INSTALLATION AND OPERATOR'S MANUAL

B SERIES WASTE OIL BOILER – B300 • B500 • B1000

SAVE THESE INSTRUCTIONS

IMPORTANT: IN ORDER TO ACHIEVE SAFE AND SATISFACTORY RESULTS FROM YOUR ALTERNATE HEATING SYSTEMS BOILER, READ SAFETY RULES AND INSTRUCTIONS CAREFULLY BEFORE INSTALLING AND OPERATING. ALL INSTALLATIONS MUST BE IN ACCORDANCE WITH STATE AND LOCAL CODES. SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.

Your Alternate Heating Systems Boiler is capable of generating very hot temperatures. Boiler temperatures and flames in the ignition box area are capable of causing ignition or explosion of explosive or flammable products or explosion of the boiler itself if maximum safe water temperature is exceeded. Maximum safe water temperature is 200° Fahrenheit. Flammable or explosive products must never be stored in the same room or in the vicinity of a boiler, and the boiler water temperature must never be allowed to exceed 200° Fahrenheit.

ALTERNATE HEATING SYSTEMS
2395 LITTLE EGYPT RD
HARRISONVILLE, PA 17228
717-987-0099
WWW.WOODGUN.COM
EMAIL:SERVICE@WOODGUN.COM

Record Model and Serial Number Below:

Model:
Serial Number:
Date of Purchase:

REV 9192024

Print Date: 09/19/24

B-Series Boilers
come with the
ASME H stamp.

Table of Contents

INTRODUCTION

The Alternate Heating Systems used oil-fired boilers have been specifically designed for burning No. 2 fuel oil, used motor oil, transmission oil, and mixtures not exceeding 50 SAE. These boilers have unique features not found on conventional boiler designs.

Alternate Heating Systems manufactures the boiler vessel to ASME standards. Used oil combustion technology differs significantly from burners designed for No. 2 fuel oil only. Additionally, used oil combustion in the boiler can produce adverse results not encountered in warm air heat exchangers. Various boiler models may have different electrical exchangers. Various boiler models may have different electrical components and control logic due to the diversity of boiler installations and options available. The appropriate "ladder logic" electrical diagram is provided with each unit.

The draft inducing fan is essential for proper operation of the boiler. This fan serves two functions: creating a negative pressure in the combustion chamber, and a positive pressure in the ash recovery cyclone. Waste oil combustion produces an ash residue which clings to all exposed fireside surfaces on the boiler. The aspirating effect of the draft inducing fan pulls much of this ash through the heat exchanger and deposits it in the ash receiver of the cyclone. However, some ash accumulation will occur in the firing chamber and the fire tubes which must be cleansed out periodically to maintain proper heat transfer efficiency.

Easy access to the fire tubes is provided by the large door on the rear of the boiler. A tube brush is provided with boiler models that have multiple tubes. **CAUTION: DO NOT OPEN THE ACCESS DOOR UNLESS THE POWER HAS BEEN TURNED OFF.** There is an opening in the lower part of the inspection door for secondary combustion air. This opening must never be covered or closed in any manner.

The fan cover assembly can be removed by loosening the retainer nuts. When replacing the fan cover assembly, attention must be given to tightening the retainer nuts evenly to ensure a proper seating of the gasket on the edge of the swirl chamber. These nuts should be checked periodically and tightened if necessary to prevent ash leakage.

The draft inducing fan is activated first in the startup sequence. This reduces the possibility of smoke release when the burner ignites. The control logic also contains a draft sensing switch which must detect a pressure differential within the unit or the burner will not operate.

This boiler must be installed by a qualified technician, knowledgeable in hot water heating system design requirements.

These boilers may have one or more hot water heating coils to produce domestic hot water for car washes, showers, etc. Consult the enclosed diagram for an appropriate method for piping the domestic coils. If the boiler coil serves hand taps it must have a tempering valve to ensure that excessively hot water does not contact humans.

If anything in this manual is unclear or technical assistance is required, contact your authorized representative or call Alternate Heating Systems, Inc. at 717-987-0099 or email service@woodgun.com

CODE INFORMATION

Purchase of an Alternate Heating Systems multi-oil boiler is a wise investment. To maximize the return on this investment you must read the manual. It contains installation instructions, diagnostic procedures, burner cleaning, maintenance procedures, and parts ordering information. Follow the installation instructions very carefully.

You can expect years of reliable performance with a properly installed and maintained system.

NOTE: THIS BOILER CANNOT BE USED FOR RESIDENTIAL USE!

The installation of the equipment shall be in accordance with the codes and regulations of authorities (state or local) having jurisdiction over environmental control, fuel, fire, and electrical safety. The installation of equipment in the United States must consider the requirements of the following publications of the National Fire Protection Association, Battery March Park, Quincy, Massachusetts 02269:

N.F.P.A. No. 30	Flammable and Combustible Liquids Code
N.F.P.A. No. 31	Standard for installation of oil burning equipment
N.F.P.A. No. 88A	Standard for parking Structures
N.F.P.A. No. 88B	Standard for Repair Garages
N.F.P.A. No. 211	Standard for Chimney, Fireplaces Vents and Solid fuel Burning Appliances

The installation of equipment in Canada must consider the requirements of CSA, Standard B139, Installation code for Oil Burning Equipment.

NOTE: Installation, operating, and maintenance permits from each of the above authorities may be required, as well as municipal permits.

Please read and save your manual for future reference. Read your installation manual thoroughly first in order to insure that your new heating system operates properly.

This boiler is listed for burning #2 fuel oil, used motor oil, and transmission oils with mixtures not exceeding 50 S.A.E.

DO NOT BURN unknown garbage oils, gasoline, naptha, or chlorinated cleaning solvents in this boiler.

PACKING LIST

Packed with Boiler
Manual
Relief Valve
Temperature/Pressure Gauge
Cyclone w/Ash Pan
Draft Box Elbow
Draft Box
Silicone Gasket
Fan Cover Assembly
Fan Cover Jib Arm
Movable Target Board and Stand
T-handle Knobs for Inspection Door
Low Water Cutoff

Boiler Installation

Sizing Boiler Correctly

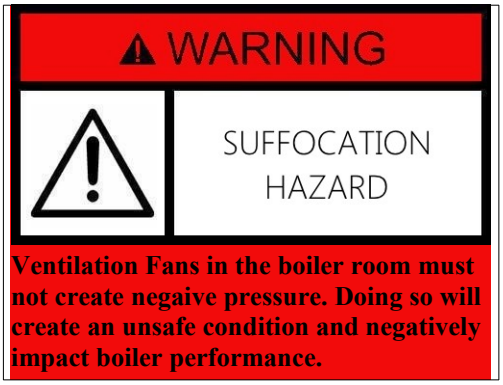
In order to make a prudent choice when determining the size of a waste oil boiler required for an installation, it is necessary to do a heat loss survey of the building.

If the unit is equipped with a domestic hot water coil, this fact will need to be considered when sizing. Drawing hot water at a rate of 3 gallons per minute requires approximately 150,000 BTU/HR, assuming a temperature rise of 100 degrees F (55 degrees C). Other unusual factors such as supplying heat for a pool or hot tub should be considered.

NOTE: B500 max flow is 50 GPM at 20 degrees temperature difference. B1000 max flow is 100 GPM at 20 degrees temperature difference

Boiler Location

B-Series Waste Oil Boilers radiate heat from multiple surfaces. This heat can be dangerous if the boiler is improperly installed. The boiler must stand on a noncombustible material such as brick, stone tile or concrete. NEVER place a boiler directly on a wood floor. The noncombustible material upon which the boiler stands should extend at least 12 inches beyond the base of the boiler in the rear and on the sides and at least 36 inches in front. The boiler must be installed in an area dedicated to the boiler and its related equipment. This area must be partitioned or separated from any living area of a residence. The room must have a constant fresh air supply to assure proper combustion of the fuel as well as ventilation of any by-products of combustion.



Boiler Room Requirements

- ✔ Must have adequate lighting, and should include a source of emergency light.
- ✔ A convenient water supply should be available for boiler flushing and to clean the boiler room floor.
- ✔ Unobstructed floor drains should be available.
- ✔ Must not be installed where there is the possibility of the accumulation of explosive vapors.
- ✔ Must have adequate air supply, which must be kept clear and unobstructed at all times. Since the combustion process requires a continuous supply of air, it is essential that provisions are made to supply adequate air to the boiler room. This air supply is necessary to insure complete combustion and venting of any gases or smoke that would be emitted from this solid fuel-burning boiler in case the boiler malfunctions.
- ✔ Electrical disconnect at point of entrance to boiler room.
- ✔ Walls and ceiling must be of fire-rated construction. Consult local or state codes for requirements.

Since the combustion process requires a supply of air at all times, it is essential that provisions are made to supply adequate air to the boiler room. This air supply is necessary to insure complete combustion, a clean fire,

and to prevent nuisance shutdowns due to excessively dirty burner parts. Air from the outside may be provided through ducts, fixed louvers, or motorized louvers.

Rigging and Positioning of Boiler

Do not attempt to move or off-load the boiler without the aid of a crane or dolly. All Alternate Heating Systems boilers have at least one or two lifting lug(s) on the top. Use caution whenever moving a boiler. When choosing the equipment to move and/or position the boiler, always be sure of the load rating on the equipment prior to use.

A ratchet puller (come along) device may be needed to move a boiler where the ground level changes in elevation. AHS suggests that professional movers should be used in any unpredictable situation. This is to prevent damage to the product, property, and to eliminate the potential for bodily injury.

Once the boiler is on the floor level where it will be installed, the unit may be rolled on pipe or may be moved by means of a pallet jack. The boiler must be placed on a concrete slab or other rigid pad of non-combustible material with sufficient strength to adequately support the boiler, **including its contents of water**.

The boiler should be positioned as closely as possible to the chimney. The smoke pipe must pitch continually upward toward the chimney and contain as few elbows as possible. No more than a total of THREE 90's can be made in a system. Level the boiler after it has been positioned.

Before proceeding with installation, inquire with local building officials to ensure that the installation is in compliance with all building, plumbing and electrical codes.

A qualified technician experienced in boiler installations is recommended for the installation of this unit. Wiring on the boiler must be properly grounded.

Be sure to Level the Boiler.

NOTE: This unit is not approved or recommended for use in residential applications.

Clearances Required for Safety and Operation

It is important to provide sufficient clearance around the boiler from combustibles and for convenient servicing and clean-out. The required minimums for B-Series Waste Oil Boilers when measured from the exterior of the boiler are:

- **Rear**: 36 inches to the rear (end of boiler with large door)
- **Sides**: 24 inches to the right side (when facing the front of the boiler)
- **Front**: 36 inches, (end of boiler with fan assembly)
- **Top**: 12"
- **Cyclone**: 18"
- **Chimney** Connector: 18"

Many boiler codes require a minimum of 3 feet of clearance on all sides. It is the customer's responsibility to determine whether the installation complies with local code or insurance company requirements.

Chimney Size Requirements

- **B300**: 6 inch minimum
- **B500**: 8 inch minimum
- **B500M**: 8 inch minimum
- **B1000**: 10 inch minimum

General Chimney Introduction

One of the most important considerations in installing a waste-oil boiler is the type of chimney that will be used. The condition and construction of the chimney is important for providing sufficient draft. The B-Series Waste Oil Boiler produces its own draft.

> NOTE: For insurance and building code compliance check with your local building inspector and insurance agent.

Draft

Natural draft in a chimney results from several factors. The main characteristic of draft is lower pressure at the top opening of the chimney than further down. This can be created by air currents blowing across the top of the chimney. In addition, draft is also produced when the temperature of the flue gases is higher than the atmosphere around the chimney. This is known as the stack effect. A chimney must be kept warm (about 250º F) for proper draft to occur. A chimney's height, expressed as the difference between the top opening and the flue pipe connection on the appliance, contributes to draft because atmospheric pressure is naturally lower at the chimney top than bottom.

It is more difficult to maintain sufficient temperature in an exposed chimney, or one that is oversized, than a chimney that is correctly sized and protected from outside temperature extremes. For this reason, insulated chimneys typically provide more draft, due to increased stack effect. A chimney with a oversized cross-sectional area may have difficulty becoming warm enough to produce good draft, because gases cool too much before exiting the chimney. This can create condensation which brings a host of issues.

The chimney must be sufficiently tall (at least 20 feet for masonry chimneys) and should extend at least three feet above the highest part of the roof to prevent downdrafts. The chimney must be leak-free from the standpoint of air entering through cracks or other chimney defects or through loose stovepipe fittings.

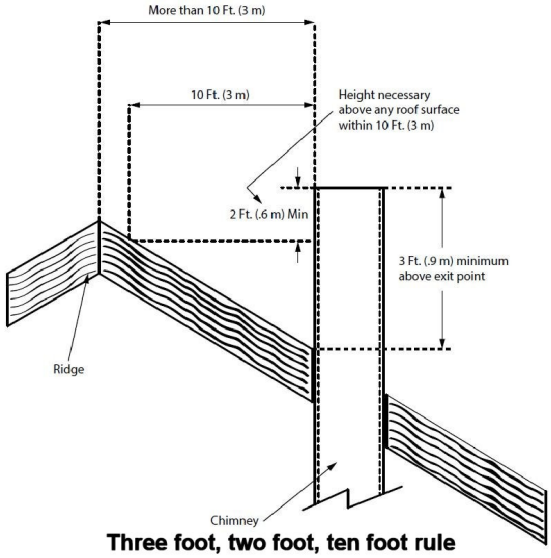


Figure 1: 3-2-10 Rule for Chimneys

If the chimney must go through a combustible wall, be sure to use a metal thimble specially designed for this purpose. The proper way to install a thimble is to cut an oversize hole in the sheetrock about 6 or 7 inches larger than the thimble. However, be sure to follow the manufacturer's directions that come with the thimble. A metal ring shield is used to cover the hole. This way air can circulate and cool the area around the passageway.

Never decrease the cross-sectional area of the stovepipe/chimney because the velocity of the exhaust will increase thus increasing the likelihood of particle discharge in the exhaust.

Technical Aspects of Chimney Performance

A device called a manometer is used in describing the technical performance of a chimney. A manometer is an instrument used for measuring the pressure of liquids and gases. An analog manometer consists of a glass tube filled with a liquid and mounted in front of a measuring scale against which the liquid level can be measured. If a manometer were connected to a leak-free chimney with a leak-free connection, then the draft in the chimney should exert enough pressure (or pull) against the water in the manometer to cause it to move at least -0.02 inches in the tube.

Figure 2: Dwyer Manometer

NOTE: See diagram below which has been modified for this manual.

Barometric Damper – Draft Controls

Where excessive natural draft exists, a barometric damper is required to prevent the boiler from overheating. Do not operate the B-Series Waste Oil Boilers with flue draft exceeding -.06 inches of water column. The likelihood of this condition increases with increased chimney height. Shorter chimneys may not require a draft control. Other aspects of chimney construction, such as the smoothness of the inner surface of the liner and the type of liner material used can impact draft. Liners that resist heat flow through the liner improve draft by keeping the chimney warmer. Warm outdoor temperatures will decrease draft while colder ones will increase draft. Windy days will generally result in more variation in measured draft. Be aware of these environmental impacts on draft during changes in the seasons between fall and winter, and winter and spring. It is best to measure draft before concluding whether a control is required or not. Excessive draft can lead to an over-firing condition. A correctly installed draft control can prevent this.

Figure 3: Barometric Damper

NOTE: The information in the rest of this section is provided by Field Controls, LLC, Kinston, North Carolina, 252.522.3031. This information is used with their permission. Some information may not apply to coal burning systems. The information is taken from Field Controls, LLC website at: www.fieldcontrols.com/draftcontrol.php. See the Field Controls website for specific models of draft controls or to place an order.

The standard type "M" field control with a "T" is recommended for satisfactory performance. For proper operation and efficient fuel consumption in oil, gas and/or coal-fired heating appliances, draft must remain relatively constant, and above -.02 inches water column, as measured with a manometer. Proper draft will normally result in greater efficiency, with less heat wasted by escaping through the vent (chimney).
Field draft controls maintain consistent draft by counteracting the negative forces caused by changes in temperature and barometric pressure, and the effects of wind. The draft should be checked with a draft meter in the flue pipe two to three feet above the boiler and before the barometric damper.

How Draft Controls Work

1. Static pressure from the cooler air around the boiler exerts pressure on the outside of the furnace or boiler, the breaching, and the stack.
2. The pressure difference between the room air and hot exhaust gasses causes products of combustion to flow (draft) through the unit and to rise through the breaching and chimney.
3. When draft reaches a value higher than the setting of the control, room temperature air enters through the barometric draft control in the precise amount needed to overcome the excess drafts caused by temperature variations, wind fluctuations and barometric pressure changes.
4. Combustion of fuel is completed and the process is stabilized. The velocity of combustion gases through the heat exchanger is slowed so more heat is extracted. The unit operates more efficiently, reliably and requires less maintenance.

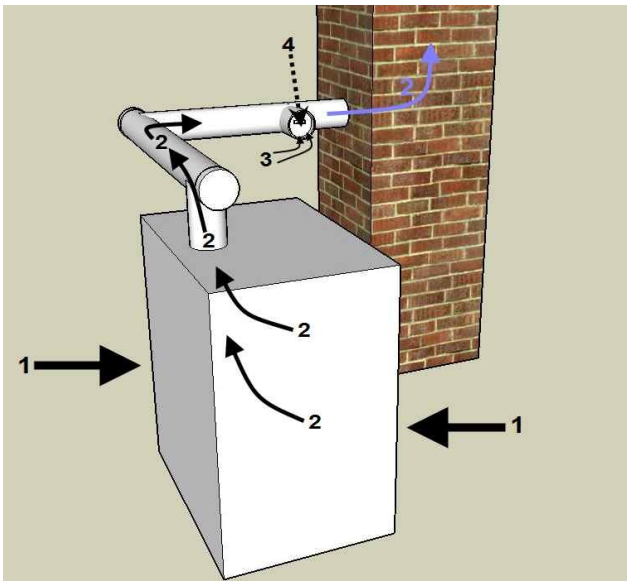


Figure 4: Draft Control

Choosing the Right Size Draft Control

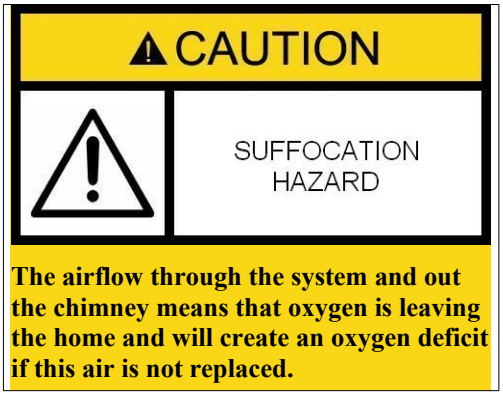
Simple rules of thumb to guide size selections:

1. Use a draft control the same size as the flue pipe, that is, a 6" control for a 6" round pipe, a 12" control for a 12" pipe, etc.
2. For intermediate sizes of smoke pipe, use the next larger size draft control to provide ample capacity. It is a simple matter to install a round control on a pipe an inch or so larger or smaller than the control.
3. If the flue pipe or breaching is square, use the round equivalent. For example - on a 14" x 14" breaching use a 14" control. Little flow occurs in the corners of a square pipe so that its capacity is approximately the same as a round pipe of the same diameter.
4. If the breaching is rectangular or oval, compute its cross-sectional area and select a draft control having the same or a greater nominal cross-sectional area. A breaching 14" high x 10" wide would have a cross-sectional area of 140 square inches. From the table, select a 14" control with a cross-sectional area of 154 sq. inches.
5. Where a control larger than 32" is required, use more than one regulator with combined cross-sectional areas equal to or greater than that of the breaching. When chimneys are of an unusual height or if the draft to be maintained is either very high or very low, it is advisable to deviate from the rules of thumb outlined here. Refer to the larger table.

Control Size	Nominal Cross-Sectional Area (Sq. In.)
6”	28
7”	38
8”	50
9”	63
10”	78
12”	113
14”	154
16”	201
18”	255
20”	314
24”	452
28”	616
32”	804

Note: Manually operated dampers must not be used with the B-Series Waste Oil Boilers

Warm outside temperatures will result in decreased draft. This can lead to operational concerns related to poor draft. Changes may be needed when transitioning between seasons and warm outside temperatures result in poor draft, or vice versa, when cold outdoor temperatures result in increased draft. It sometimes necessary to add a draft inducer in warmer seasons to maintain the recommended -.02 to -.06 inches of water column.



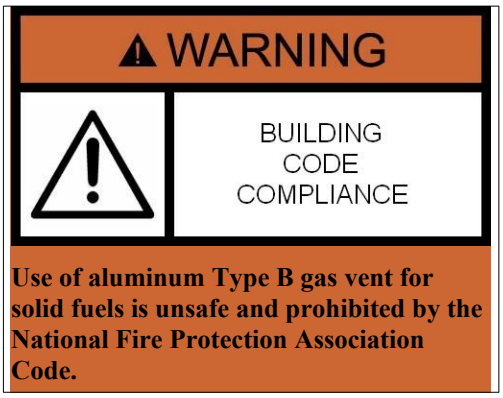
The airflow through the system and out the chimney means that oxygen is leaving the home and will create an oxygen deficit if this air is not replaced. There is usually sufficient leakage in older homes, but in well-insulated homes it may be necessary to provide additional outside air into the home.

