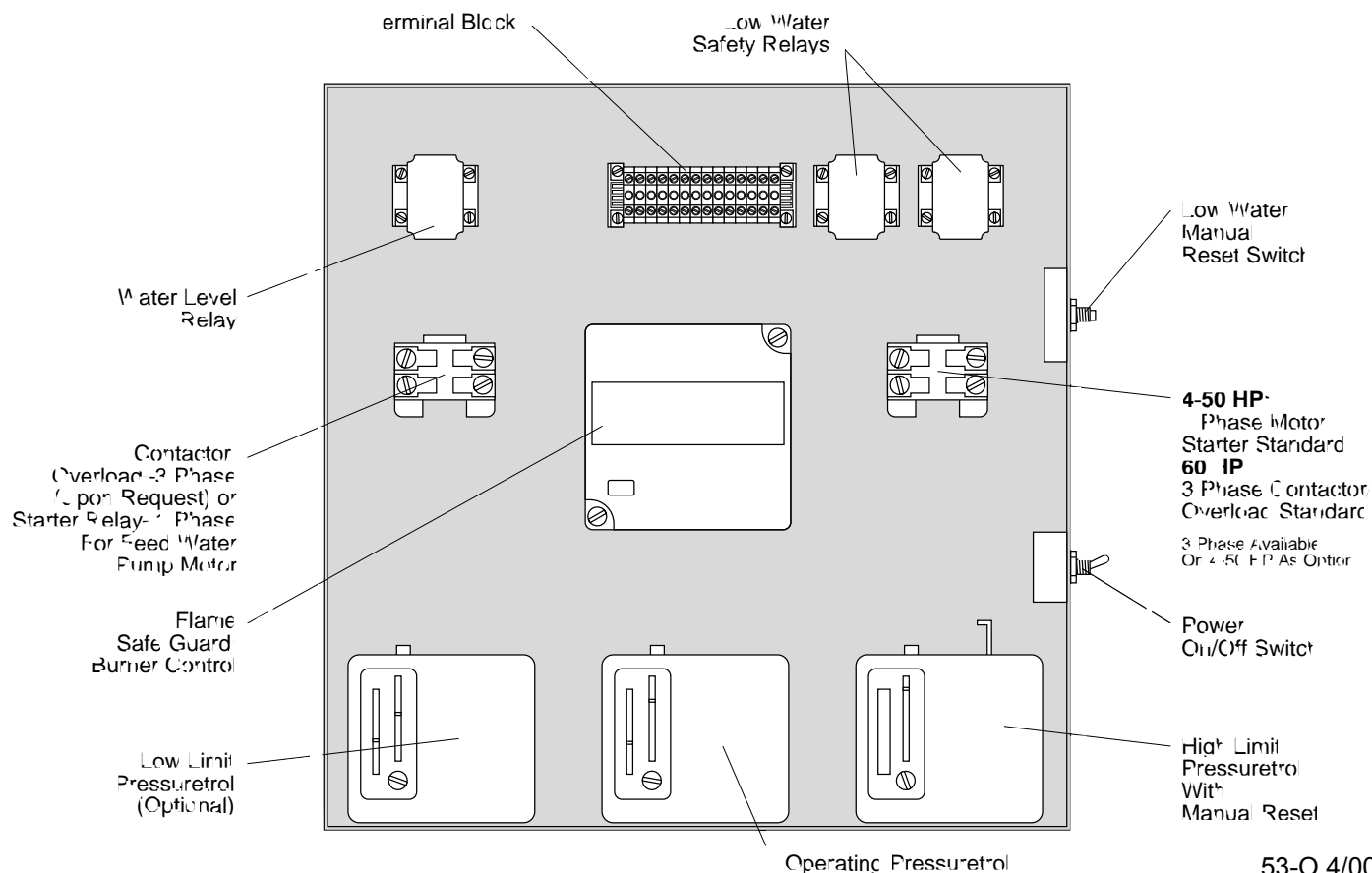
Part No.	Flame Safeguard Control	HP
2-40-223	8184 Protectorelay 120V	4-15
2-40-224	8184 Protectorelay 220V	4-15
2-40-260	RM7895A Programmer	20-50
2-40-262	RM7800M Programmer	60-100
2-40-272	Display Module For 7800 Series Controls	60-100