Stovepipe

Use only 22-24 gauge single wall stove pipe in open areas that are no closer than 18 inches from walls or ceiling. If the stovepipe must be closer than 18 inches from the nearest wall or ceiling, or if it must go through walls, closets, or boxed in areas, then UL listed insulated stovepipe must be used. Stovepipe that runs along the outside walls of a building must also be UL listed insulated pipe, even if it runs along a non-combustible outside wall.

Proper Chimney Connection

The boiler must be connected to a listed type HT prefabricated or masonry chimney. For connecting pipe, 24 gauge black or blued or stainless steel is the minimum requirement. Stainless steel is recommended for durability.



The recommended method for connecting the boiler to the chimney is to connect to the flue opening on the top of the boiler. This pipe will go on the inside of the opening of the exhaust flange.

It is best to place a T-joint at the top of the vertical section leading from the breach (exhaust) flange. The rear opening must be covered with a cap, which can be removed for cleaning and inspection without disturbing the rest of the pipe. The inclusion of a horizontal run must feature provision for pipe disassembly, inspection and removal of any fly ash that accumulates. If the horizontal run to the chimney is inclined more steeply, it will encourage any fly ash that would otherwise be deposited in the pipe to fall back into the ash separator. The minimum rise is a quarter inch per foot of horizontal run. Ensure that there is at least 18” clearance between horizontal piping and combustible ceiling. Ensure that the chimney connection pipe extends at least 2” into the chimney, but does not extend so far into the chimney that it blocks airflow. A “T” should always be used where the stovepipe changes directions (rather than an elbow) to allow for easy cleanout. Do NOT connect this unit to a chimney flue serving another appliance.
If a second change of direction is required before entering the chimney, a cleanout “T” should be placed at this point also, as indicated in Figure 1. Each joint should be secured with three sheet metal screws and sealed with high temperature sealant capable of withstanding 650º F. If the selected stove pipe contains seams, these may also need to be sealed. Use of aluminum Type B gas vent for solid fuels is unsafe and prohibited by the National Fire Protection Association Code.

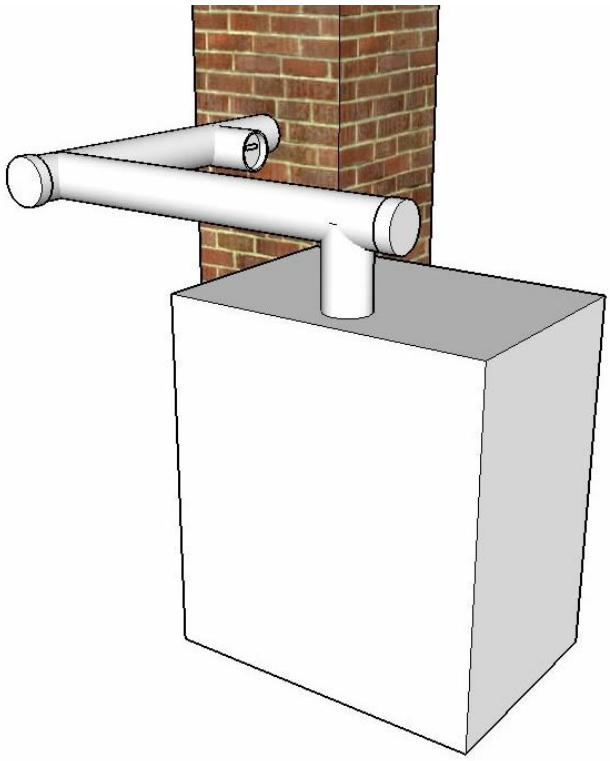


Figure 5: Example Chimney Connection

Particular attention should be paid to the point where a flue passes through a wall or ceiling. The pass-through should always be made with insulated pipe and the proper accessories or use of a thimble that provides a diameter of not less than three times the diameter of the stovepipe.

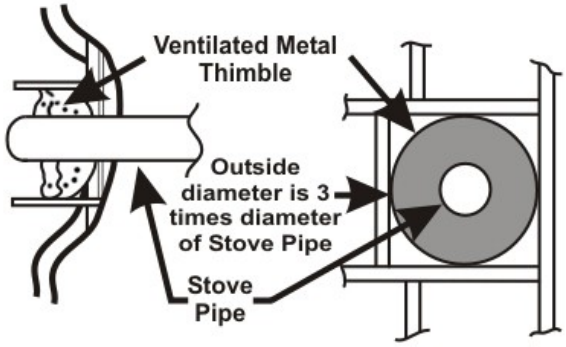
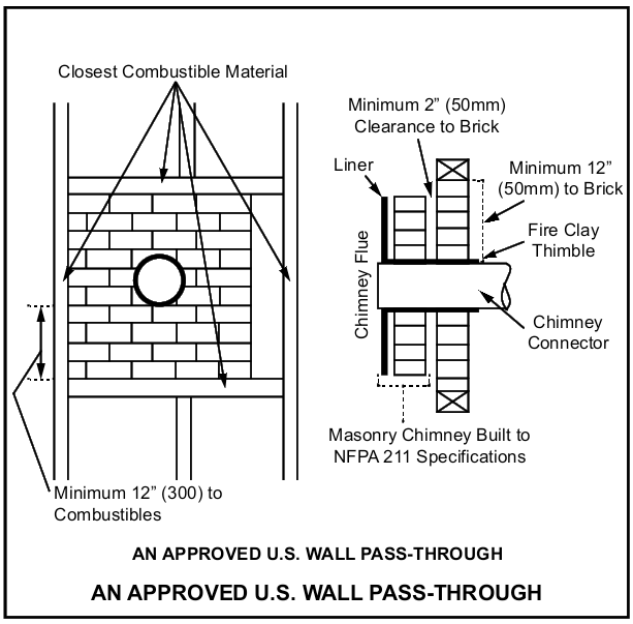


Figure 6: Stove pipe passing through wall

Wall Pass-Through: United States

In the U.S., the national code is NFPA 211. While many localities adopt this standard, be sure to check with local authorities before beginning your installation. The NFPA (National Fire Protection Association) permits four methods for passing through a combustible wall. A commonly used method to pass through a wall directly to a masonry chimney is to clear a minimum 12"(300 mm) around the entire chimney connector, and fill it with brick masonry which is at least 3.5"(90 mm) thick. A fireclay liner, minimum 3/8" (9 mm) wall thickness must run through the brick wall to the chimney liner (but not beyond the inner surface of the liner). It must be cemented in place with refractory cement. This method is illustrated. For details on the other three options, refer to the most recent edition of the NFPA 211 code.



AN APPROVED U.S. WALL PASS-THROUGH

Figure 7: U.S. Wall Pass-Through

Wall Pass-Through: Canada

Three methods are approved by the Canadian Standards Association. The diagram following this paragraph shows one method requiring an 18" (450mm) air space between the connector and the wall. It allows use of one or two covers as described in the diagram. The two other methods are described in detail in the current issue of CAN/CSA B365, the national standard.

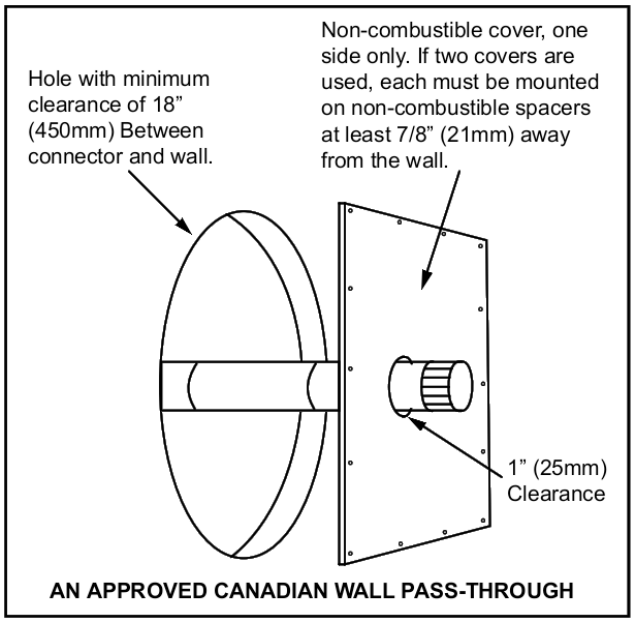


Figure 8: Canadian Wall Pass-Through

Chimney Requirements

This unit must be installed into a chimney approved for use with solid-fuel appliances. In the U.S., it must be connected to (1) a prefabricated chimney complying with the requirements for Type HT chimneys in the Standard for Chimneys, Factory-Built, Residential Type and Building Heating Appliances, UL 103, or (2) a code-approved masonry chimney with a flue liner.

In Canada, this unit is listed for use with prefabricated chimneys tested and listed to the high temperature (650 degrees C) chimney standard, ULC S-629, or with a code approved masonry chimney.

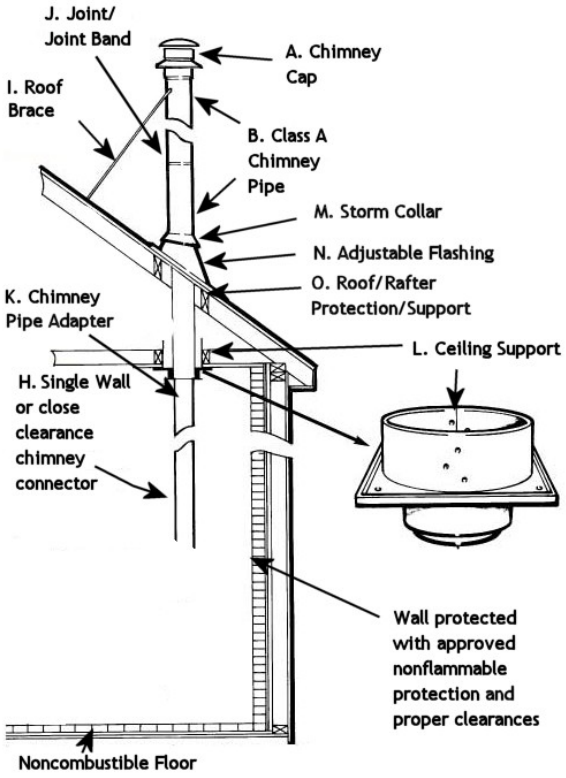
Masonry Chimneys

If you plan on using a preexisting masonry chimney, have it thoroughly inspected and cleaned. Any faults which make the chimney unsafe and unusable must be repaired prior to use. These can include improper height, structural defects, blockages, inadequate clearance to combustibles, unsealed openings into other rooms of the house, signs of creosote or smoke leakage, a loose or absent clean-out door, or absence of a liner.
When connecting to a masonry chimney, several provisions are standard. First, whether the chimney connector is vented to the chimney through a thimble or a breech pipe, neither must pass beyond the inner surface of the chimney liner, and both must be firmly cemented in place with refractory cement. (A thimble is a masonry pipe which is inserted through the chimney wall, and is frequently the preferred method; a breech pipe is a piece of steel pipe used the same way.) In Canada, a breech pipe has ridges or protrusions to lock it firmly into the refractory cement. In either case, the chimney connector vents to the chimney through the thimble or breech pipe.

Prefabricated Chimneys

When venting your Coal Gun boiler using a prefabricated chimney, be sure to contact local building code authorities, and to follow the manufacturer's instructions exactly. Use only the manufacturer's parts; do not use makeshift installation techniques. All prefabricated chimneys must be tested to either the U.S. or Canadian high-temperature standards, UL 103 or ULC-629.
Your manufactured chimney may contain more parts than is shown in the subsequent diagrams. Include all required items in your installation. A chimney cap (A) serves to keep rain and snow from entering the chimney. An approved Class A chimney (B) is required for the B-Series Boiler. Wall Bands (C) must be deployed for support per manufacturer's recommendations. A manufacturer's Wall Support Kit (D) will contain required items for supporting the chimney. Such kits will cost less than individual items purchased separately. A Bottom Cap (E, location marked, but actual cap not shown) allows for cleaning. A Finishing Collar (F) provides inside wall protection. A Wall Thimble (G) provides for required clearance between the chimney pipe passing through a flammable wall. The Chimney Connector (H) must be approved single wall, or a low clearance pipe, installed with required clearances in place. A Roof Brace (I) is required for chimneys that extend more than a certain distance, as referenced by the
manufacturer's instructions, from the roof. Manufactured chimneys may feature a built in "twist lock" at each joint, but a Joint Band (J) is still normally required to secure pipe at the joint. An approved Chimney Pipe Adapter (K) is required. A Ceiling Support (L) will provide structural support for the chimney and is typically part of a kit that includes items that maintain required clearances to flammables. A Storm Collar (M), and Adjustable Flashing (N) prevent water from entering the home by running down the outside of the chimney. Additional items or a kit (O) provide additional mounting support or fire protection to the roof joists or other roof components.

Inside Chimney



Outside Chimney

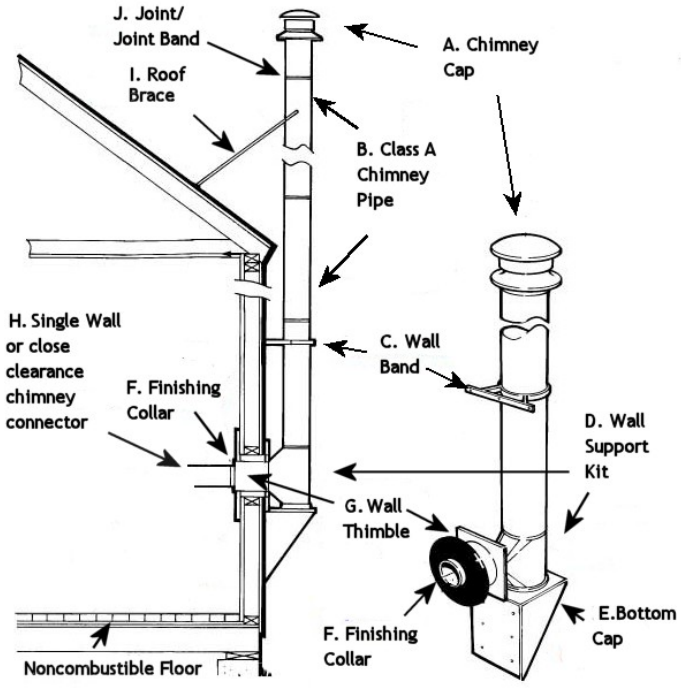


Figure 9: Chimney Diagram

Alternate Stack Installation

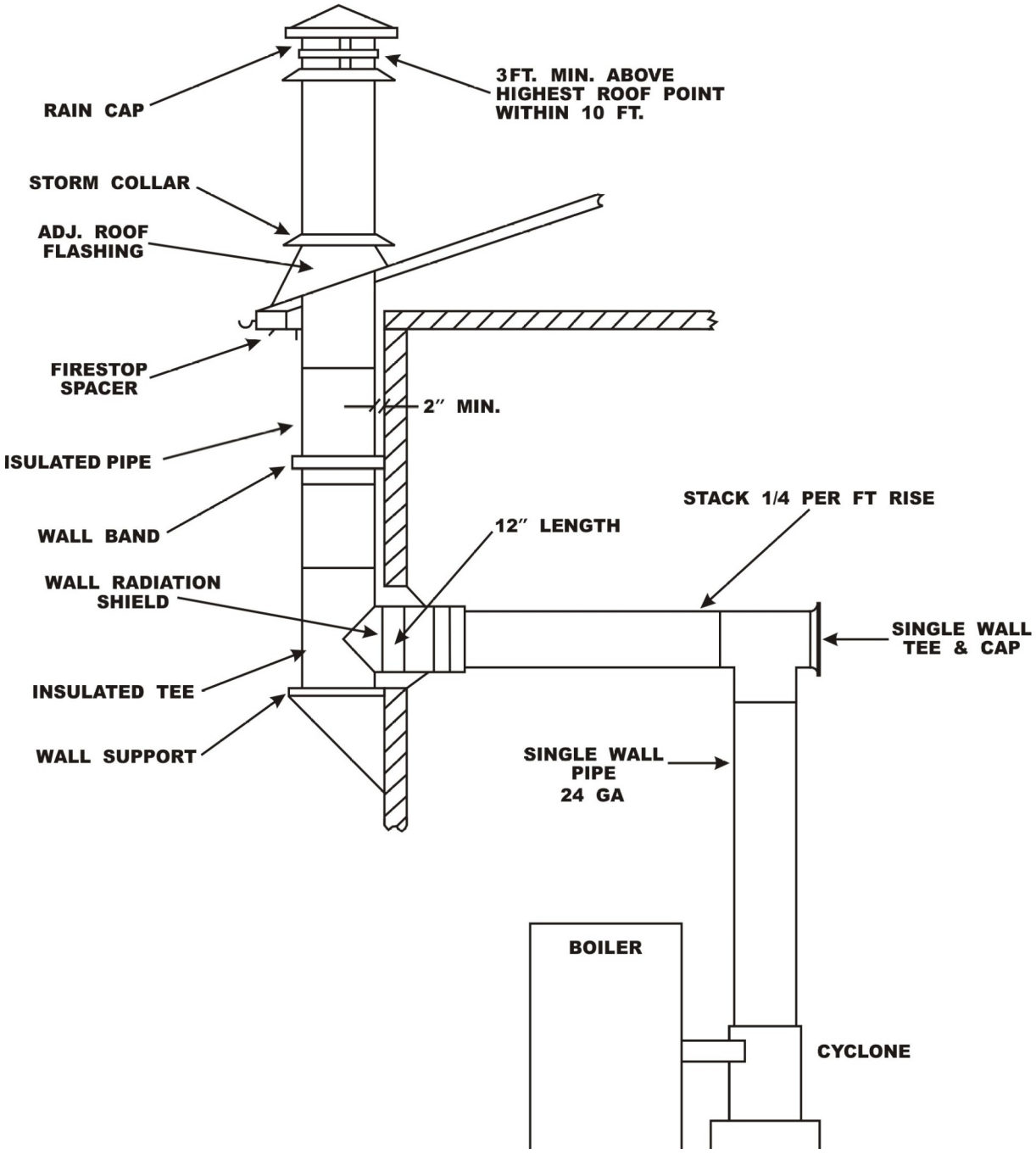


Figure 10: Alternate Stack Installation

In case of chimney fire

1. Call the fire department. (In the event the fire is out before they get there, you will want them to inspect the structure and make sure there is no latent damage or hazard.)
2. Shut the boiler down by turning the main power off.
3. If you have a chimney fire, use a chemical flare type fire extinguisher. If you don't have an extinguisher, go to step 4.
4. Using a water hose, wet down the area of the roof surrounding the chimney. Do not wet the chimney itself or try to put water down the flue as it will very likely damage the flue tiles.
5. Contact a chimney professional to inspect your chimney for damages.

In case of runaway fire

1. Shut the boiler down by disconnecting power.
2. Be sure the draft inducer is off and/or make sure the barometric damper opens. (Excessive draft can cause a runaway fire.)
3. Maintain continued circulation of boiler water to remove heat from the boiler and if boiler is equipped with a domestic coil run hot water.

Combustion Air Supply

It is important to make provision for adequate supply of combustion air, either via natural infiltration through a door or window or by ducting outside to the boiler. If combustion air is ducted from the outside, then install a metal vent pipe of sufficient diameter for the boiler to be used. Contact Alternate Heating Systems if an outside air ducting kit is required.
When the intake is ducted outside, inspect the opening regularly to be sure that it does not become obstructed by debris.
Outside combustion air may be necessary if:

- The appliance does not draw steadily, produces odd odors, experiences smoke roll-out, burns poorly, or back-drafts, whether or not there is combustion present.
- Any of the above symptoms are alleviated by opening a window slightly on a calm day.
- The house is equipped with a well-sealed vapor barrier and tight fitting windows and/or has any powered devices that exhaust house air.
- There is excessive condensation on windows in the winter.

Boiler Piping for Hydronic Systems

Normal operating temperature for the B-Series Waste Oil Boiler is 180° F. This allows for optimum operation and less fly ash accumulation on heat exchange surfaces. Water returning to the boiler from zones should be about 160° F, and at no time (after initial startup) should return water temperatures be lower than 140° F, or more than 40F less than the hot supply water leaving the boiler. If your system design results in water returning to the boiler too cold, incorporate a mixing valve to bring water temperatures back up to acceptable temperatures.

> Note: Hydronic and steam distribution and system design are ultimately the responsibility of the customer or installer.

Due to the design requirements of the various B-Series Waste Oil Boiler models, the tappings are not always in the same location on each boiler model. The washout plugs in the bottom of the unit are a requirement of the ASME boiler code and must be closed before filling the unit with water.

A boiler drain should be inserted in the tapping on the opposite side of the boiler from the tapping used for the return. Optionally, a “T” and short nipple could be attached to the return tapping for the location of the boiler drain.

> Note: Be sure to close all ports in the unit before filling the unit with water.

Piping the Boiler in Parallel with another Boiler

The B-Series Waste Oil Boilers may be connected to a heating system supplied by one or more boilers that are already in place. There are many possible configurations that allow for an existing boiler to function as a backup to the B-Series Boiler.

The pipe diameter must be determined by taking into account the distance involved and flow required to achieve required BTU output. If the pipe is too small the flow rate (GPM) will be restricted causing a drop in delivered BTU’s and a boiler return water temperature that is too low. This could lead to condensation which causes a host of problems.

Checklist: When the Boiler is Added to an Existing System

- ✔ Operate the (gas, oil, electric) boiler periodically to ensure that it will operate satisfactorily when needed.
- ✔ Do not relocate or bypass any of the safety controls in the original (gas, oil, electric) boiler installation.
- ✔ The operation of the gas boiler must be verified for acceptable operation before and after installation of the add-on appliance by a gas fitter who is recognized by the regulatory authority.
- ✔ Do not connect to any chimney or vent serving a gas appliance.
- ✔ The installation should comply with requirements of CAN/CSA-B365, and changes to the installation should comply with CSA B139 (for oil-fired), C22.1 (for electric), or CAN/CGA-B149.1 or CAN/CGA-B149.2 (for gas-fired).

Pressure Relief Valve

The pressure relief valve is factory installed into a fitting on top the boiler. A length of copper pipe must be connected to the pressure relief valve, continuing to a point 6” from the floor. Extending the pipe to the floor is a requirement of building codes. It reduces the likelihood that a release of boiler pressure would scald anyone standing near the boiler.

If the B-Series Waste Oil Boiler is installed as the primary boiler, it is necessary to provide a water supply using a pressure regulating valve and a back-flow prevention valve in the feed water line.

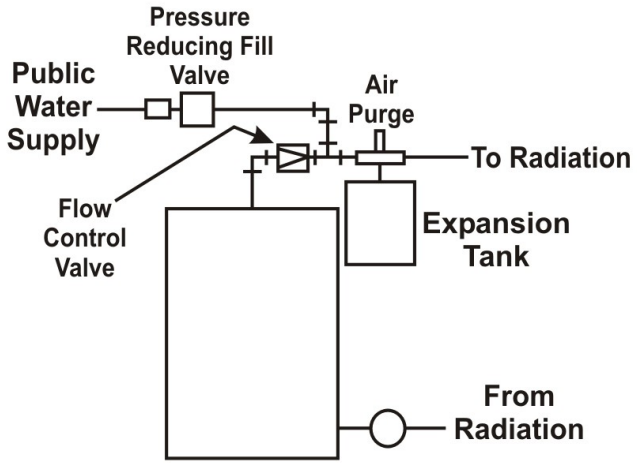
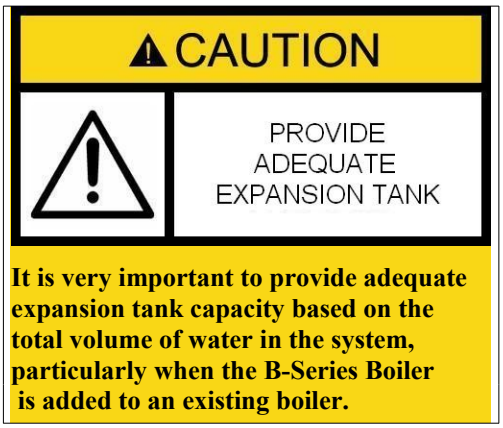
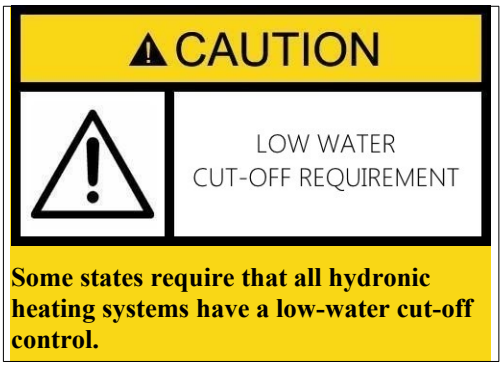


Figure 11: Pressure Regulating and Back-flow Prevention Valves' Configuration



It is very important to provide adequate expansion tank capacity based on the total volume of water in the system. This is particularly true if the B-Series Boiler is added to an existing boiler. Check the chart to determine the water capacity of the B-Series Boiler installed. The expansion tank or air cushion tank installed originally may not be adequate for the additional volume of the B-Series Waste Oil Boiler.



Many states require that all hydronic heating systems have a low-water cut-off control. Even if your state and local codes don't require this, it is still highly recommended. In cases where this control is required it should be located in a “T” placed in the supply riser 6 – 10 inches above the tapping in the boiler.

Forced Hot Air Systems (Water to air Coil in Duct)

The B-Series Boiler may be easily adapted to any forced hot air heating system by installing a heat exchange coil in the hot air supply duct. The size and type of coil or heat exchanger required may be established after several factors are determined. These factors include: the heat output required (BTU/Hr), the capacity of the existing fan blower (CFM) and the size of the duct or plenum where the coil will be installed. Sizing of the air coil will be the responsibility of customer and/or installer.

The coil creates increased resistance to air flow, so this factor must be considered when determining the final airflow. Design water temperature is usually 180º F, and a desirable output air temperature is 115º - 125º F. The coil is connected in the same manner as in other types of radiation heating equipment. The thermostat can be wired to engage both the fan blower and the circulator pump.

If a hole was cut in existing ducting to install the coil, the opening should be closed tightly with a metal cover and sealed with duct tape.

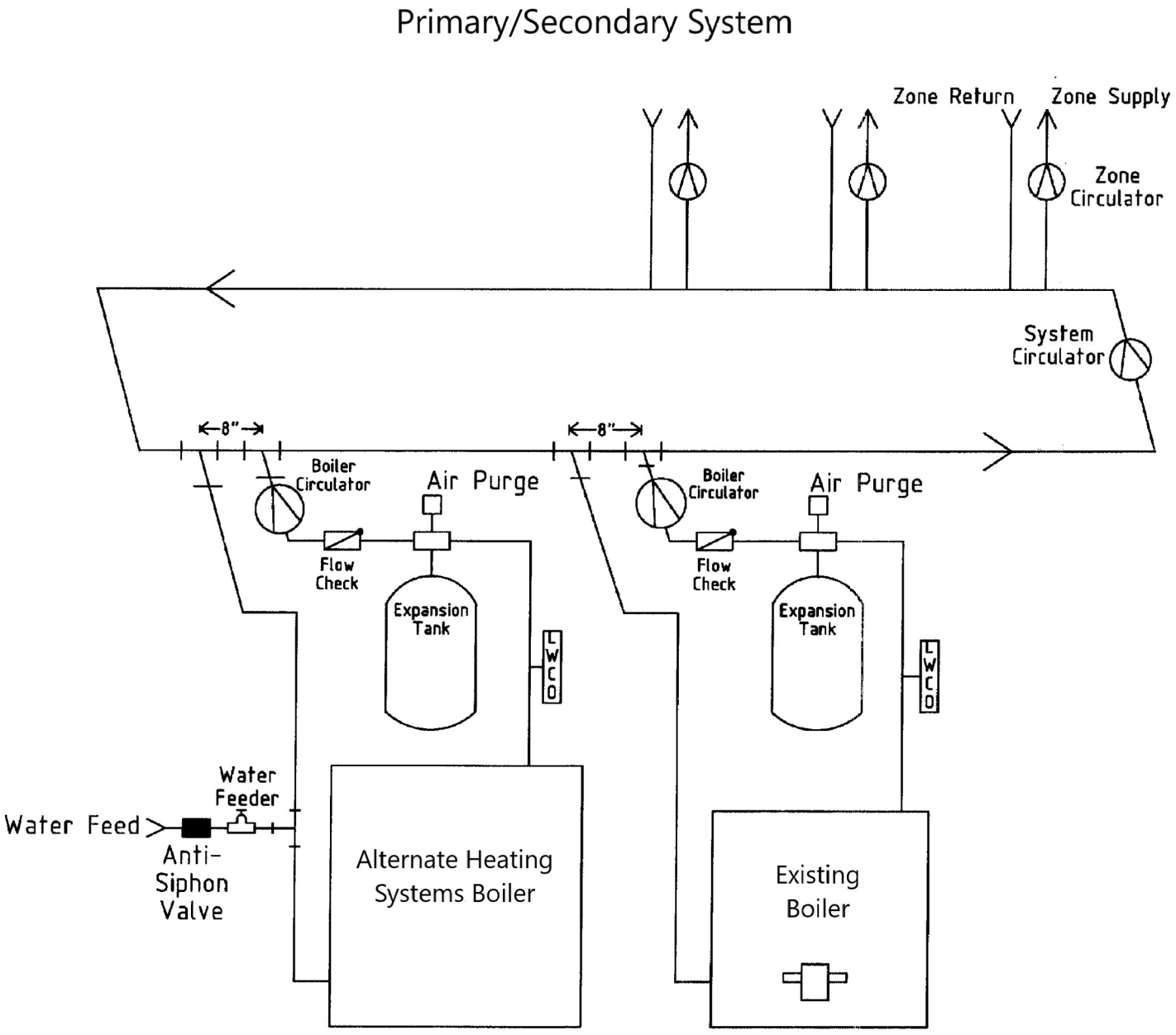


Figure 12: B-Series Boiler Used in a Primary/Secondary System

Note:

1. A call for heat from any zone activates Boiler Circulators, System Circulator and the Zone Circulator.
2. Each Boiler Circulator should controlled by a low limit to prevent operation when the Boiler is cold.
3. Dump zone operation will activate one or more zones, System Circulator and Boiler Circulator. If boiler overheats.
4. Do not bypass temperature supply control system on radiant heat system. In radiant heat applications, permit activation of a call for heat but allow system controls to regulate water temperature.

Not all system components, valves and devices are shown in this drawing. Actual conditions and application requirements will vary. Please consult a heating expert or your Alternate Heating Systems dealer for additional information.

Water Treatment

Proper treatment of make up water and boiler water are necessary to prevent scale or other deposits and corrosion within the boiler. The absence of adequate external and internal treatments can lead to operation upsets or total boiler failure. Where a choice is available the pretreatment external to the boiler is always preferred and more reliable than treatment within the boiler.

Instructions for feed water treatment as prepared by a competent feed water chemist should be followed. Do not experiment with homemade treatment methods or compounds.

Representative samples of feed water and boiler water need to be analyzed frequently to ensure that they are in specification. The following terms and guidelines are to be used in conjunction with the advice of a water treatment specialist.

PH

- The Ph value of your boiler water is a number between zero and fourteen. Values below seven are acidic while values above seven are basic.

- The Ph factor is the most important factor influencing scale forming or the corrosive tendencies of boiler water. It should be adjusted to between a minimum of 10.5 and a maximum of 11.0 to prevent acidic corrosion of boiler tubes and plates and to provide for the precipitation of scale forming salts.

- Below a Ph of 5.0 the water is acidic enough to dissolve the steel boiler plates. Under these conditions the steel gradually becomes thinner and thinner until its destruction. At a Ph between 5 and 9.4 pitting of steel plates will occur at a rate depending on the amount of dissolved oxygen in the boiler.

DISSOLVED OXYGEN

Dissolved oxygen is caused by the solubility of atmospheric oxygen into the supply water. Aeration of city water supply is frequently used to remove other noxious gasses. Efficient aeration results in saturation of the water with oxygen.

- The majority of corrosion problems are directly related to the quantity of dissolved oxygen in the boiler water. Elimination of the corrosive effect of dissolved oxygen can be accomplished both directly or chemically.

- Direct or mechanical removal of dissolved oxygen is done through the use of dearator. Chemical dearation is done through the introduction of specific chemicals in the boiler to react with the oxygen.

- The dissolved oxygen content should be maintained at a minimum but at no time should it exceeded 0.007 mg/l.

SULFITES

- Sodium sulfite is generally used for the chemical removal of dissolved oxygen within the boiler water. To assure the rapid and complete removal of the oxygen entering the boiler feed water system the concentration of sulfite in the boiler must be maintained at a minimum of 120 p.p.m. (parts per million).

SOLIDS

- Solids can be broken up into two categories of either suspended and dissolved. Suspended solids are those which could be removed by filtration while dissolved solids are in solution with the water.

- The best test for the determination of solids content of the boiler water is through a conductance test.

- The conductance value of boiler water varies by the various ionized salts present. The conductance can be used to measure the total dissolved solids in the boiler water and to serve as an accurate means for the control of solids through the use of blow down.

- Another test which is sometimes used as a gauge of solids is to measure the chloride present in the boiler water. The ratio of chlorides in the boiler water to that of the feed water can be used as a means to determine the amount of blow down required. The chloride test is unsuitable for feed water with low incoming concentrations and the concentrations in the feed water must be averaged over time for accuracy.

- High boiler solids will lead to foaming, priming, surging, and carry over. These items may only be over come by proper daily blow down of the boiler.

ALKALINITY

- The alkalinity of boiler water should be sufficiently high enough to protect shell and plates against acidic corrosion, but not that high to produce carryover. A minimum value for alkalinity for adequate protection is 200 p.p.m.

- High boiler alkalinity those which are in excess of 700 p.p.m. should be avoided. Values higher than this can lead to embritlement of the steel.

PHOSPHATES

Phosphates are used to react with calcium hardness in the boiler water. In order for this reaction to take place it is important to maintain a Ph at a minimum value of 9.50. It is desirable to keep the concentration of phosphates in the water to 30-50 p.p.m. in order for the complete reaction of the phosphates with the calcium hardness entering the boiler through the feed water.

HARDNESS

- The hardness of water is caused by calcium and magnesium ions, which will vary greatly throughout the country depending on the source of the water.

- In boilers the hardness of the water can cause the formation of scale and sludge or mud. The hardness must be removed in the makeup water to the return system. Total hardness should not exceed 50 p.p.m.

OILS

- Every effort should be made to prevent oils from getting into the boiler water. Oil causes foaming or combines with suspended solids to form a sludge, which can cause the overheating of boiler plates. If oil does not get into the boiler, the boiler should be taken immediately out of service & thoroughly cleaned.

Additional Information:

- Each gallon of water circulated through the system delivers a definite quantity of heat which is dependent on the water temperature drop for which the system is designed. Water temperature drop is the difference between the temperatures of the water leaving the boiler and the water returning to the boiler.

- It will be noted that the smaller water temperature drops result in less BTU/H capacity per GPM. This means an increase in the GPM requirements of the pump. It has been found that a 20 degree water temperature drop usually provides the most economical selection of pump and pipe sizes.

- It should be noted that under actual operating conditions the temperature drop usually is considerably less than that for which the system is designed and will not appreciably affect the outputs of the heat distributing units. The temperature drop provides a starting point for determining the number of BTU/H which will be delivered to the heat distributing units by the circulation of each gallon of water per minute.

- In accordance with the definition of a BTU, if one pound of water drops one degree Fahrenheit as it circulates through the forced hot water heating system, then one BTU is given off. A gallon of water, weighing approximately 8.3 lbs. At the temperatures used in a system, will give off 8.3 BTU if it drops one degree as it is circulated through the system. One gallon per minute for 60 minutes, or one hour, will, if it drops one degree, give off 8.3 x 60 = 498 BTU/H.

- Using 500 rather than 498 for easier figuring, the design water temperature drop multiplied by 500 is the BTU/H (BTU per hour) delivered by the system when one GPM is circulated through the system.

- The proper pump capacity is determined by dividing the calculated BTU/H heat loss of the structure by the BTU/H carrying capacity of each gallon per minute calculated. In a system designed for a 20 degree water temperature drop, one GPM equals 10,000 BTU/H.

Source: Better Heating-Cooling Council Handbook

Domestic Hot Water Coil Piping

The B-Series Boiler may be fitted with a domestic hot water coil, which threads into a 4” tapping in the boiler. Multiple coils can be installed into larger boilers, the total number dependent on the size of the boiler and the number of fittings made available at time of manufacture. There are three methods for plumbing the domestic coil. One way is to connect the coil in series with an existing hot water heater.

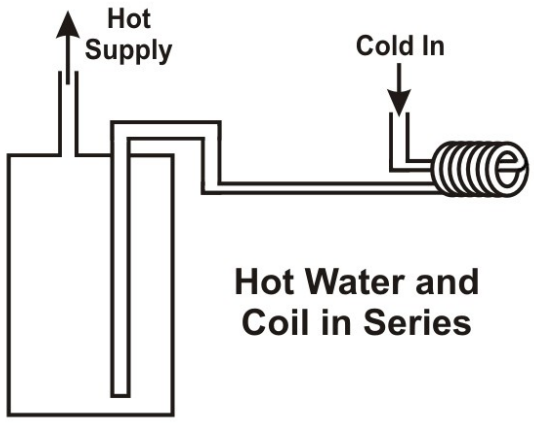


Figure 13: Plumbing – Coil in Series

A second method of plumbing the domestic coil is to connect the coil in parallel with an existing water heater so that the conventional water heater may be used when the B-Series Boiler is not being fired (for example in the summer). The diagram that follows indicates how this can be done.

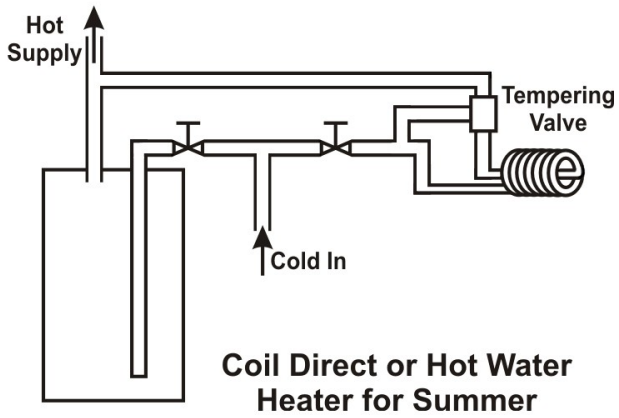


Figure 14: Plumbing – Coil in Parallel

The third method of plumbing the domestic coil uses a small pump to circulate water continuously between the coil and existing hot water heater. It is also necessary to include a tempering valve or temperature controller on the supply side of the storage tank/water heater to prevent super-heated water from reaching the domestic hot water tank and, ultimately, the faucets.

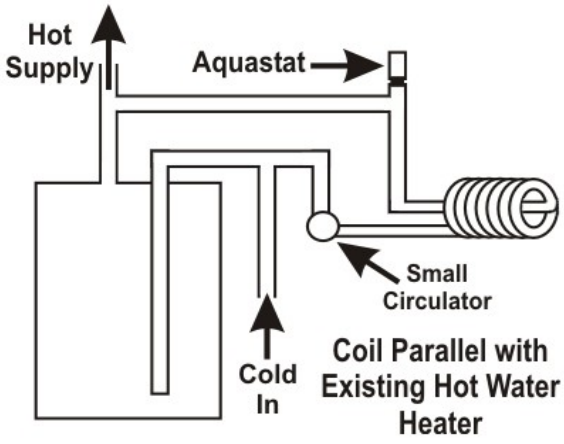
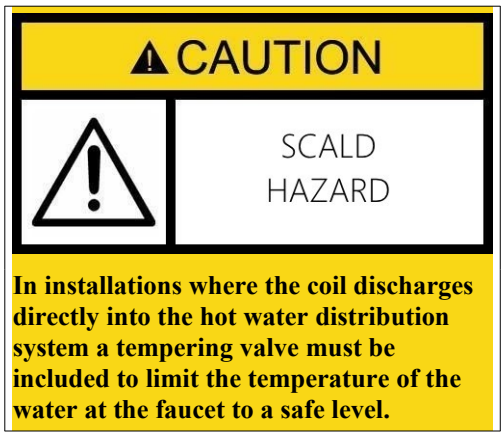


Figure 15: Plumbing – Coil with circulator



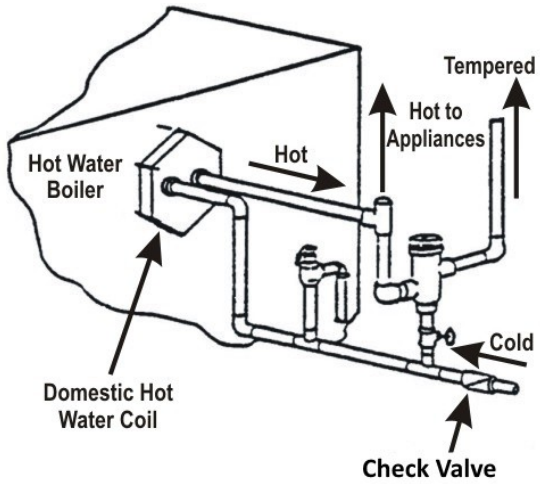


Figure 16: Tempering valve

Additional Specifications

Pressure Drop

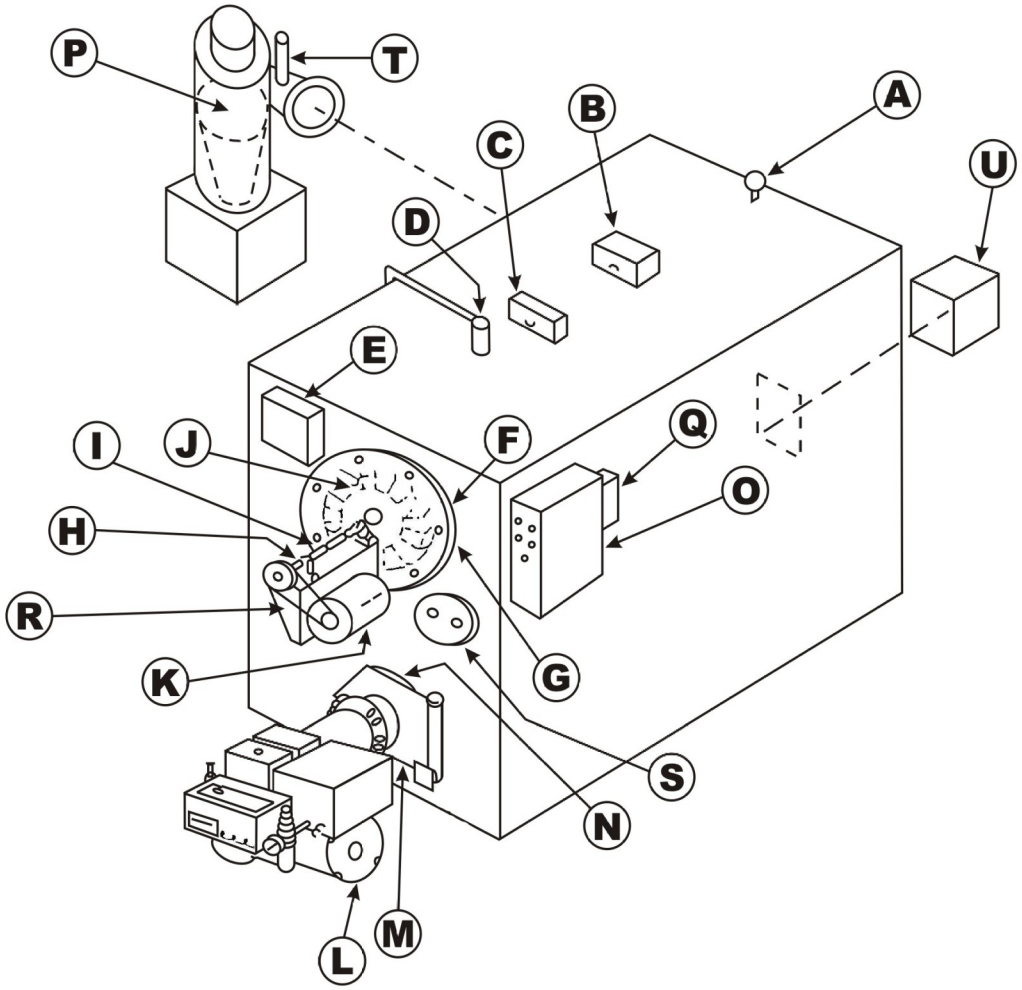
Pressure Drop (Line Loss) within the boiler is less than the pipe rating of the pipe within the boiler, so there is no appreciable pressure drop.