Part No.	Motor Contactors (Three Phase)	HP
2-40-568	Contactant -9A/220V	4-60
2-40-567	Contactant- 9A120V	4-60
2-40-565	Overload - 1.0-2.9 amps	
2-40-648	Overload - 1.5-1.6 amps	
2-40-573	Overload - 3-12 amps	
2-40-566	Overload - .4-1.6 amps	
2-40-651	Overload - .6-25 amps	Note:

Contactant Overload depends on motor h.p. and voltage

Part No.	Pressuretrols	HP
4-40-050	Night Heating Pressuretrol Set Up	4-100
2-40-227	Pressuretrol L404A - 2-15 PSI	4-100
2-40-228	Pressuretrol L404A - 5-50 PSI	4-100
2-40-229	Pressuretrol L404A - 10-150 PSI	4-100
2-40-230	Pressuretrol L404A - 20-300 PSI	4-100
2-40-231	Pressuretrol L404C - 2-15 PSI	4-100
2-40-232	Pressuretrol L404C - 5-50 PSI	4-100
2-40-233	Pressuretrol L404C - 10-150 PSI	4-100
2-40-234	Pressuretrol L404C - 20-300 PSI	4-100

Note: Correct pressuretrol is based on boiler trim pressure.



# Parts

1	Part No.*	Burner Motor	RPM	HP
	2-40-605	1/3 HP 115/230/60/1	3450	4-15
	2-40-606	1/3 HP 230/460/60/3	3450	4-15
	2-40-603	1/3 HP 110/220/50/1	2850	4-15
	2-40-770	1/3 HP 380/50/3	2850	4-15
	2-40-608	3/4 HP 115/230/60/1	3450	20-30
	2-40-611	3/4 HP 230/460/60/3	3450	20-30
	2-40-609	3/4 HP 110/220/50/1	2850	20-30
	2-40-772	2.0 HP 380/50/3	2850	40-60
	2-40-616	2.0 HP 115/230/60/1	3450	40-60
	2-40-618	2.0 HP 230/460/60/3	3450	40-60
	2-40-617	2.0 HP 110/220/50/1	2850	40-60

\*The correct part number is located on the burner motor.

2	Part No.	Burner Scroll Casting	HP
	2-11-123	Burner Scroll Casting	4-15
	5-20-059	Burner Scroll Casting	20
	5-20-060	Burner Scroll Casting	30
	2-11-126	Burner Scroll Casting	40-60

3	Part No.*	Burner Fan	Fuel	HZ	HP
	2-30-462	5-1/2 x 1 x 5/8	#2 Oil	60	4
	2-30-407	5-1/2 x 1 1/2 x 5/8	#2 Oil	60	4
	2-30-410	6-1/4 x 1-1/2 x 5/8	#2 Oil	50/60	6
	2-30-412	7 x 1-1/2 x 5/8	#2 Oil /Comb.	60	10
	2-30-413	7 x 2 x 5/8	#2 Oil /Comb.	50	10
	2-30-414	7-11/16 X 1-1/2 x 5/8	#2 Oil /Comb.	60	15
	2-30-417	8-3/8 x 1-1/2 x 5/8	#2 Oil or Comb.	50	15-20
	2-30-418	8-3/8 x 2 x 5/8 -	#2 Oil or Comb.	60	30
	2-30-431	9-15/16 X 1-1/2 x 5/8	#2 Oil or Comb.	50	30
	2-30-415	7-11/16 x 2 x 5/8	#2 Oil or Comb.	60	20
	2-30-559	9-15/16 x 3 x LO75	#2 Oil or Comb.	50	40-60
	2-30-565	9-3/16 x 2-1/2 x 1	#2 Oil or Comb.	60	40
	2-30-825	9-15/16 x 2-1/2 x 1	#2 Oil or Comb.	60	60
	2-30-559	9-15/16 x 3 x 1	#2 Oil or Comb.	60	60

\*The correct part number is located on the back of the fan plate.