Explanation of GPM Flow

The following are given as examples of gallons per minute water flow required to deliver hot water in order to provide heating of a given number of degrees and at a certain BTU level:

- 300K BTU's at 20 degrees temperature differential requires 30 gallons per minute
- 500K BTU's at 20 degrees temperature differential requires 50 gallons per minute.
- 1M BTU's at 20 degrees temperature differential requires 100 gallons per minute

Component Identification – Waste Oil Boiler

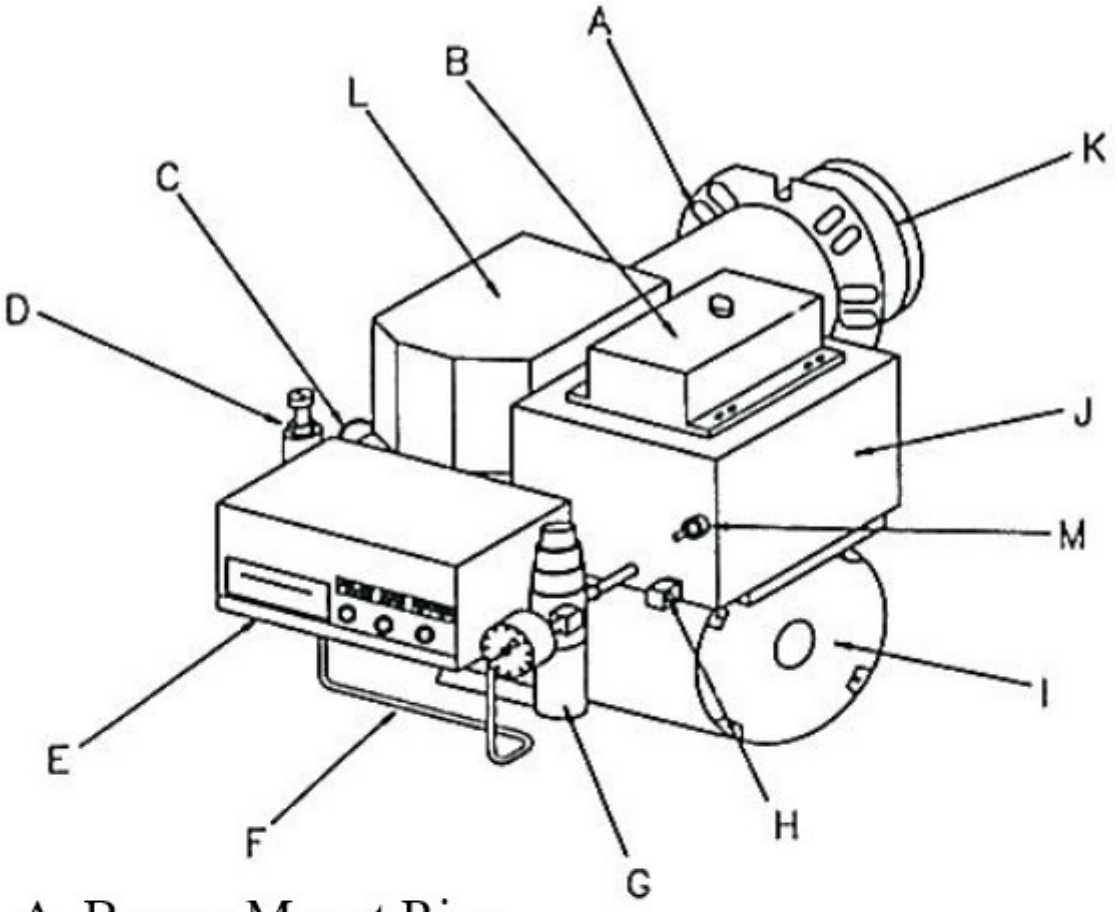


A. Temperature/Pressure Gauge
B. Operation Control
C. Hi-Limit Control
D. Relief Valve
E. Low Water Cutoff
F. Abrasion Shield
G. Ceramic Heat Shield
H. Pillow Block Bearings x2
I. Fan Shaft
J. ID Fan
K. ID Fan Motor
L. Waste Oil Burner
M. Burner Mount
N. Burner Mount Gasket
O. Electrical Panel
P. Cyclone & Pan & Funnel
Q. Pressure Sensor
R. ID Fan Belt
S. Domestic Coil (Optional)
T. Draft Sensor Riser & Cap
U. Draft Box & Elbow

- NOTE -
THE ELECTRICAL CONTROLS MAY VARY IN LOCATION ON TOP OF THE BOILER.

Figure 17: Boiler Component Diagram

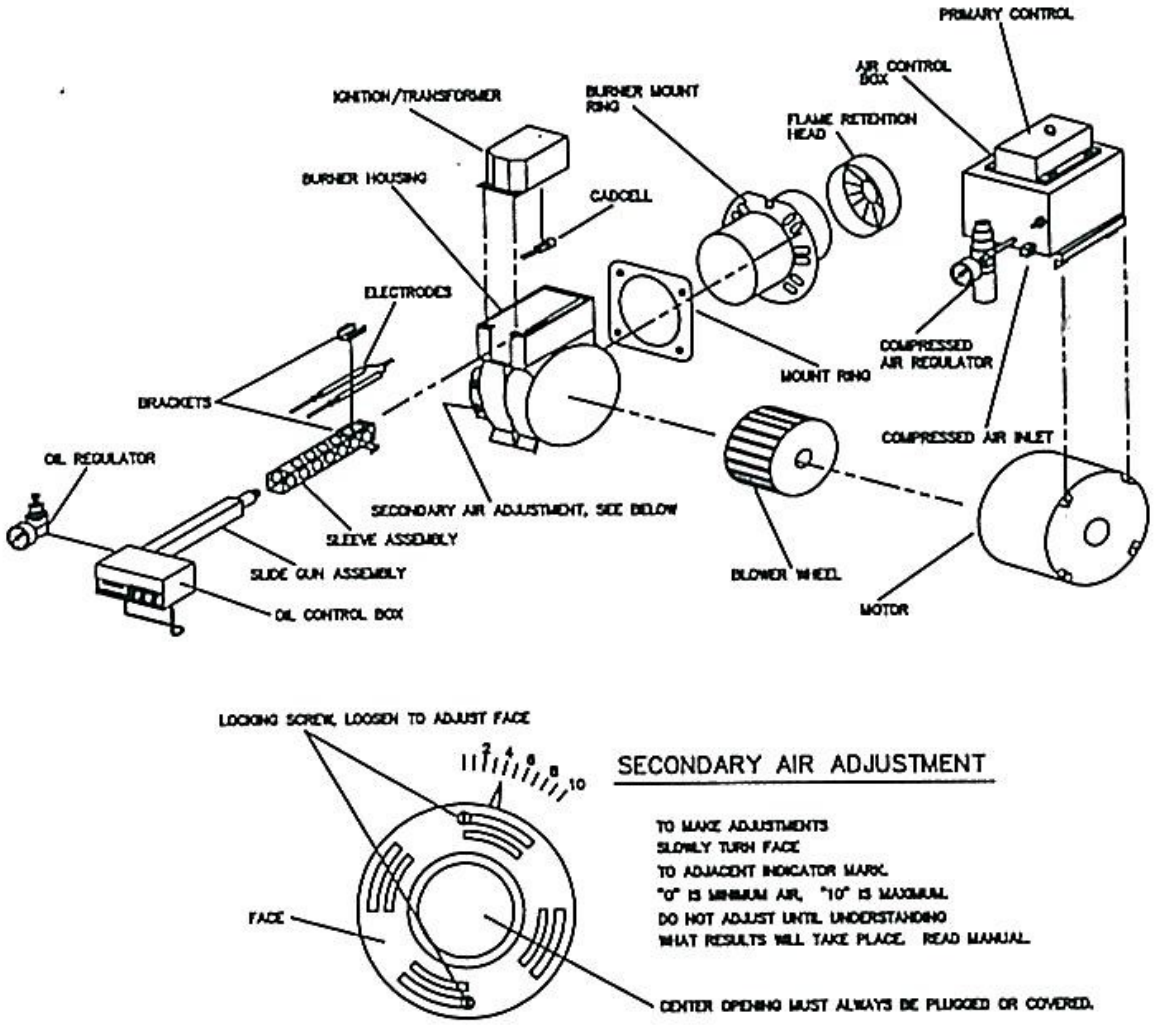
Burner Components



A. Burner Mount Ring
B. Primary Control
C. Primary Air Band
D. Fuel Supply Connection
E. Slide Gun Assembly
F. Regulated Compressed Air Line
G. Compressed Air Regulator
H. Compressed Air Connection
I. Motor
J. Air Control Box
K. Flame Retention Head
L. Ignitor Box
M. Run/Off/Prime Switch

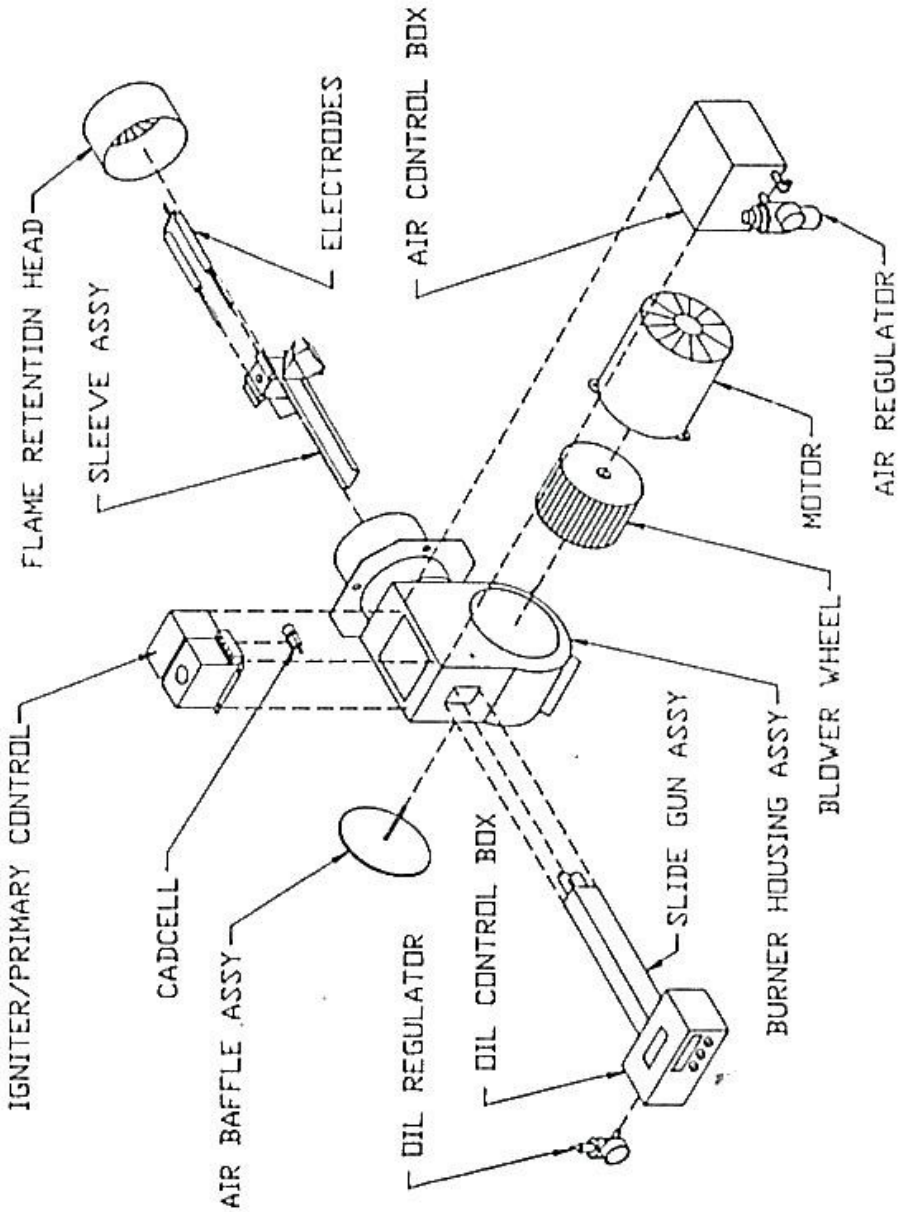
Figure 18: Buner Component Diagram

Burner Components – Parts Breakdown



Waste Oil – B10 Burner Components

WO-B10 BURNER COMPONENTS



Electrode, Nozzle and Retention Head Assembly

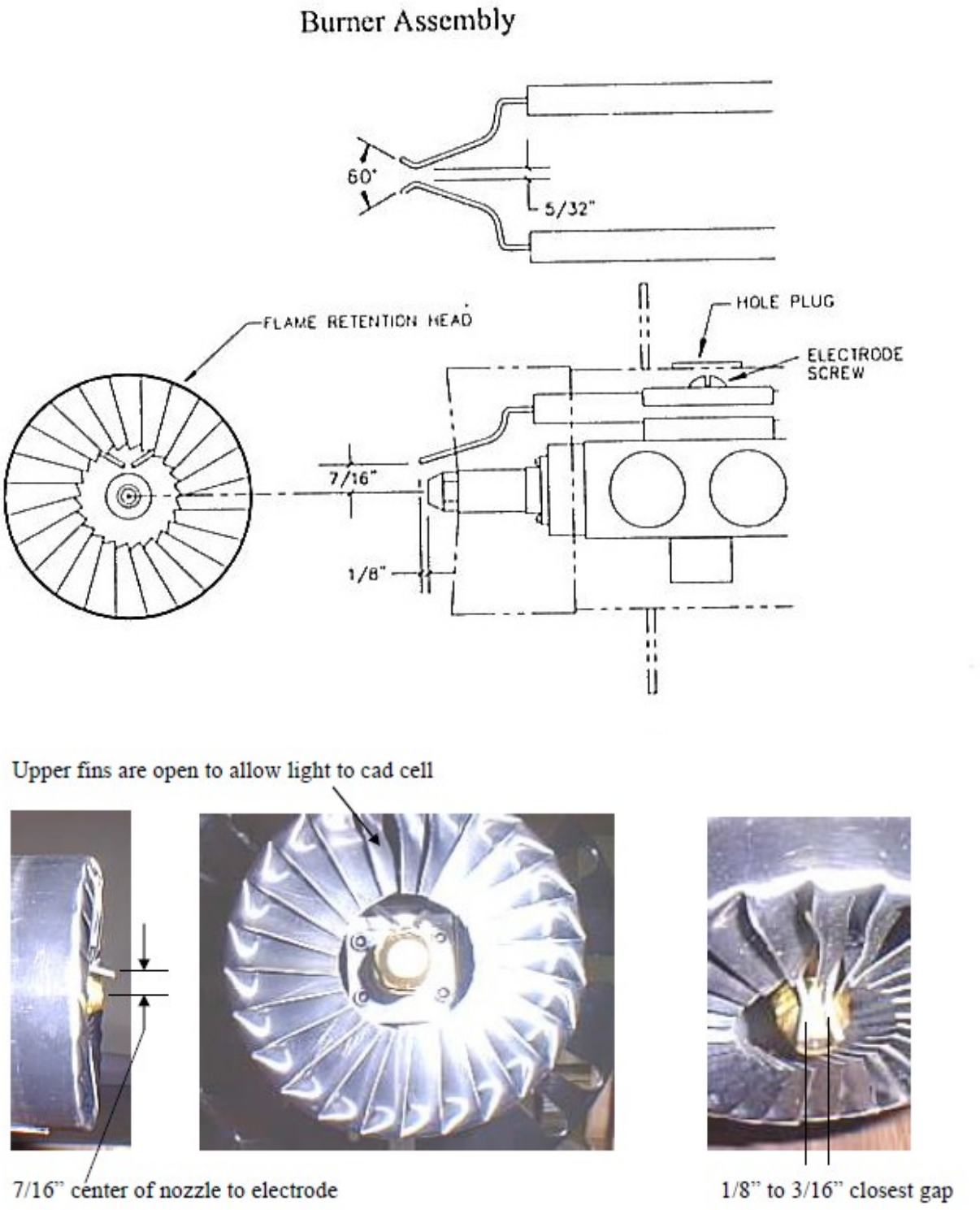


Figure 19: Electrode Position and Retention Head Spacing

1. Prior to installing the burner, examine flame retention head and ignition electrode position. This illustration shows a single nozzle B5 Burner. Follow this same procedure for the two nozzle B10 Burner.
   If needed, make adjustments to the electrodes after removing the "hole plug" on top of burner tube near mount flange.

A. With screwdriver, loosen (do not remove) screw holding electrode clamping plate.
B. Adjust electrodes as shown.
C. Retighten screw snugly but do not over tighten. Insulation on electrodes may crack.
D. Examine electrode position after tightening screw to be sure position has not changed.
E. Replace hole plug.

2. Install burner onto fire chamber mount port and secure with lock nuts. Be careful when installing the burner into the fire chamber. Damage to the retention head can occur if it contacts the studs or port. Install electrical flex cable and wire from burner into field junction box.

WASTE OIL BOILER ASSEMBLY

Cyclone Ash Separator

Once the waste oil boiler has been positioned, the cyclone ash collector should be attached to the flange on the right side of the boiler. Apply a strip of the supplied 1/8" x ½" self-stick sponge rubber to the boiler flange before attaching the cyclone to the boiler flange using three 5/16-18 x 3/4 IN bolts and matching washers. For the B1000 the bolts will consist of 4 – 3/8-16 x 1 IN bolts and matching washers. To apply, carefully remove the paper backing from the rubber strip to expose the adhesive. Overlap the strip approximately 1" and cut off the excess material with a knife or scissors. The adhesive will hold the gasket in place until the cyclone assembly is positioned.
You will also need to attach the draft sensor tubing to the cyclone. You will use the supplied ¼" compression fitting.

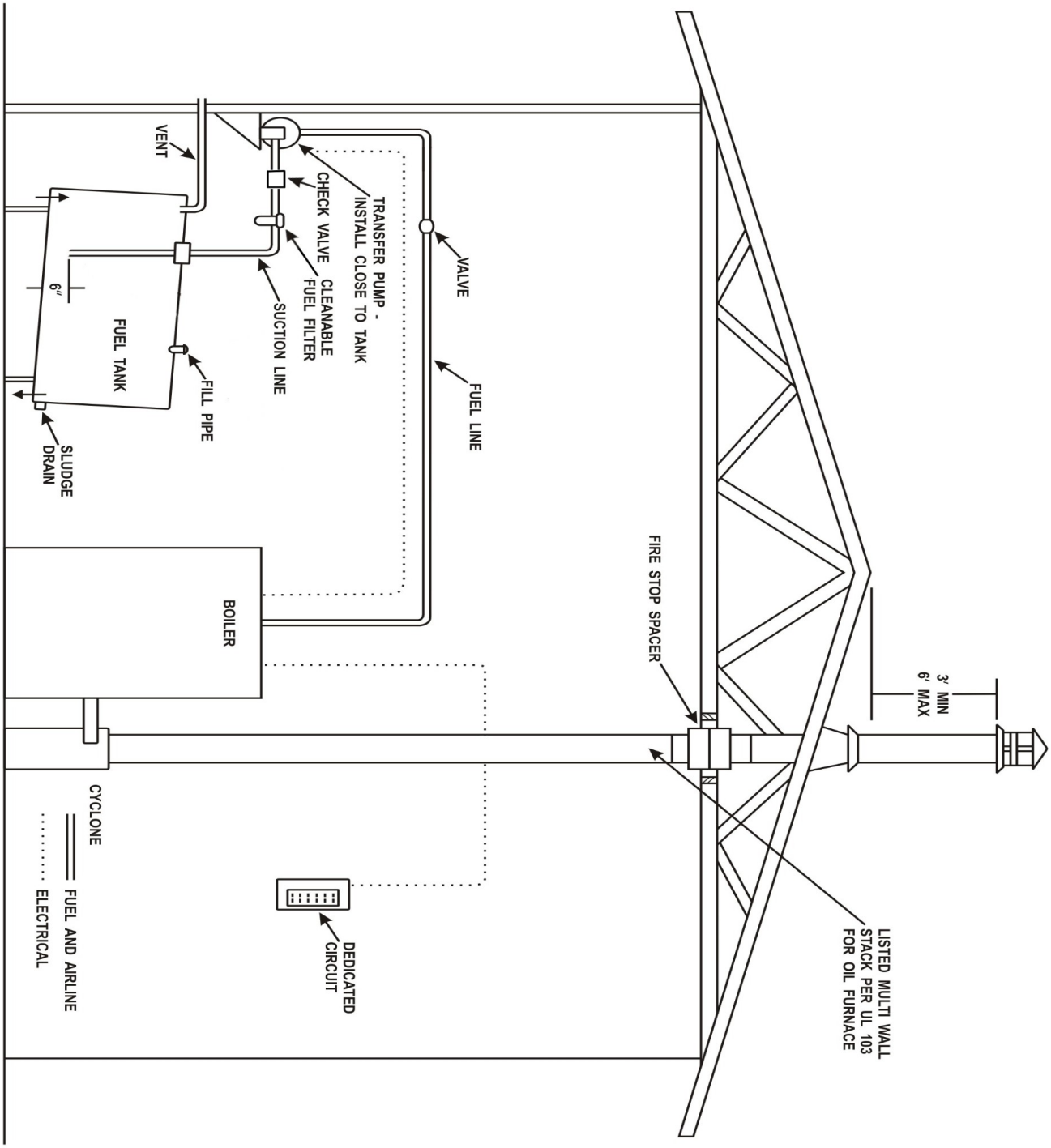
Draft Inducer Fan Assembly

The draft inducing fan assembly may be shipped in a separate box. If so, the fiberglass rope gasket must fit neatly in the groove without overlap or wrinkles. When tightening down the fan assemble nuts, alternate studs and apply equal pressure until the gasket seals firmly against the end of the swirl chamber.
The ¼" copper tubing will attach to the fan assembly at the ¼" compression fitting.