4	Part No.	Ignition Transformer
	2-40-086	120/60/1
	2-40-087	240/60/1
	2-40-088	120/50/1
	2-40-089	240/50/1

5	Part No.	Air Deflector	HP
	5-30-025	Air Deflector	4-6
	5-30-020	Air Deflector	10-15
	7-30-722	Air Deflector	20-30
	7-30-724	Air Deflector	40-60

6	Part No.	Oil Nozzle*	HP
	2-30-048	1.00 GPH - 80°	4
	2-30-050	1.65 GPH - 80°	6
	2-30-052	2.25 GPH - 80°	10
	2-30-054	3.50 GPH - 80°	15 & 30
	2-30-056	5.00 GPH - 80°	20
	2-30-057	6.00 GPH - 80°	40-50
	2-30-058	7.00 GPH - 80°	60

\* 30 -100 HP require two

7	Part No.	Magnetic Oil Valve
	2-30-130	Magnetic Oil Valve 115V
	2-30-129	Magnetic Oil Valve 230V

8	Part No.	Oil Pump	HP
	2-30-134	Oil Pump #2 oil	4-30
	2-30-135	Oil Pump #2 oil	40-60

	Part No.	Flame Detectors	HP
9	2-40-221	Cad Cell with Holder	4-15
10	2-20-007	Cad Cell Adaptor	4-15
11	2-40-161	Scanner for 7800 Series	20-60

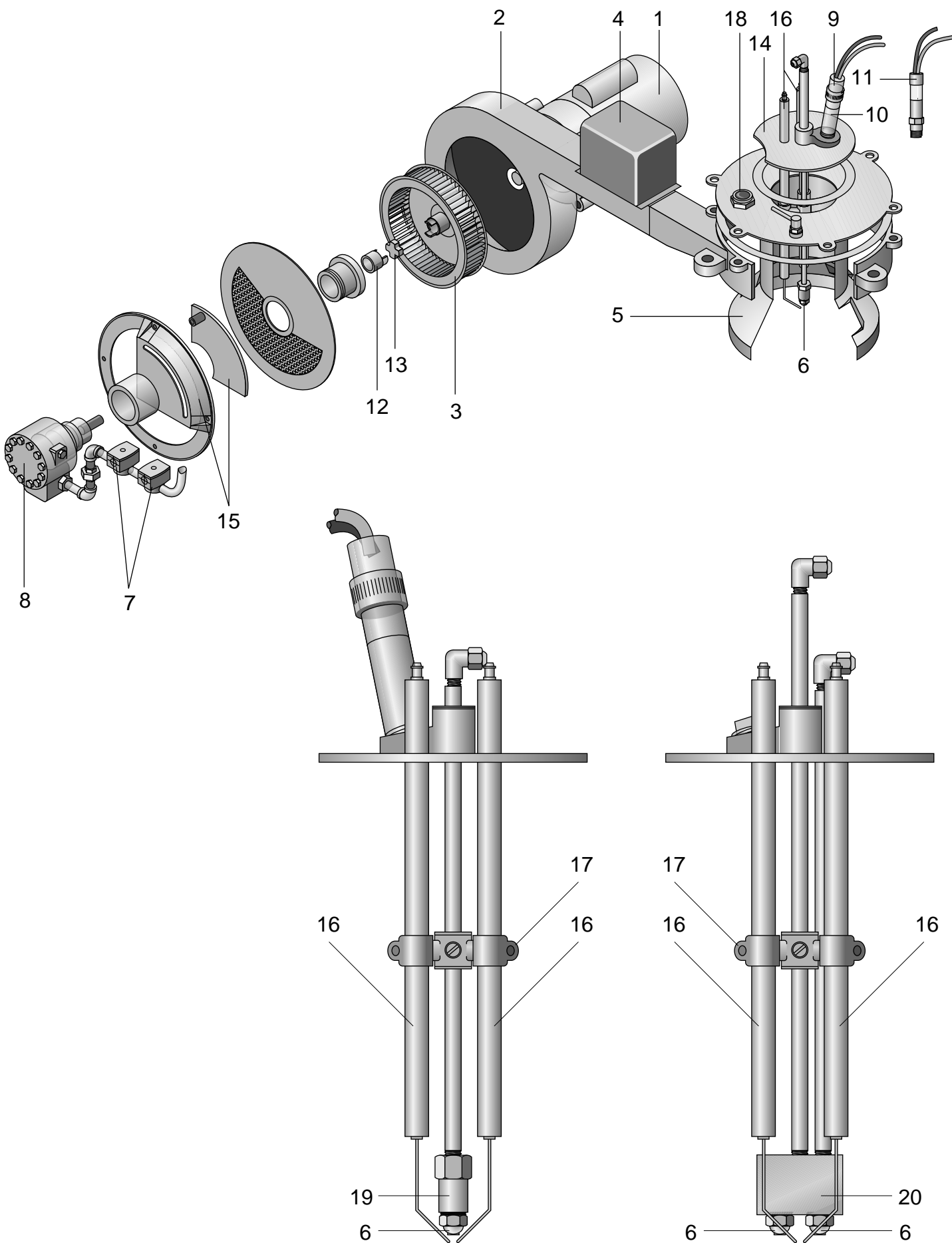
	Part No.	Couplings	HP
12	2-30-191	Coupling Fan to Oil Pump	40-60
13	2-30-190	Rubber Spider for Coupling	40-60
	2-30-039	Rubber Spider for Coupling	4-30
	2-30-038	Coupling LO50 half	