CAUTION: DO NOT TIGHTEN NUTS EXCESSIVELY AS THEY MAY DAMAGE THE GASKET OR THE CERAMIC BOARD HEAT SHIELD.

The wires leading from the fan motor must be inserted into the electrical box on the rear of the unit and connected as indicated in the wiring diagram of the particular model at hand.

Installation Illustration



FUEL LINE INSTALLATION

1. Install fuel tank to have a gravity drain so water and sludge can be drained from bottom of the tank periodically.
2. The correct sequence of the fuel line is 1st the tank, 2nd the 40 micron oil filter, 3rd the check valve, 4th the oil transfer pump, 5th the burner. You will also have a ¼" tube as relief line from the oil transfer pump back to the tank.
3. Use Permatex #2 non-hardening gasket sealer to seal all threads. DO NOT USE TEFLON TAPE.
4. Use ½" copper pipe to connect the tank to the oil filter. The copper pipe will be a continuous piece from the oil filter down into the oil tank. Use a flare fitting at the filter. Assemble oil pump pick up (suction) line and insert into storage tank. Keep bottom of the pipe at least 6-8" off bottom of tank to allow settling of sludge and water.
5. The oil filter of 40 micron is protect the burner components from fouling.
6. After the filter plumb in the check valve. Note direction arrow on check valve. The check valve prevents the oil in the line from flowing back to the tank.
7. Locate oil pump close to fuel storage tank. Do **not** exceed 12 feet vertical lift.
8. From the pump run a ½" metal line to within 36" of burner then reduce to flexible 3/8" OD metal tubing prior to burner. This will allow burner removal without disconnection for service. If pump is more than 75 feet from furnace, use a 1" diameter fuel line. Install a cutoff valve near the burner.
9. **Note**: if using a fixed rate pump. You will need to install a line from the relief port on the pump back to the tank. You can use ¼" nylon air brake line.
10. **Note**: if you are using a fixed rate pump, you will not need an oil pressure regulator. You will just need a pressure gauge.
11. The fuel line must be purged. Purge for roughly 15min to ensure all air is out of the lines and filter. Instructions to do this are provided on upcoming electrical section.

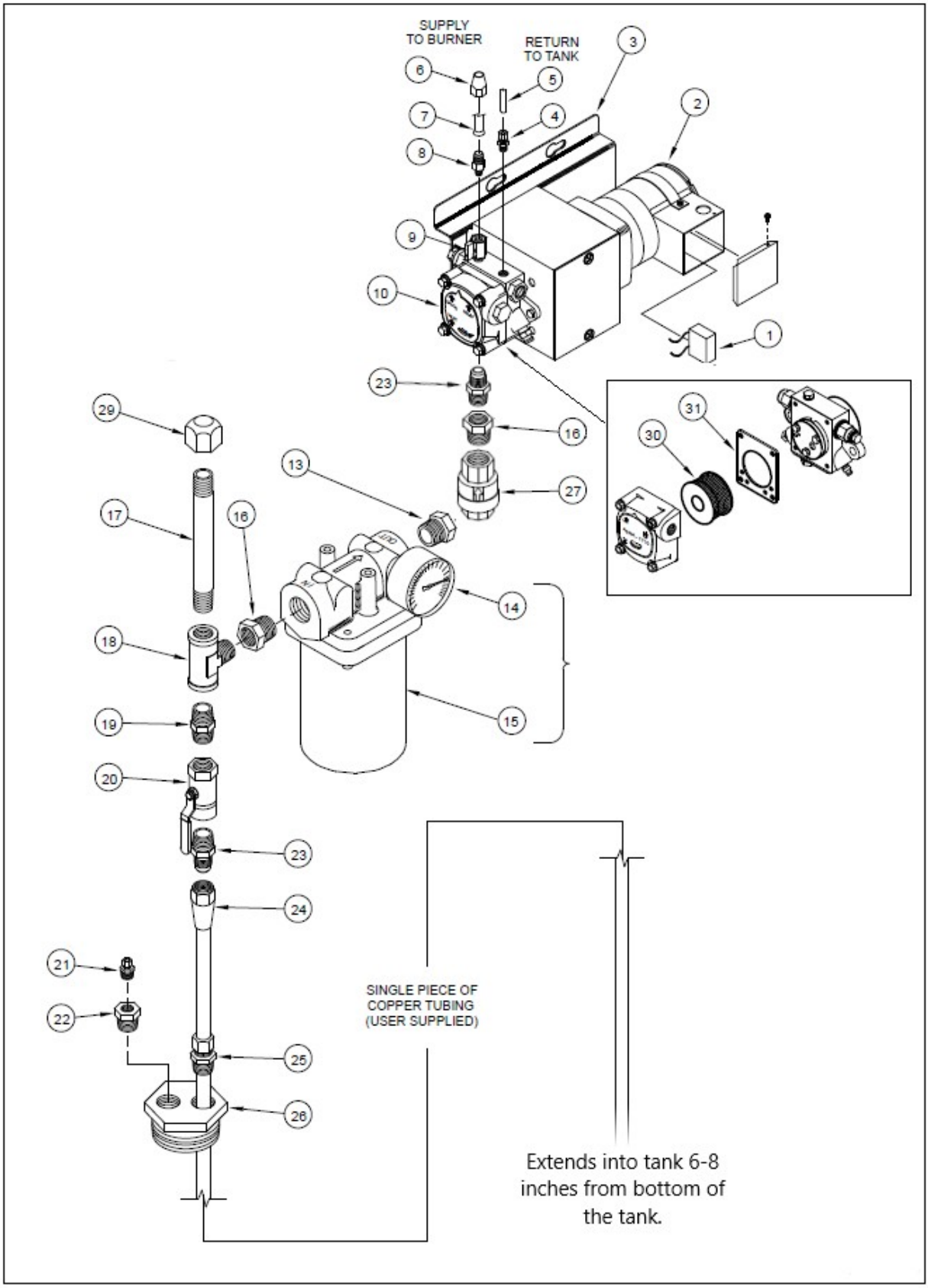


Figure 20: Fuel Line Diagram

COMPRESSED AIR SUPPLY

1. A minimum of 2 CFM air supply at 40 psi is required for the B5 burners.
2. A minimum of 5 CFM air supply at 40 psi is required for the B10 burners.

Connect compressed air line to inlet fitting on the burner. See preceding burner component diagrams for location of fitting.

Special Features

Your boiler has a hinged oil burner door assembly. This door allows cleaning of the oil burner flame retention head, electrode assembly, and nozzle by swinging oil burner door open (**CAUTION: POWER TO BURNER MUST BE SHUT OFF BEFORE SERVICING THIS BURNER. DO NOT ATTEMPT TO FIRE THE BURNER WHILE DOOR IS OPEN).**

It is suggested to use quick disconnects for the air and oil lines to the oil burner. A good grade of hydraulic disconnect should be used. These can be found at a farm implement supply store.

ELECTRICAL COMPONENTS

All electrical wiring must be done in accordance with the National Electrical Doe, N.F.P.A. #70 for furnaces installed in the U.S. and in accordance with C.S.A. Standard C22.1, Canadian Electrical Code, Park 1, for furnaces installed in Canada.

Run all wiring in conduit to the junction box on Boiler – use minimum of 10 gauge wire.

Install a wall mounted switch or breaker with 120V, 60HZ, 30AMP service. A fusible firomatic switch should be located near the boiler.

The B300 have an 115V, 15AMP service. The B500 and B1000 has a 230V, 20AMP or a 230V, 3PH, 25AMP service.

Wiring Connections Within Main Control Panel

B500 230v AC 20 Amps

Note: See wiring schematic later in this manual. If problems occur, consult the Troubleshooting section.

1. Connect GREEN ground wire from power supply to the Ground (green/yellow) Terminal Block.
2. Connect White wire (N-common) from power supply to Letter N Terminal Block
3. Connect L1 (115v) from power supply to L1 Terminal Block
4. Connect L2 (115v) from power supply to L2 Terminal Block
5. Connect wire from number 60 Terminal Block (115v) to oil pump and connect the WHITE pump wire to Letter N Terminal Block.

B1000 230v AC 20Amps

Note: See wiring schematic later in this manual. If problems occur, consult the Troubleshooting section.

1. Connect GREEN ground wire from power supply to the Ground (green/yellow) Terminal Block.
2. Connect White wire (N-common) from power supply to Letter N Terminal Block
3. Connect L1 (115v) from power supply to L1 Terminal Block
4. Connect L2 (115v) from power supply to L2 Terminal Block

5. Prior to connecting oil transfer pump motor into control circuit, wire motor direct and check rotation (arrow on pump). If it is not correct, reverse rotation per instruction on motor name plate. With proper rotation confirmed, proceed to purge oil lines as follows:
6. Connect wire from number 60 Terminal Block (115v) to oil pump and connect the WHITE pump wire to Letter N Terminal Block.

B1000 230v AC 25Amps 3 phase

Note: See wiring schematic later in this manual. If problems occur, consult the Troubleshooting section.

1. Connect GREEN ground wire from power supply to the Ground (green/yellow) Terminal Block.
2. Connect White wire (N-common) from power supply to Letter N Terminal Block
3. Connect L1 (115v) from power supply to L1 Terminal Block
4. Connect L2 (115v) from power supply to L2 Terminal Block
5. Connect L3 (115v) from power supply to L3 Terminal Block

Special Features

Your boiler has a hinged oil burner door assembly. This door allows cleaning of the oil burner flame retention head, electrode assembly, and nozzle by swinging oil burner door open (**CAUTION: POWER TO BURNER MUST BE SHUT OFF BEFORE SERVICING THIS BURNER. DO NOT ATTEMPT TO FIRE THE BURNER WHILE DOOR IS OPEN).**

It is suggested to use quick disconnects for the air and oil lines to the oil burner. A good grade of hydraulic disconnect should be used. These can be found at a farm implement supply store.

INITIAL START UP AND OPERATING SEQUENCE BURNERS

Priming the Fuel Line

Once the fuel line is installed as explained in a previous section you need to allow the pump to run and fill the fuel system with oil. There cannot be any air in the system or the burner will not fire, pulse, or burn incompletely.

1. Prior to priming oil lines check rotation of the pump motor (arrow on pump). If it is not correct, reverse rotation per instruction on motor name plate. With proper rotation confirmed, proceed to purge oil lines.
2. Disconnect fuel line at burner. Or if equipped open the bleeder valve. Have a bucket or container ready to catch the oil.
3. Start pump
   a. Turn on main switch.
   b. Turn Boiler Switch to “OFF”.
   c. Turn on Pre-Heat switch.
   d. Turn the run/off/prime switch located on **burner** to “prime”.
4. It may take the pump 10 – 15 minutes to prime itself and before you start seeing oil come out the open line.
5. Once you see oil allow the pump to run for at least 10 more minutes to completely purge lines. As the oil comes out of the open line the air can be seen in the oil stream. You want the pump to run until the oil stream is 100% solid no air “interuptions/bubbles”.
   a. If you have allowed the pump to prime for more than 20 minutes and still see air “interuptions/bubbles” coming out of the pipe. You most likely have a leak in the line before the pump.

b. To fix leaks you will need to tighten any and all threads, flare fittings.
c. If leaks insist you may need to tear system apart and reseal all the threads with Permatex #2 sealant and inspect all flare fittings.

6. Once the line is filled you will start catching the contaminated oil in your bucket. When the oil is free of air and debris run another few gallons more and close the burner bleeder valve or connect the oil line to burner.
7. Once oil is free of air and debris close the close the burner bleeder valve or connect the oil line to burner.

Staring Up the Boiler

1. Ensure the boiler is properly installed.
   a. The boiler must be installed in accordance with this manual and the boiler filled with water.
   b. Fill boiler and system with water and allow the water pressure to rise to 15psi.
      i. Allow circulator pump to run to allow any air to be removed by the Air-Eliminator.
      ii. You may need to add more water once air is worked out of the system.
      iii. Water pressure should be 12 – 15psi at all times.
   c. The fuel system must be leak free and purged of any air in the lines. See section above.
   d. The exhaust pipe must be installed in accordance with this manual.
2. Enable the water circulation system. Open all necessary valves and turn on all necessary pumps.
3. Turn the oil preheaters on.
   a. On the boiler turn the Main Switch to “on”. Turn the Auxiliary Pre-Heat switch to “ON” (if equipped). Turn the Pre-Heat switch “ON” but leave the Boiler Switch “OFF”.
   b. Now turn the run/off/prime toggle switch <u>on the Burner</u> to “RUN”. The amber and red lights on he slide gun will come on.
4. Wait for the red light on the slide gun to go off. This indicates the oil is preheated enough. The burner is now ready for the starting sequence.
5. Now you can turn the burner on. Turn the Boiler Switch to “ON”. If the Operate Aquastat is set higher than boiler water temperature the burner will start.
6. Observe flame.
   a. A proper flame should not reach the end wall of the unit. Excessive flame in any heater will cause excess wear to the door insulation, and may burn poorly causing it to smoke. If you believe the flame is improper advise Alternate Heating Systems, they can confirm you have the proper pump and advise you of options.
      i. Check air pressure. Pressure should be approximately 12 -16 PSI for Models B300, B500, and B1000. You may need up to 22 PSI depending on BTU output.
      ii. Check oil pressure. Pressure should be approximately 1-6 PSI.
         1. If there is a brass oil pressure regulator on the burner it is not required when using a metering pump, the regulator may be removed. If the brass oil regulator is left on the burner turn its screw full clockwise to 100% flow, it will then have no affect on oil flow.
   b. If a consistent flame is not established during the initial 30 seconds the primary control will lockout……Beware some controls will retry ignition after 45 seconds automatically.
      i. DO NOT attempt to manual restart a control until the heater has time to cool down and any unburned oil mist has exited the chamber.
      ii. Forcing a quick restart can put hot oil on the hot surfaces of the heat exchanger and may cause an explosion hazard, or excessive fire leading to personal or property damage.
      iii. It is not unusual to lock out one or two times at startup until air and oil have purged through the slide gun.

Sequence of Operation

1. The Boiler's sequence of operation is as follows:
    a. The Low Water Cutoff must be satisfied.
    b. The High Limit Aquastat with manual reset must also be satisfied
    c. If the water temperature is lower than the Operate Limit setting, the boiler will receive a call for heat.
    d. The Operate Limit will send power through the TR1 timer delay relay to the MR1 (Motor Relay).
        i. The TR1 relay will cut power if flame is not sensed by the Burner's flame sensor eye within 45 seconds.
    e. The MR1 will start the fan. The fan will create a negative pressure in the burn chamber, this is sensed by the differential pressure switch.
    f. The pressure switch will send power to CR3 (Contact Relay) and TR2
    g. The CR3 sends a 24v signal to the burner's TT terminals and which allows the burner to fire. (Be sure the run/off/prime switch on burner is set to "RUN")
    h. When the compressed air to the burner is at least 20 psi the air proving switch (in the burner), it will send power to its fan motor, the ignition transformer, the oil solenoid valve(s) & green light.
    i. At the same time the burner's Primary Control will send a signal to start the fuel pump (CR4).
        1. If the Primary Control's flame sensing eye does not see fire it will shut the boiler down.
    j. The preheated oil and air are mixed at the nozzle and the fuel is atomized as the electrodes arc for ignition. The red light will cycle on/off automatically to show the preheaters in the oil block are on or off.
    k. When ignition occurs and combustion is sustained, the water temperature will rise. When 180° F is achieved, the Operate Limit opens, thus shutting the boiler down and wait until the circulation system removes enough heat to drop the water temperature to 160F creating another call for heat.
        i. The temperature the boiler operates at can be adjusted by turning the dial on the Operate Limit. Be sure the High Limit aquastat is at least 20F more than the Operate Limit aquastat.

FINE TUNING THE BURNER

Due to variations in waste oils, the air and oil pressure regulator settings are approximate. Final adjustments need to be made with your specific fuel.

Observe the flame pattern through the observation port and make all adjustments while observing the flame.

1. The ideal flame will appear bright yellow/white in color with no visible smoke emitting from the chimney.
2. If the flame appears dull yellow and red in color, it is oxygen starved.
3. Secondary air is admitted through the adjustable air bands on the side of the burner.
4. Ideal operating condition is 10% to 12% CO_2 with smoke test at trace to #1.
5. Do not allow flame to touch or impinge on the opposite end of boiler.
6. Air/Fuel adjustment should be verified by a Bacharach Stack Test.
7. The fuel flow rate is controlled by the RPM of the oil pump motor. If the flame mushrooms on the target plate with oil pressure less than 1 PSI, replace the nozzle with a smaller size.

The burners primary, and secondary air adjustments allow for ideal air/fuel ratios assuring peak performance and combustion efficiency. Excess secondary air will reduce efficiency.

PRIMARY CONTROL FUNCTION

Safety Lockout

CAUTION: DO NOT PUSH THE RESET BUTTON IF THE BURNER FAILS AND THE BOILER IS HOT! PUSHING THE RESET BUTTON AT THIS TIME CAN FORCE UNBURNED FUEL INTO THE HOT COMBUSTION CHAMBER AND CAUSE AN EXPLOSION HAZARD.

When the primary control locks out, there is a malfunction. Determine the cause. The primary control is a safety device similar to a breaker in an electrical circuit. It will lock out when:

1. The CAD cell (electronic eye) detects no flame for over 30 seconds. A signal measured in ohms is communicated between the cad cell and the primary control. A poor or absent flame produces a high ohm reading. When this signal is > 1500 ohms the control goes into reset. A signal indicating a very good flame is < 500 ohms. A moderate flame would be 500 to 1000 ohms.
2. There is a malfunctioning oil pump, combustion fan, burner motor, or interruption in electrical supply or air supply.
3. The CAD cell is defective, lens is dirty, or flame is weak.
4. The retention head fins are not allowing light to pass to the cad cell.
5. The primary control is defective.
6. Boiler needs cleaned
7. Burner's slide gun assembly, nozzle, or oil filter may need cleaned.

When the ceramic liner of the combustion chamber is cool to the touch, observe oil pressure reading on the regulator; push the reset button and determine whether oil pressure is present. If the gauge shows normal oil pressure, and the burner does not fire, DO NOT push the reset button repeatedly, as this will flood the boiler. If the gauge shows no oil pressure, locate and correct fuel supply problem.

THE PRIMARY CONTROL WILL GO INTO A HARD LOCK OUT THE BURNER AFTER 3 UNSUCCESSFUL RETRIES.

TROUBLESHOOTING

Burner Fails to Ignite:

1) Check air pressure. Pressure should be approximately 12 -16 PSI for Models B300, B500, and B1000. 20 PSI for B1000 producing more than 1,000,000 btu/hr
2) Check oil pressure. Pressure should be approximately 3 PSI.
3) Determine whether fuel supply is adequate. Check the actual gallons per hour at the burner. See the section on Priming the fuel system.
4) Check oil filters in line. NOTE: All filters in the oil line need to be checked periodically. Filter should have less than 10" HG of vacuum.
5) Check for condensation in compressed air line.
6) No spark at igniter. Check the following...
   NOTE: Switch off power source before working on wiring. Only qualified persons should service burner controls.
   a) Check for loose connections in wiring.
   b) Check igniters for correct spacing.
   c) Check for spark jumping across end of porcelain insulators.
   d) Check for cracked porcelain insulators. Remove both and examine.
   e) Check for carbon buildup on points of igniters.
   f) Check ignition wire (orange) from primary control for output voltage of 100V.
7) If oil flow is restricted, producing an irregular flame, shut down. Remove slide gun assembly. Inspect nozzle and clean or replace as required.