14	Part No.	Burner Plate	HP
	5-20-063	Oil Burner Plate	4
	5-20-008	Oil Burner Plate	6-20
	5-20-009	Oil Burner Plate	30-100

15	Part No.	Air Gate	HP
	5-20-065	U.K. Air Gate	4-15
	5-20-066	U.K. Air Gate	20-60

	Part No.	Electrode Parts	HP
16	2-20-021	11" Ignition Electrode	4-60
17	5-20-021	Ignition Electrode Holder	4-60
18	2-12-014	Pyrex Plate Glass 1"	4-60
19	2-20-003	Single Oil Nozzle Adaptor	4-20
20	2-20-004	Double Oil Nozzle Adaptor	30-60

## Parts

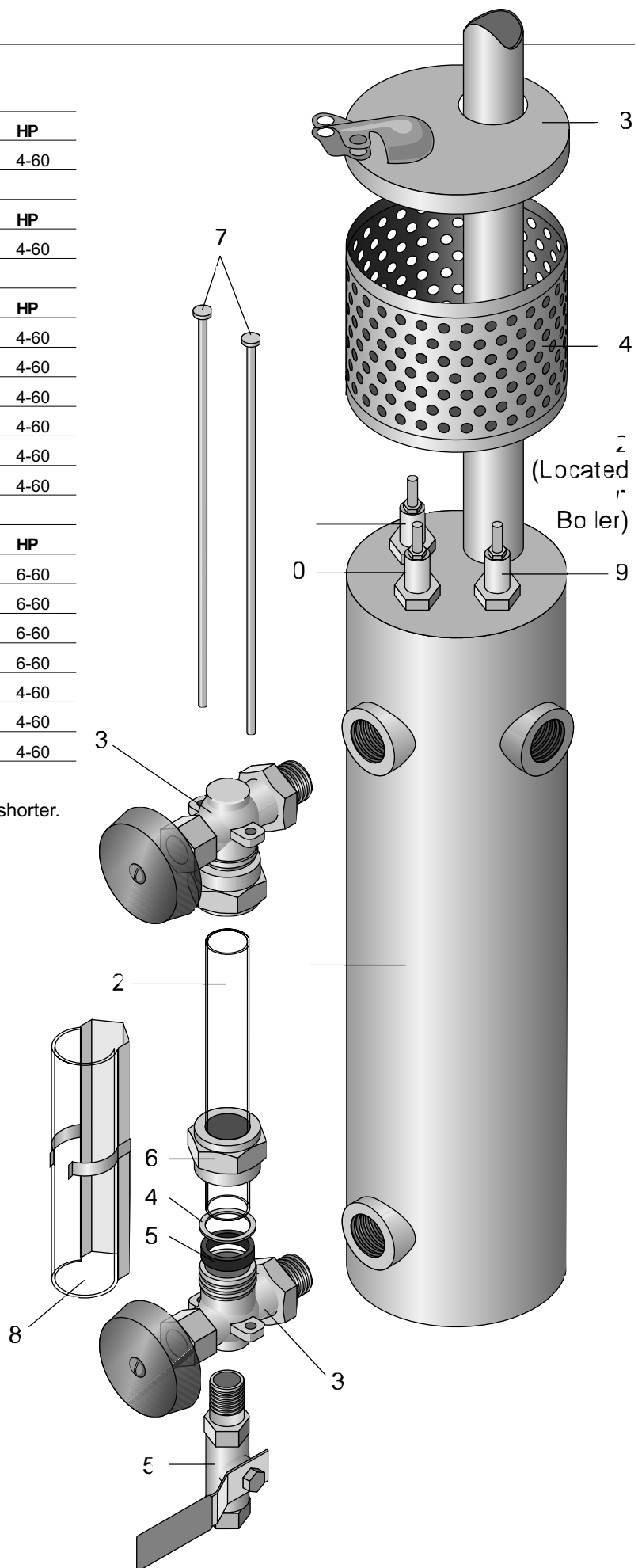


# Parts

## Water Column - Parts

<b>1</b>	<b>Part No.</b>	<b>Water Column Bottle Casting</b>	<b>HP</b>
	5-20-022	Water Column Bottle Casting	4-60
<b>2</b>	<b>Part No.</b>	<b>Water Gauge Glass</b>	<b>HP</b>
	2-12-017	9-1/4" Water Gauge Glass -Corning	4-60
	<b>Part No.</b>	<b>Water Gauge Glass Trim</b>	<b>HP</b>
<b>3</b>	2-30-149	Water Gauge Glass Valves w/Ball Checks	4-60
<b>4</b>	2-12-020	Brass Water Gauge Glass Gasket	4-60
<b>5</b>	2-12-019	Rubber Water Gauge Glass Gasket	4-60
<b>6</b>	2-35-514	Brass Packing Nut for Gauge Glass Valve	4-60
<b>7</b>	2-30-330	Gauge Glass Protector Rods	4-60
<b>8</b>	2-12-022	Lucite Gauge Glass Guard -9-1/4" Glass	4-60
	<b>Part No.</b>	<b>Water Level Probes &amp; Plugs</b>	<b>HP</b>
<b>9</b>	2-20-010	*Pump Off Probe - 7-1/4"	6-60
<b>10</b>	2-20-011	*Pump On Probe - 9-1/4"	6-60
<b>11</b>	2-20-012	*Low Water Probe in Water Column-11-1/4"	6-60
<b>12</b>	2-20-017	Low Water Probe in Boiler- 17-1/2"	6-60
<b>13</b>	2-21-021	Probe Cover	4-60
<b>14</b>	2-21-013	Probe Basket	4-60
<b>15</b>	2-30-398	1/4" Ball Valve for Water Column	4-60

\*For 4 HP boilers only, the water column probes are 2" shorter.