Excessive Fluttering or Pulsating Flame

A. Excessive draft
B. Air leaks in oil pump suction line
C. Dirty or plugged fuel filter
D. Nozzle gaskets or O-Ring seals in nozzle assembly defective
E. Water or anti-freeze in the fuel
F. Condensation in the compressed air supply

Flame Failure

A. Failure of air Pre-Heater in nozzle gun assembly.
B. Failure of heat sensor for Pre-Heater.
C. Improper primary or secondary air adjustments.
D. Fuel pump not operating.
E. Water or anti-freeze in oil.
F. Dirty or plugged fuel filter.
G. Igniters improperly adjusted.
H. Obstruction in nozzle – clean or replace.

Smoke On Ignition

A) Air pressure set too low (set at approximately 12 to 16 PSI for Models B300, B500. Up to 20psi for HO B1000).
B) Too much fuel pumped to burner which needs a lot of primary and secondary air (install optional starter damper or decrease flow rate of fuel)
C) Carbon buildup on igniter points.
D) Igniter points improperly positioned.
E) Weak Transformer.

CHECKLIST FOR ELECTRICAL PROBLEMS

Burner Fan Motor Will Not Run

1. Must have power to burner.
2. Check status of Primary Control
3. There is a thermal overload reset button on the motor. Push to reset.

Lack of Power to Burner

1. Boiler Combustion Fan must be running.
2. Main and secondary fuses must be closed or breakers must be on.
3. Boiler pressure switch must close. Check tubing is properly connected.
4. Turn preheat switch on.
5. Verify the run/off/prime switch is set to “run”.
6. Check High limit. Press reset.
7. Check Low water cutoff. Press reset.

Oil Pump Will Not Run

1. Must be power at pump.
2. Oil pump fuse/breaker must be closed.
    a. If VFD controlled, check for errors.
3. Check the Primary Control.
4. The run/off/prime switch must be set to “run” or “prime”.

Boiler Combustion Fan will not Run

1. Check for phase failure.
2. Must have a call for heat. Compare High limit and Operate Limit aquastats settings’ to boiler’s water temp.
3. Check the status of the Low Water Cutoff
4. All switches on must be set to “on”.
5. The run/off/prime switch on the burner must be set to “run”.
6. Check breaker/fuse.
7. Does the motor and fan shaft spin freely.
8. For 3-phase motors. Press the reset button on Thermal overload, or check for errors on VFD (if applicable)
9. For single phase motors. Check for power at the motor. If there is power…
    1. Could be tripped by internal thermal overload. Wait for the motor to cool down.
    2. Check Capacitor
    3. Check end/start Switch
10. Check the Primary Control on the Burner.

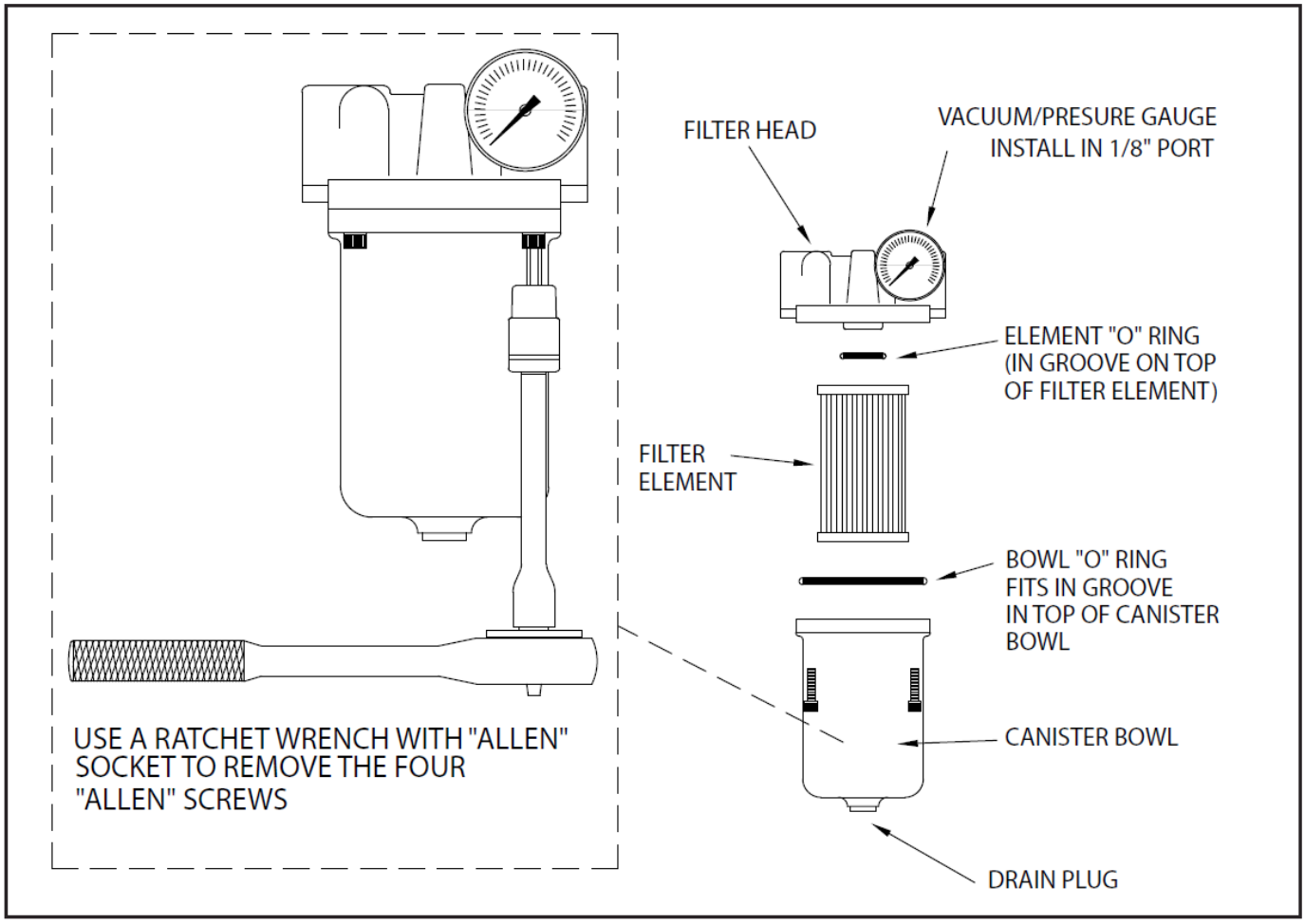


Figure 21: Oil Filter Diagram

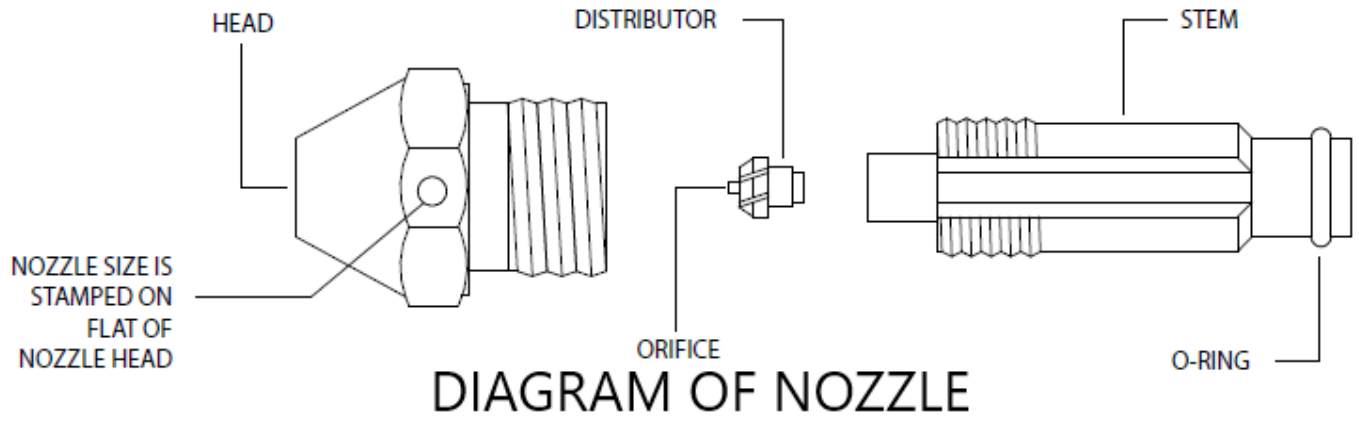


Figure 22: Diagram of Nozzle

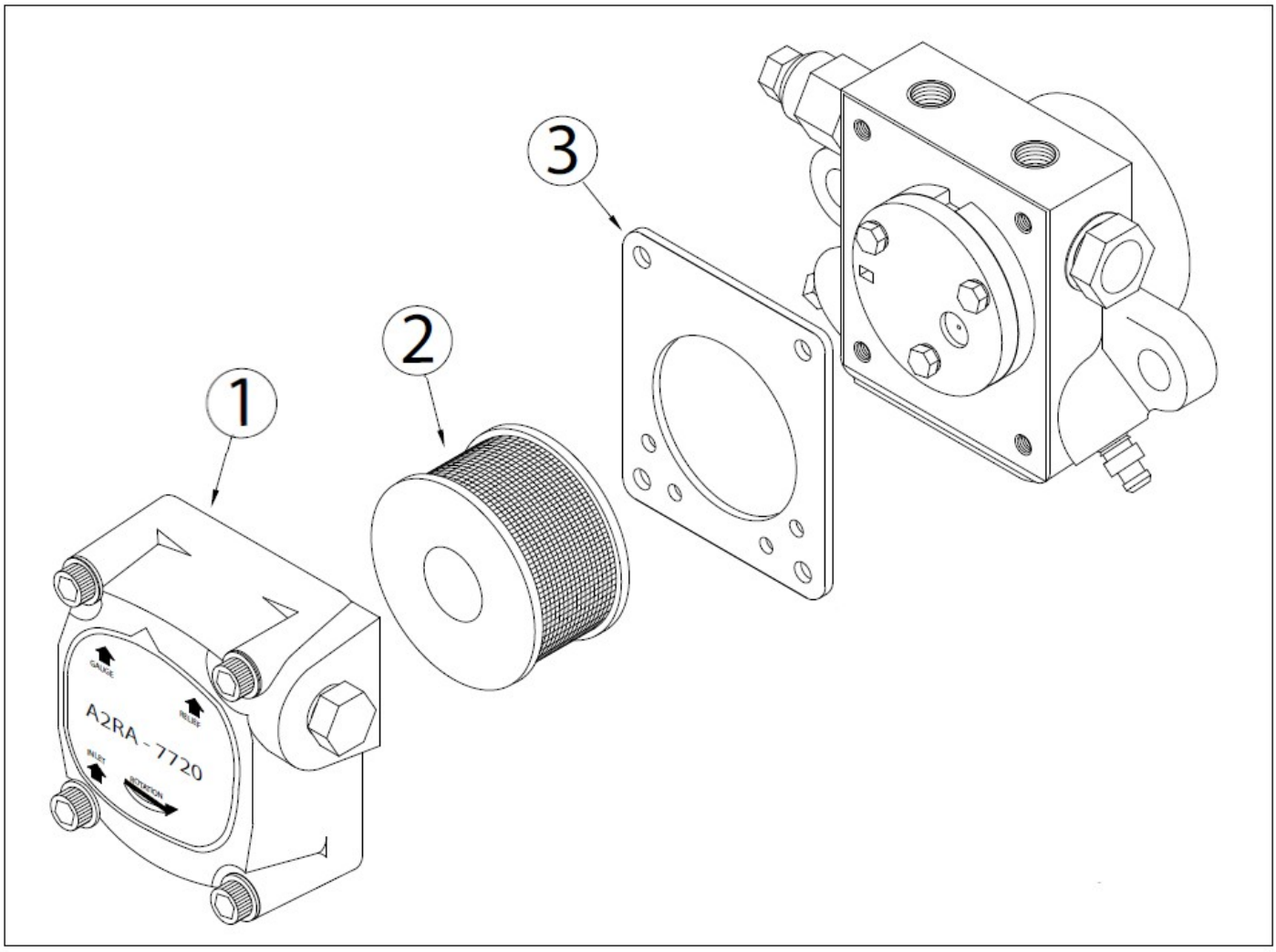
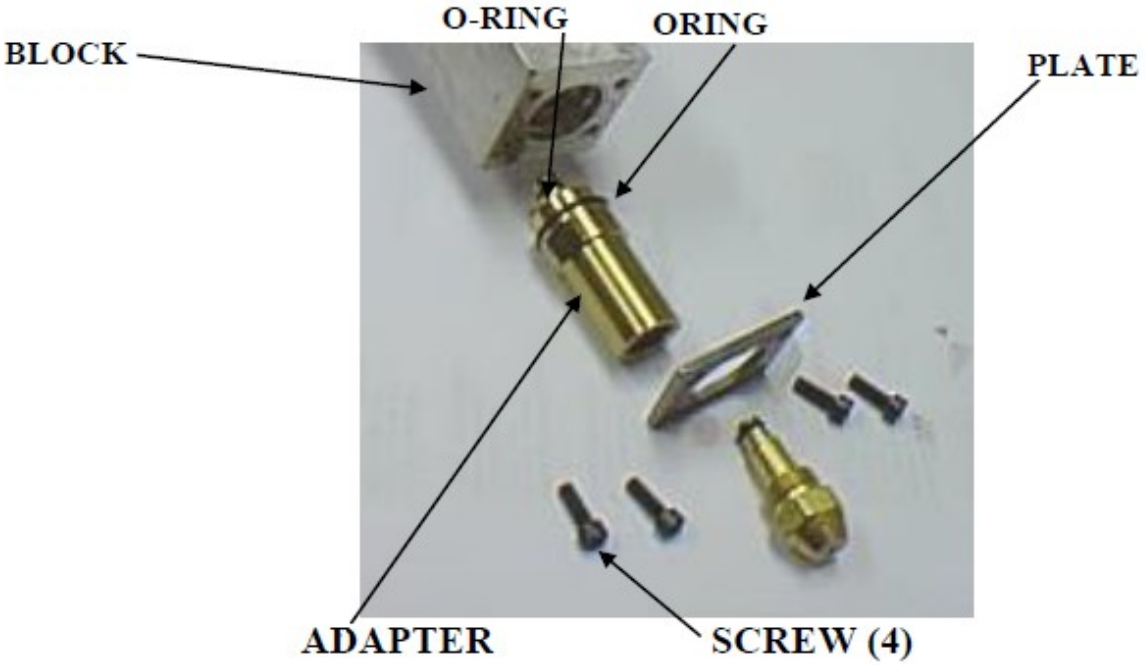
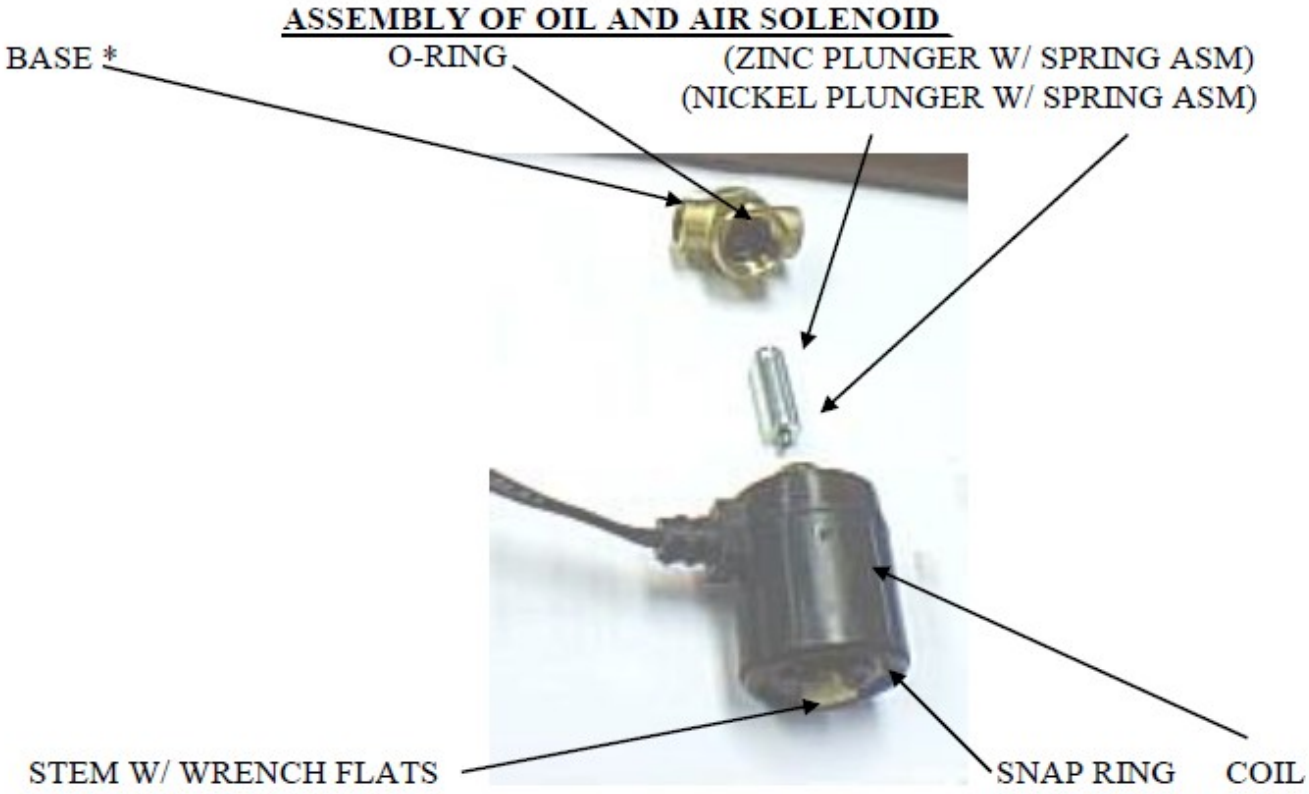


Figure 23: Oil Pump Diagram





*** Pay attention to detail, the solenoid base has a specific inlet and outlet direction.**

Figure 24: Nozzle Adapter and Solenoid Diagram

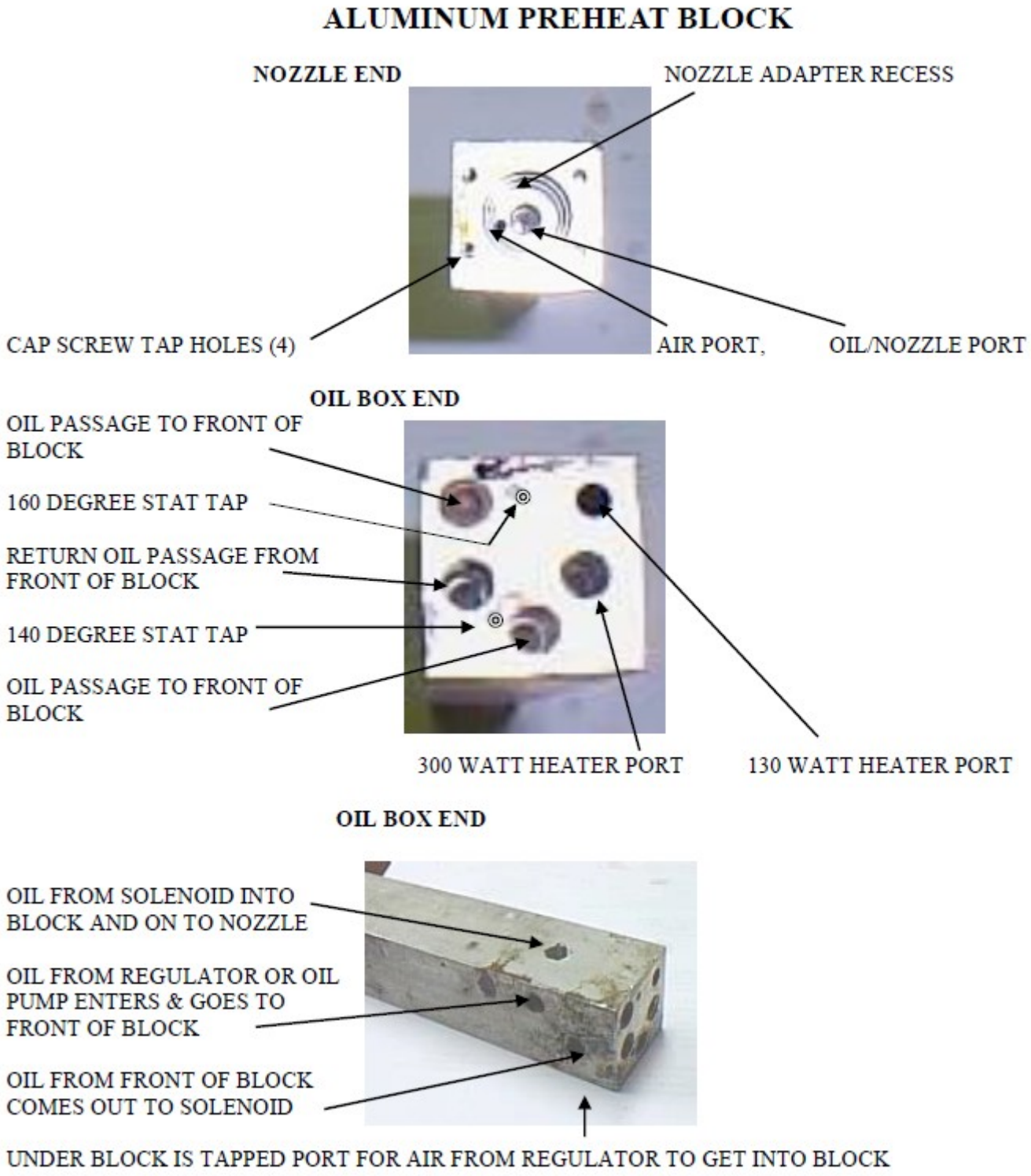


Figure 25: Slide Block Assembly Diagram

MAINTENANCE AND INSPECTION SCHEDULE

A properly cleaned and maintained boiler operates efficiently and prevents possible soot fires.

CAUTION:

Waste oil contains heavy metal compounds and foreign materials. When burned, the compounds are deposited within the furnace. When cleaning the unit, including connector pipe and chimney, protective clothing, including gloves, face mask and respirator must be worn. All waste materials removed when cleaning the system should be stored in a closed non-combustible container until properly disposed.

Do not store cleaning solvents and materials near the furnace.

Check nozzle, retention head, and igniters frequently for buildup of residue until experience indicates maximum allowable interval before removing for service. A flame inspection mirror is useful for a routine check of the nozzle, ignition, and retention head while the unit is operating. However, the slide gun assembly, sleeve assembly or complete burner must removed for periodic iginitor position check, cleaning, and other servicing that may be needed.

Servicing the Burner

The nozzle and electrodes can be serviced without removing burner from boiler. The burner is mounted on a hinged burner mount which allows access to burner nozzle when opened.

To remove the slide gun assembly:

Switch off power to furnace

1. Disconnect air line (under the assembly) and the oil line.
2. Remove the mount screw on left side of burner
3. Pull on assembly out towards you. When pulled out the electrical plug disconnects and comes out from burner housing
4. Inspect nozzle. If it appears dirty, remove and clean with solvents and soft cloth
5. If wear is evident, install a new nozzle
6. Inspect O-Rings: replace if worn, torn, or deformed

Note: the nozzle can be cleaned. See figure in previous section.

To remove the electrode sleeve assembly with nozzle gun assembly removed:

1. Remove/open ignition transformer box (2 screws and a hinge)
2. Remove (2) sleeve retainer screws on burner tube
3. Withdraw sleeve assembly from burner
4. Inspect the electrode tip and insulators. If cracked or discolored, replace
5. Clean any carbon deposits from tips.
6. Replace if tips are worn or shortened.

To adjust electrodes to nozzle:

1. Insert slide gun assembly into sleeve
2. Adjust Electrodes. Reassemble to burner.

To remove burner for complete servicing:

1. Switch power off.
2. Disconnect air and oil lines
3. Disconnect electrical connections and conduit from junction box
4. Remove (3) attach nuts
5. Lift burner slightly and pull it out of boiler.
6. Remove slide gun assembly and electrode sleeve assembly per previously listed procedures – inspect, clean, and replace parts as needed
7. Remove flame retention head and clean head and burner housing
8. Reassemble burner and set aside until heat exchanger is cleaned

Note: Diagrams showing these parts are in a previous section.

BOILER MAINTENANCE

- Disconnect all incoming electrical power prior to servicing this boiler.
- Use Extreme caution around boiler piping and the low water cut off since they may be hot (if provided).
- Accumulation of ash produces numerous adverse effects. Reduced heat transfer (US Bureau of Mines) Research by the US Bureau of Mines has determined that 1/32-inch of soot coating causes 9.5% loss of boiler efficiency. The following table shows how soot thickness effects efficiency

1/32 – inch of soot	9.5% loss of efficiency
1/16 – inch of soot	26% loss of efficiency
1/8- inch of soot	45% loss of efficiency
3/16 – inch of soot	69% loss of efficiency

- The life of your boiler can only be measured by the care given to it by those who are charged with the responsibility of boiler maintenance. A log of the following items should be maintained in the boiler room at all times. A sample recording sheet is the rear of the section.

Daily boiler check/maintenance list

1. Observe operating pressures are normal.
2. Observe operating temperatures are normal
3. Listen for any unusual noises and correct as necessary.

Weekly boiler check/maintenance list

1. Observe condition of flame.
2. Check fuel valves-open limit switch and make aural and visual check.
3. Check fuel supply.
4. Observe operation of circulating pump(s).
5. Check all filters and water traps in the oil and air supply lines
6. Clean and/or replace filters as experience dictates.

Do not alter or increase the firing rate above the maximum indicated on the listing plate. This may cause burner to over fire.

Monthly boiler check/maintenance list

1. Safety relief valve – try lever test.
2. Test smoke alarms and CO alarms.

3. Oil boilers-fuel temperature and pressure interlocks.
4. Test Low Water Cutoff. Press the Test button, boiler will shutdown. Press reset button to allow boiler to run.
5. Test aquastats. Temporarily turn the temperature dial lower that water temp, boiler will shutdown. Return to original setting.
6. Check boiler room floor drains for proper operation
7. Inspect fuel systems in boiler room.
    a. Check oil pressure at filter and the oil pressure at the burner.
8. Check condition of heating surfaces.
9. Perform draft and combustion test.
10. Remove cyclone ash pan and empty ash in proper container. Replace ash pan and close door.
11. Remove fan assembly and clean tubes. Use tube brush to run through tubes.
12. Open inspection door and vacuum ash from combustion chamber.

Two or Three Times During Heating Season

1. Remove stove pipe from cyclone, clean out any ash or residue.
    a. See Cleaning the Boiler section below.
2. Inspect ceramic board on inspection door for wear – replace if badly worn.
3. Follow initial startup procedures

End of Heating Season

1. Turn off power to boiler
2. Clean boiler and burner thoroughly. See Cleaning the Boiler section below.
3. Replace any worn out, damaged parts, nozzle, and filters.
4. Flush oil pump with #2 fuel oil or kerosene
5. Close fuel oil valve nearest supply tank during non-heating season
6. Close fuel oil valve nearest supply tank during non-heating season
7. Drain water and sludge from fuel tank
8. Clean connector pipe and chimney thoroughly
9. Reinstall burner
10. Startup procedures for new heating season are the same as initial startup
11. Routine burner maintenance.
12. Routine maintenance of circulating pump(s).
13. Relief Valve Pop test.
14. Combustion and draft tests.
15. Inspect expansion tank.
16. Inspect boiler room louvers or fresh air intake.

Door Hinge Adjustment

For proper operation of the waste oil boiler, it is important that the inspection door have an air-tight seal. All have a simple adjustment mechanism on the hinge plate and latch which permits the door to be moved tighter as the gasket compresses during service. To adjust the hinge, open the door, loosen the bolts which hold the hinge plate, and bump the door toward the door frame and re-tighten. Be careful not to make it so tight as to prevent the latch side from closing properly.

To adjust the latch side of the doors with handles, remove the two bolts that secure the latch keeper in place and remove one of the spacer shims. Two shims are inserted at assembly; one of which is 1/8” thick and the other 1/16” thick. Remove the thin one first and, if more adjustment is required later, it can be used to replace the thicker one to gain more adjustment.

Periodically, lubricate the door handle wear pad, door hinges, and door handle with the Tri-Flow lubricant, WD-40, or similar household lubricant.

Door Seal Replacement

If the gasket becomes damaged or deteriorates to the extent that a good seal cannot be obtained through the adjustment procedure, it should be replaced. Remove the old gasket rope and clean the groove well before inserting new rope. Use 1" diameter, high density fiberglass rope.

Cleaning the Boiler

Under normal operating conditions the flue passages will need to be cleaned every month. If excessive soot has built up on the flue passages they can be cleaned following this procedure.

1. Open the front cleanout door. Care must be taken when removing these doors not to damage the insulating ceramic board. Be sure electric power is off to prevent accidental burner firing.
2. Open the fan assembly and gasket on rear of boiler.
3. Using a flue brush, brush the accumulated soot and scale staring in the rear of the boiler brushing the top, proceed to brush down the heat exchanger.
4. Brush the side wall of the firebox through the burner opening.
5. Carefully vacuum the soot and scale which is now laying in the chamber of the boiler.
6. Remove stovepipe from cyclone to clean and remove any soot, especially the horizontal runs.
7. Remove the top of the cyclone to clean the connecting tube and the main body of the cyclone.

FAN ASSEMBLY MAINTENANCE

CAUTION: Be sure to disconnect power to the unit before servicing or removing the fan.

The fan-motor assembly may be removed by loosening the nuts from the studs which hold it in place.

If the gasket is damaged, all of the old material must be removed and a new gasket inserted. Use only 5/8" diameter, high density fiberglass rope or 1" diameter low density fiberglass rope.

On units which have a shaft drive fan, the bearings and belt should be checked every three months. The fan belt may be tightened by means of adjustment screw on motor mount. To check for proper alignment of the pulleys, lay a straight edge across both pulleys and adjust until it touches at all points.

After replacing the fan-motor assembly on shaft drive models, turn the fan over by hand to ensure that it does not bind. If a tight spot is evident, loosen the locking collars on the shaft and move it in until it touches and mark the shaft. Then pull the shaft out until the fan touches and mark the shaft. Position the shaft midway between the two marks and re-tighten the collars. Be certain to replace the belt guard if it was removed for servicing.

NOTE: Pillow block fan shaft bearings are permanently sealed and do not require lubrication. Premature bearing failure can be caused by forcing an excessive amount of grease which ruptures the seal allowing all the lubricant to run out as soon as the bearing becomes warm.

Changing the RPM of the Fan

Models with a VFD

1. Press and hold the “hexagon” button on the VFD for 4 seconds.
2. Use the up and down arrow buttons to find parameter number P-20
3. Once at P-20 press the “hexagon” button
4. Now use the up and down arrow buttons to change to desired RPM.
5. When finished press the “hexagon” button.

Models without a VFD

1. Turn boiler off.
2. Loosen the motor from mounting plate.
3. Remove the belt
4. to increase the fan RPM you can either decrease the size of the shaft pulley or increase the size of the motor pulley.
5. To decrease the fan RPM you can either increase the size of the shaft pulley or decrease the size of the motor pulley.
6. For variable pitch pulley one full revolution changes the diameter by 0.2 inches.
7. Formula.

   motor pulley diameter/shaft pulley diameter*RPM of motor=shaft RPM

Changing the RPM of the Fuel Pump Motor

Models with a VFD

1. Press and hold the “hexagon” button on the VFD for 4 seconds.
2. Use the up and down arrow buttons to find parameter number P-20
3. Once at P-20 press the “hexagon” button
4. Now use the up and down arrow buttons to change to desired RPM.
5. When finished press the “hexagon” button.

Models without a VFD call Alternate Heating Systems. 717-987-0099

Maintenance – Testing – Inspection Log

Maintenance, Testing and Inspection Log		Building:		Month:	Year:
Hot Water Heating Boilers		Address		Fuel Type:	
Person(s) to be notified in Emergency (Name & Telephone No.)				Boiler No:	

	DAILY CHECKS																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
(1) Record Pressure																															
(2) Record Boiler Water Temperature																															
(3) Record Flue Gas Temperature																															

	WEEKLY CHECKS (Enter Date)			
	WEEK 1	WEEK 2	WEEK 3	WEEK 4
(1) Observe Flame Condition				
(2) Observe Circulating Pumps				

MONTHLY CHECKS (Enter Date)			
(1) Manual Lift Relief Valve			
(2) Review Condition of or Test each Item	(A) Flame Detection Devices	(F) Refractory	
	(B) Limit Controls	(G) Stop Valves	
	(C) Operating Controls	(H) Check Valves	
	(D) Floor Drains	(I) Drain Valves	
	(E) Fuel Piping	(J) Linkages	
(3) Observe Gage Glass on Expansion Tank			
(4) Combustion Air Adequate / Unobstructed			
General Comments:			

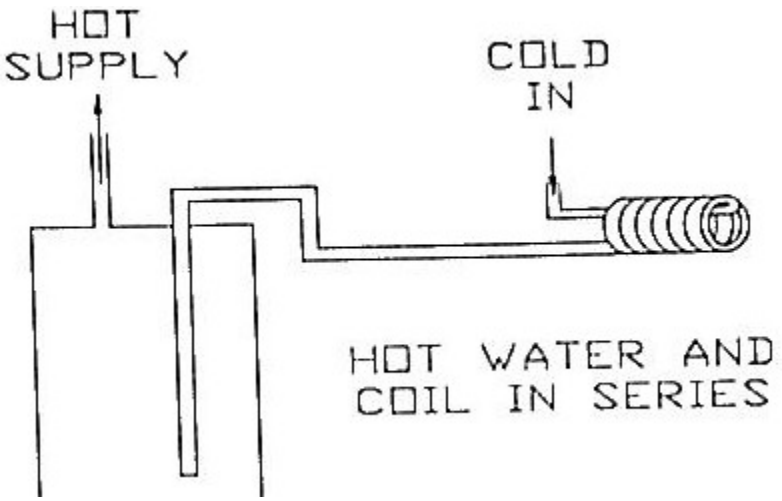
#59001

INSTALLATION OPTIONS

Domestic Hot Water Coil

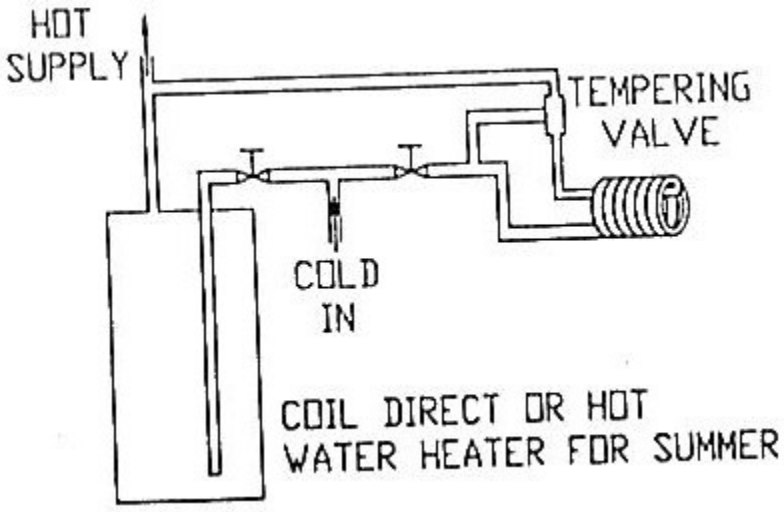
These coils can be factory or field installed. Coils are rated at 5 GPM or 10 GPM. The coils can be used for domestic hot water and wash bays. You can also use these coils to pre-heat water in hot water heaters.

There are three methods for plumbing the domestic coil. One way is to connect the coil in series with an existing hot water heater.



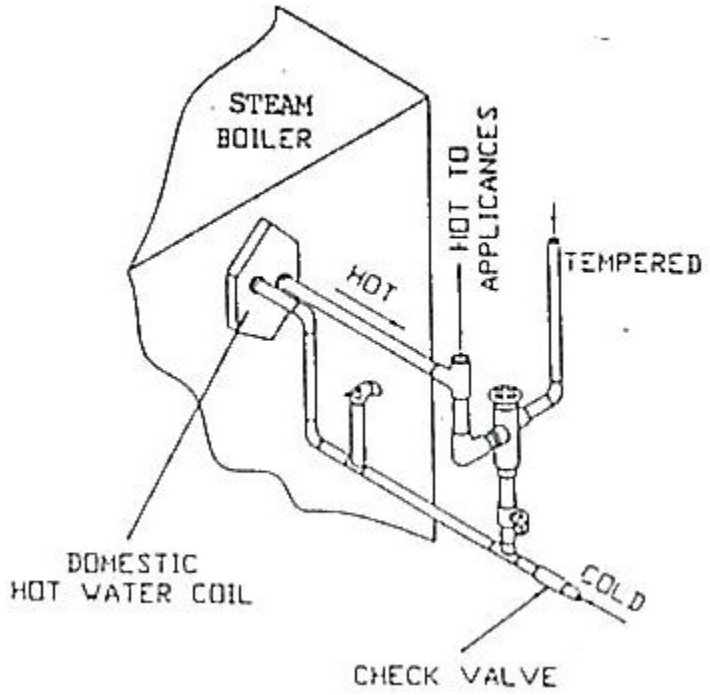
PLUMBING – COIL IN SERIES

A second method is to connect the coil in parallel with an existing water heater so that the conventional water heater may be used when the waste oil boiler is not being fired, in the summer, for example. The diagram below indicates how this can be done.

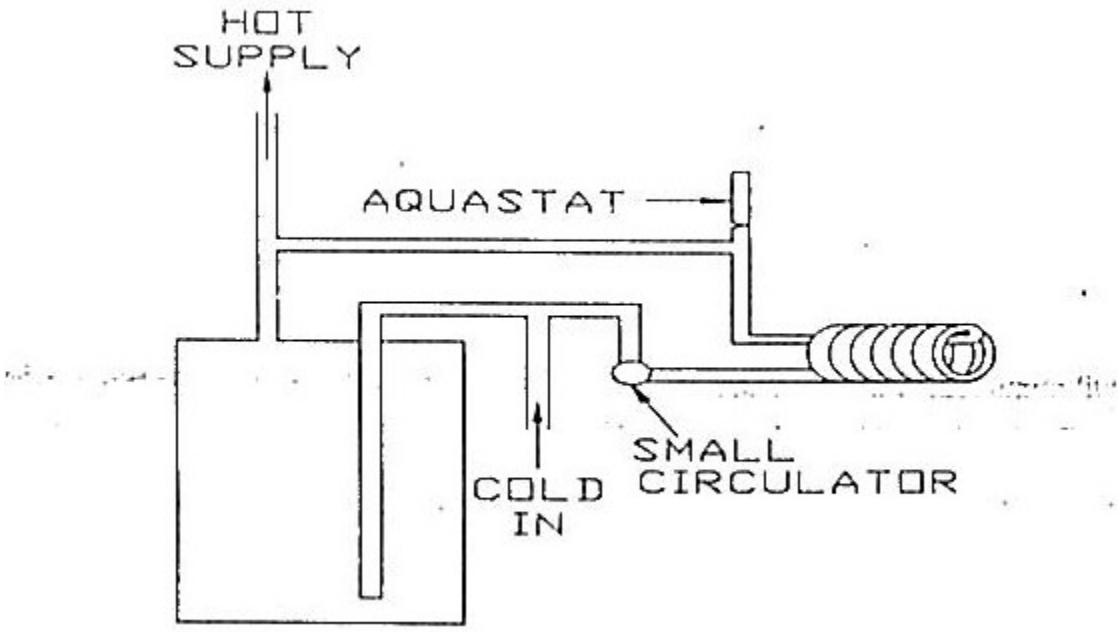


PLUMBING – COIL IN PARALLEL

NOTE: Installation where the coil discharges directly into the hot water distribution system, a tempering valve must be included to limit the temperature of the water at the faucet to a safe level.

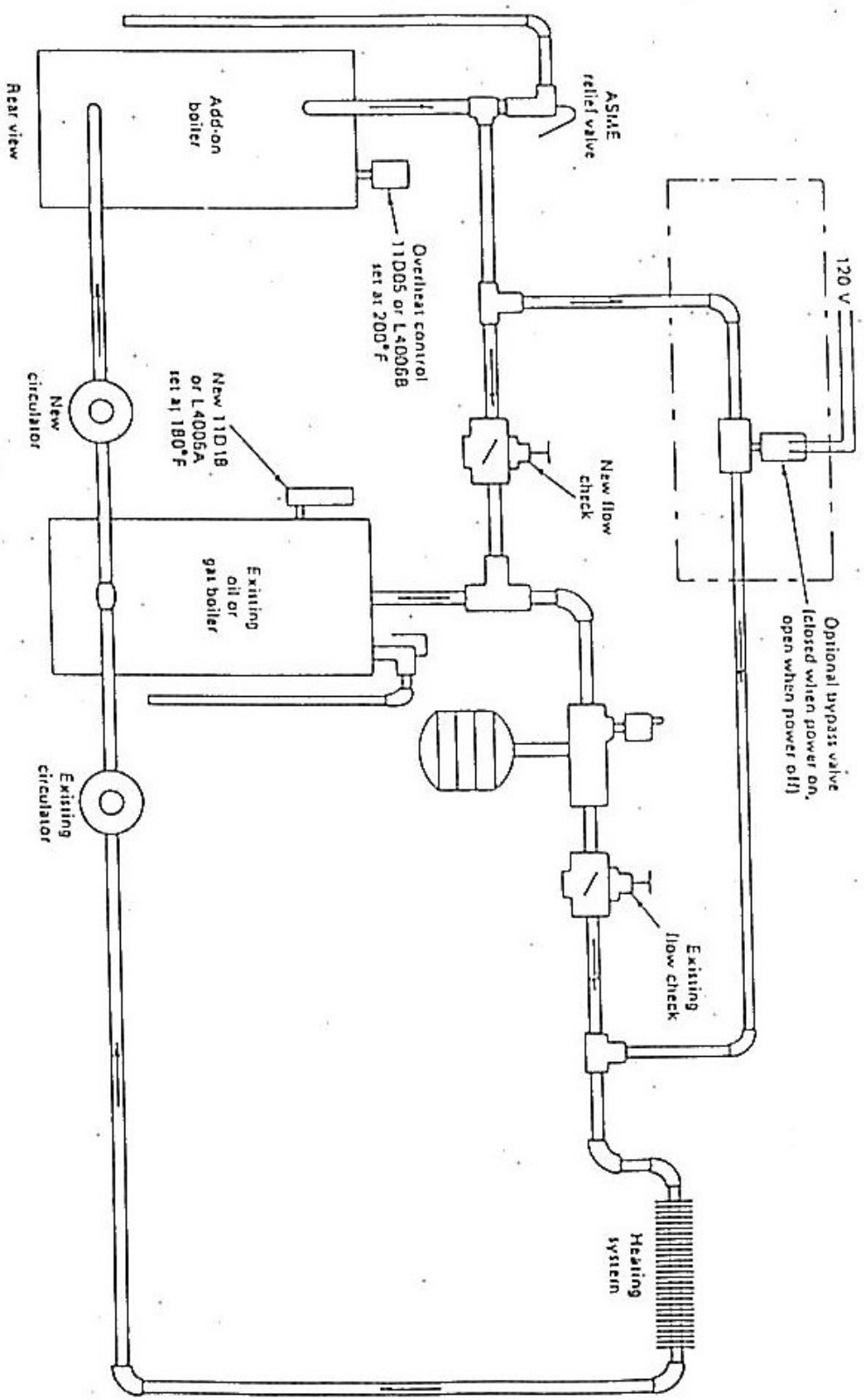


The third method uses a small pump to circulate water continuously between the coil and existing hot water heater. It is also necessary to include a tempering valve on the supply side of the storage tank/water heater.