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# **Standard Warranty for Fulton Boilers**

Warranty Valid for Models ICS, ICX, ICW, ICXW, VMP, VMPW, FB-A, FB-F, FB-L, FB-S, FB-W

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## **Five (5) Year (60 Months) Material and Workmanship Warranty**

The pressure vessel is covered against defective material or workmanship for a period of five (5) years from the date of shipment from the factory. Fulton will repair or replace F.O.B. factory any part of the equipment, as defined above, provided this equipment has been installed, operated and maintained by the buyer in accordance with approved practices and recommendations made by Fulton. The commissioning agency must also successfully complete and return the equipment Installation and Operation Checklists to Fulton's Quality Assurance department. This warranty covers any failure caused defective material or workmanship; however, waterside corrosion or scaling is not covered. Therefore, it is imperative that the boiler water management and chemistry be maintained as outlined in the Installation and Operation Manual.

## **Parts Warranty**

Fulton will repair or replace F.O.B. factory any part of the equipment of our manufacture that is found to be defective in workmanship or material within one (1) year of shipment from the factory provided this equipment has been installed, operated and maintained by the buyer in accordance with approved practices and recommendations made by both Fulton and the component manufacturers and the commissioning agency has successfully completed and returned the equipment Installation and Operation Checklists to Fulton's Quality Assurance department.

## **General**

Fulton shall be notified in writing as soon as any defect becomes apparent. This warranty does not include freight, handling or labor charges of any kind.

These warranties are contingent upon the proper sizing, installation, operation and maintenance of the boiler and peripheral components and equipment. Warranties valid only if installed, operated, and maintained as outlined in the Fulton Installation and Operation Manual.

No Sales Manager or other representative of Fulton other than the Quality Manager or an officer of the company has warranty authority. Fulton will not pay any charges unless they were pre-approved, in writing, by the Fulton Quality Manager.

This warranty is exclusive and in lieu of all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Fulton shall in no event be liable for any consequential or incidental damages arising in any way, including but not limited to any loss of profits or business, even if the Fulton Companies has been advised of the possibility of such damages. Fulton's liability shall never exceed the amount paid for the original equipment found to be defective.

To activate the warranty for this product, the appropriate commissioning sheets must be completed and returned to the Fulton Quality Assurance department for review and approval.



9/9/09



# Extended Warranty for Fulton Skid Mounted Steam Boilers

Warranty Valid for Models ICS, ICX, VMP, FB-A, FB-F, FB-L, FB-S

## Ten (10) Year Material and Workmanship Warranty

The pressure vessel is covered against defective material or workmanship for a period of ten (10) years from the date of shipment from the factory. Fulton will repair or replace at our option, F.O.B. factory any part of the equipment, as defined above, provided this equipment has been installed, operated and maintained in accordance with the Installation, Operation and Maintenance Manual. The commissioning agency must also successfully complete and return the equipment Installation and Operation Checklist to Fulton's Service Department. This warranty covers any failure caused by defective material or workmanship, however, waterside corrosion or scaling is not covered. Therefore, it is imperative that the boiler water management and chemistry be maintained as outlined in the Installation, Operation and Maintenance Manual.

The extended warranty is valid only for steam boilers that are purchased as part of a skid mounted boiler system. Generally, this system MUST include ALL of the following equipment in order for the warranty to apply.

1. Fulton boiler with model number as listed above.
2. Fulton DA or condensate return system with preheat kit.
3. Fulton blowdown tank/separator
4. Water softener
5. Chemical feed system
6. Automatic surface or bottom blowdown, which must operate to maintain TDS levels as specified in the Installation, Operation and Maintenance Manual.

Any deviation or additional equipment specified by Fulton Engineering must be used and maintained per the Installation, Operation and Maintenance Manual

There is a \$1,000 labor allowance for any failed pressure vessel that is covered under the above warranty.

## Parts Warranty

Fulton will repair or replace FOB factory any part of the equipment of our manufacture that is found to be defective in workmanship or material within twelve (12) months of shipment from the factory provided this equipment has been installed, operated and maintained by the buyer in accordance with approved practices and recommendations made by both Fulton and the component manufacturers.

## General

Fulton shall be notified in writing as soon as any defect becomes apparent. This warranty does not include freight, handling or labor charges of any kind.

No Sales Manager or other representative of Fulton other than the Quality Manager or an officer of the company has warranty authority. Fulton will not pay any charges unless they were pre-approved, in writing, by the Fulton Quality Manager.

This warranty is exclusive and in lieu of all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Fulton shall in no event be liable for any consequential or incidental damages arising in any way, including but not limited to any loss of profits or business, even if Fulton has been advised of the possibility of such damages. Fulton's liability shall never exceed the amount paid for the original equipment found to be defective.

## Conditions of Warranty

Warranties are only valid if the boiler is installed, operated and maintained as outlined in the Installation, Operation and Maintenance Manual. Fulton shall accept no responsibility if the equipment has been improperly installed, operated or maintained or if the buyer has permitted any unauthorized modification, adjustment, and/or repairs to the equipment. The use of replacement parts not manufactured or authorized by Fulton will void any warranty express or implied.

Warranty coverage for all components and equipment in said warranty are not valid unless the boiler is started up by a factory certified technician. The commissioning agency must successfully complete and return the equipment Installation and Operation Checklist to Fulton's Service department.

The boiler must be maintained in accordance with the product manual and annual combustion and maintenance reports must be produced for warranty consideration.

The warranty is valid for the original installation only in the U.S.A and Canada.



08/20/10



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