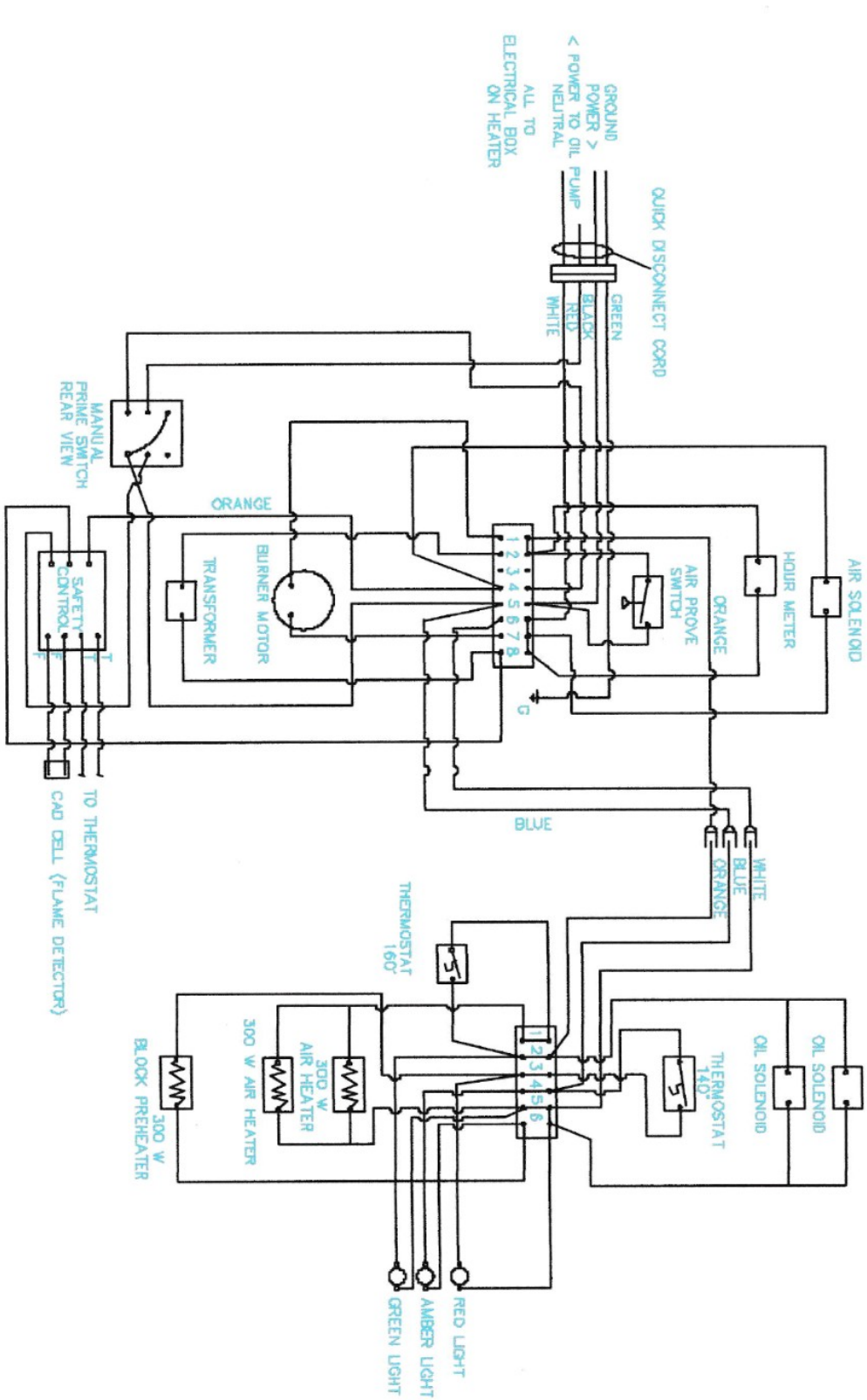


COIL PARALLEL WITH EXISTING HOT WATER HEATER

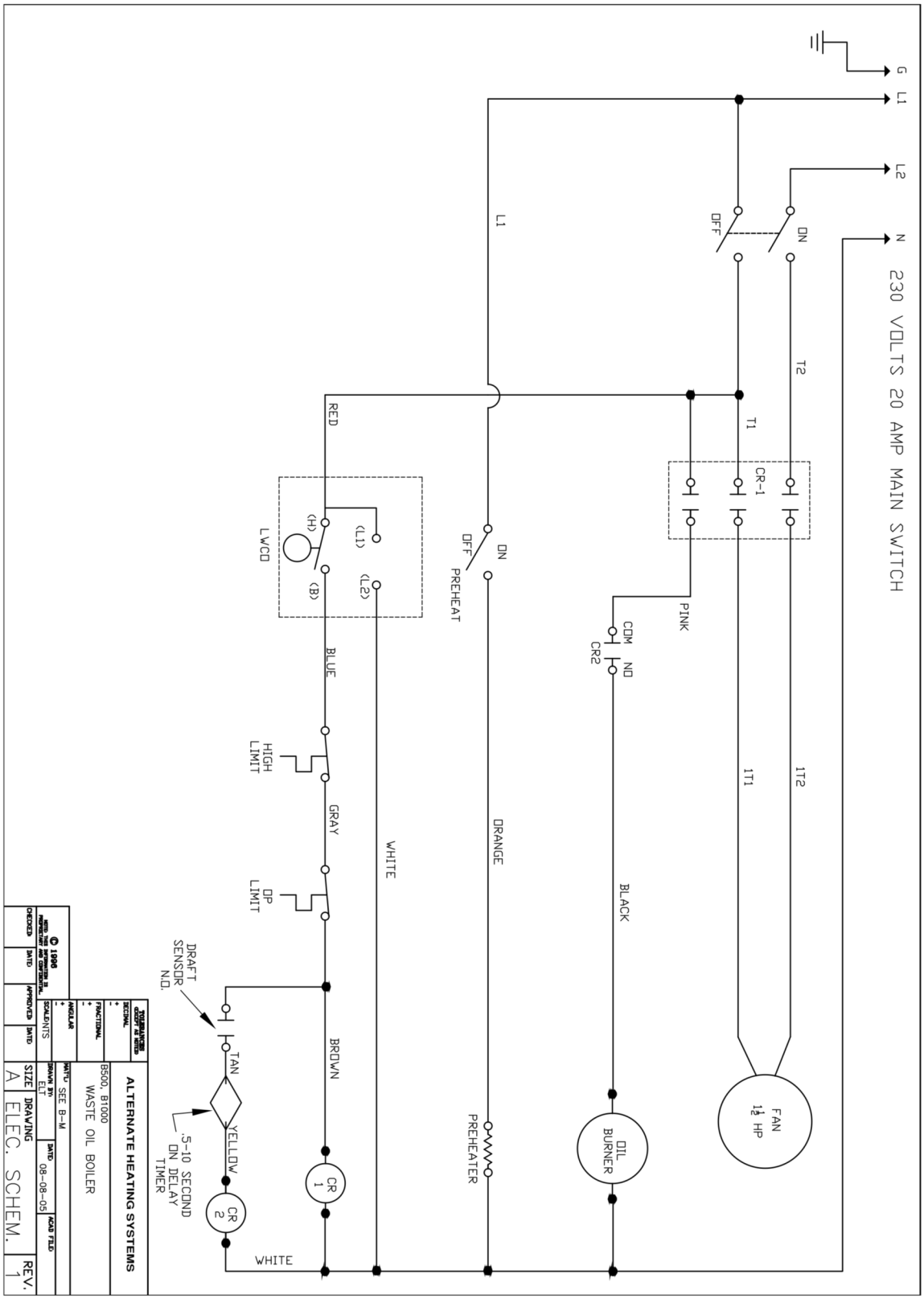
Functions Independently Or With Existing System



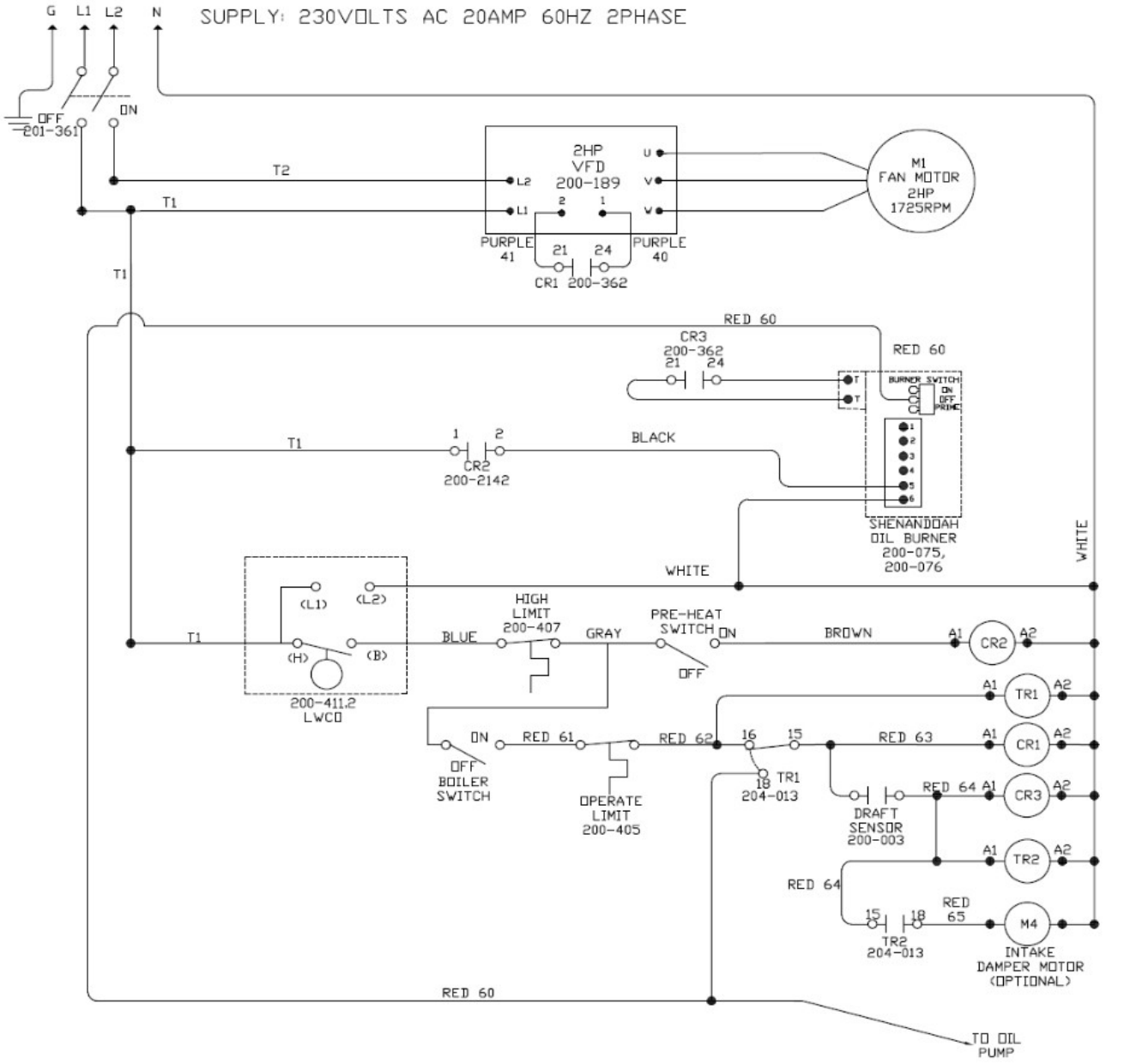
FireLake B10 Double Nozzle Burner Wiring Schematic



Wiring Schematic – B500-B1000 230 V

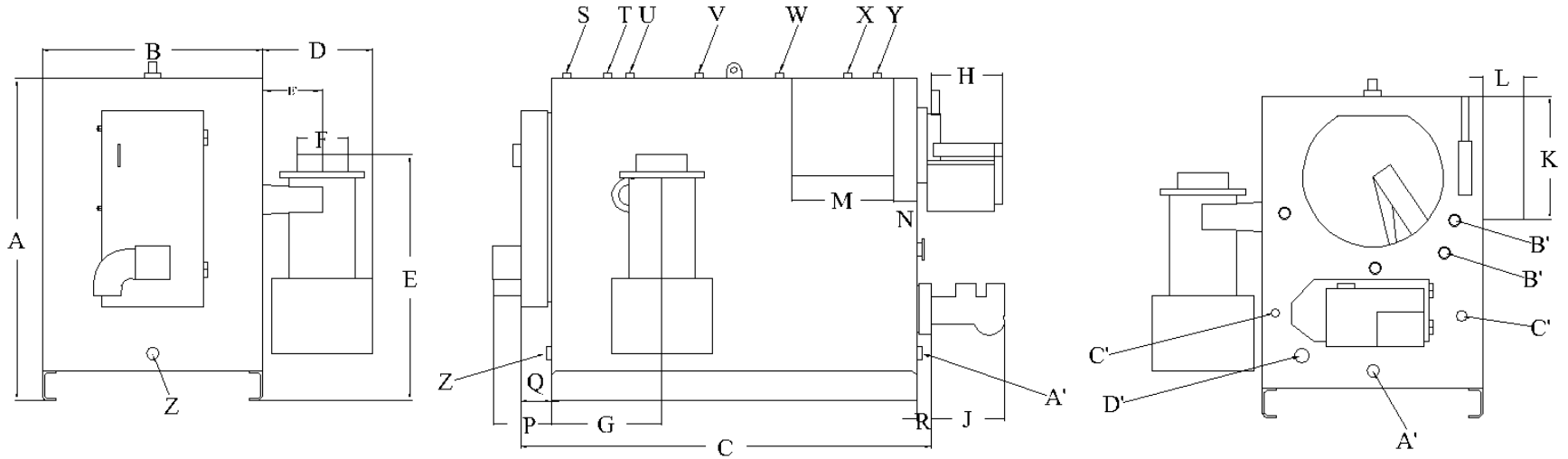


B-500 THRU B-1000 WASTE OIL BOILER ELECTRICAL SCHEMATIC



TOLERANCES (EXCEPT AS NOTED)	**ALTERNATE HEATING SYSTEMS**
DECIMAL ±	B500, B1000
FRACTIONAL ±	WASTE OIL BOILER WITH VFD, AND INTAKE DAMPER
ANGULAR ±	MATL: SEE B-M
SCALE: NTS	DRAWN BY: CWG — DATE: 8/18/24 — ACAD FILE:
CHECKED: — DATE: — APPROVED: — DATE:	SIZE: A — DRAWING: ELEC. SCHEM. — REV: 7

B SERIES WASTE OIL SPECIFICATION DIAGRAM



UNIT	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	A'	B'	C'	D'	E'
B150	38	26	43	14	29	6	9	10	14	16	7	12	5	4	3	3	1/2	1 1/2	1 1/2	3/4	-	3/4	3/4	-	3/4	4	1 1/2	1 1/2	
B300	46	32	60	18	32	6	13	17	14	16	7	12	5	5	5	3	1/2	1/2	1/2	2	3/4	3/4	1	1 1/2	1 1/2	4	-	2	
B500	54	34	72	24	43	8	15	17	14	16	7	12	5	6	5	3	1/2	2	3/4	1/2	1/2	1 1/4	1 1/2	1 1/2	2	4	-	2	14
B1000	71	42	96	28	47 3/4	8	20	21	14	20	7	16	3	7	5	5	1/2	2 1/2	1/2	1/2	3/4	1 1/2	1 1/2	1 1/2	1 1/2	4	2 1/2	-	

For B1000 Waste Oil Boiler Only

S - Pressure Temp Guage
T - Hot Water Supply
U - Aqua Stat
V - Aqua Stat
W - Low Water
X - Auxilary
Y - Relief Valve
Z - Boiler Drain
A' - Boiler Drain
B' - Domestic Coil Fitting
C' - Cold Water Return

All dimensions in inches unless otherwise specified.

B Series Waste Oil Specification Diagram

LIMITED WARRANTY

USED OIL BURNERS: 🐟 B175: 🐟 B300: 🐟 B500: : 🐟 B1000

The manufacturer, ALTERNATE HEATING SYSTEMS, INC., warrants to the original owner, for the periods specified below, that the boiler to which this warranty applies is free from defects in materials and
workmanship when installed, operated and maintained in accordance with the printed instructions supplied with the unit.

A. WHAT IS COVERED AND FOR HOW LONG
(All from date of original installation)
(1) Boiler Vessel, Ten (10) years pro-rated (pro-rated as follows: 5th year – full: 6th year – 40%: 7th year - 30%: 8th year – 20%: 9th year – 10%: 10th year – 10%). This does not cover any corrosion
or deterioration in boiler vessel due to improper PH levels in water or oxidated water (heating systems that have plastic piping).
(2) Doors (excluding gasketing, knobs, and ceramic insulation board), draft regulation mechanisms, insulation jacket, draft fan assemble (excluding ceramic heat shield), stack/cyclone assembly,
firebox refactory side pieces and center pieces – One (1) year.
(3) All electrical and plumbing components and controls such as temperature/pressure gauge, safety relief valve, aquastat controllers, electric motor, domestic hot water coil, oil burner, fan shaft
bearings, timer, draft motor, etc. purchased by ALTERNATE HEATING SYSTEMS, INC. from other manufacturers, Limited to warranties offered by those manufacturers, usually One (1) year.
(4) V-belt, pulleys, ceramic board door and fan hear shields, ceramic blanket firebox lining, fasteners, sight glass, smoke flap, door gasket and silicone rubber seal, door handle knobs, paint, wiring
and wiring devices-Thirty (30) days.

B. WHAT WE WILL DO AND NOT DO
(1) Alternate Heating Systems. will repair and replace, at our option, units or component parts found defective after inspection by ALTERNATE HEATING SYSTEMS, INC. or our authorized representative during
the periods outlined above.
(2) ALTERNATE HEATING SYSTEMS, INC. SHALL NOT BE LIABLE UNDER THIS WARRANTY IF:
(a) the unit or any of its component parts have been subject to misuse, alteration, unauthorized repair, neglect, accident or damage from handling.
(b) the unit is not installed, operated and maintained in accordance with the printed instructions supplied with the unit and in accordance with local plumbing and/or building coeds.
(c) the unit is operated above its rated output which is shown on the nameplate attached to the unit and listed in Alternate Heating System's printed literature.
(d) the unit is fired with fuels other than those recommended by ALTERNATE HEATING SYSTEMS, INC.. this includes fuels recommended by dealers and distributors selling ALTERNATE HEATING
SYSTEMS, INC. products if these are not fuels recommended by ALTERNATE HEATING SYSTEMS, INC..

C. WHAT THE CUSTOMER MUST DO
(1) Contact the dealer who sold you the unit.
(2) If said dealer cannot be located, contact any other ALTERNATE HEATING SYSTEMS, INC. dealers in your area.
(3) If you are unable to locate a dealer, submit your warranty claim directly to ALTERNATE HEATING SYSTEMS, INC. at the address listed below.
(4) When you make an inquiry or warranty request, be sure to include the following information:
(a) Unit model number
(b) Serial number
(c) Date of installation
(d) Dealer's name
(e) Type of fuel burned
(5) The OWNER and not ALTERNATE HEATING SYSTEMS, INC. or its dealers will be liable for the following costs involved in repair or replacement of the defective unit or component part
(a) All necessary costs in returning the defective unit or component part to the factory or other location designated by ALTERNATE HEATING SYSTEMS, INC..
(b) All freight and delivery costs of shipping a new or required unit or replacement component part to the owner.
(c) All labor and other costs incurred in the removal of the defective unit or part and installation of a new or required unit or part.
(d) Any material required to complete installation of new or required unit or replacement part.

D. LIMITATIONS AND STATE LAW RIGHTS
(1) ALTERNATE HEATING SYSTEMS, INC. neither assumes nor authorizes any representative or other person to assume for it any other obligation or liability in connection with its products other than expressly written here.
(2) Implied warranties of merchantability and fitness for a particular purpose are limited to the duration of this LIMITED WARRANTY.
(3) ALTERNATE HEATING SYSTEMS, INC. shall not be liable for any incidental or consequential damages such as water, smoke or heat damage to property arising directly or indirectly from any defect in its products or their use.
(4) Some state do not allow limitation on how long an implied warranty lasts and the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.
(5) This warranty gives you specific legal rights, and may also have other rights, which vary, from state to state.
(6) The remedies set forth herein shall be the exclusive remedies available to the owner.

ALTERNATE HEATING SYSTEMS
2395 LITTLE EGYPT ROAD
HARRISONVILLE, PA 17228
(717)987-0099

IMPORTANT - READ AND KEEP IN YOUR POSSESSION