

HARTLEY AND SUGDEN

MANUAL

FOR

SCP BOILERS

CONTENTS

SECTION	DESCRIPTION
1.0	Warnings General Description
2.0	EQUIPMENT
2.0	Ancillaries
2.1	Shunt Pump
2.2	Gas Booster
3.0	INSTALLATION
3.1	Space Requirements
3.2	Ventilation
3.3	Boiler Base
3.4	Flues and Chimneys
3.5	Electrical Supply
3.6	System
3.7	Lifting
3.8	Fire Protection
3.9	Filling the System
3.10	Flow and Return Temperatures
3.11	Boiler Plant Noise Levels
4.0	BOILER OPERATION
4.1	Operating Instructions
4.2	Instruments and Controls
4.3	Starting Up after Shut-Down
4.4	Normal Running
4.5	Shut Down
5.0	BURNER INSTRUCTIONS
-	Refer to Burner Manufacturers Manual
6.0	MAINTENANCE
6.1	Introduction
6.2	Protection of Boilers out of Service
6.3	Re-Assembly
6.4	Periodic Inspection

- 6.5 Boiler Cleaning
- 6.6 Shut Down
- 6.7 Entering the Boiler
- 6.8 Mountings and fittings
- 6.9 Insurance Inspection (Annual strip down)

7.0 DRAWINGS

8.0 WIRING DIAGRAMS

9.0 WATER TREATMENT

1.0 GENERAL DESCRIPTION

The Hartley and Sugden SCP Hot Water boilers are triple pass units in which the first pass is formed by the furnace tube at the inner end of which is the combustion chamber. The second and third passes are through small tubes, the second pass being from the combustion chamber to the front smoke box and the third pass from the front to the rear smoke box. The combustion chamber is of completely wet back design on all sizes of boiler thereby minimising refractory linings. The only refractory in the boiler is the lining of the front opening door. This door gives full access for cleaning purposes to the furnace tube, combustion chamber and both passes of tubes. The door has a “silk aluminium” heat resisting finish with black front surround.

The boiler shell is insulated with mineral wool and is protected by a strong pre-coated sheet steel casing carefully finished with an attractive blue alkyd finish. The casing is protected by a “peelable” plastic which **MUST BE REMOVED** prior to commissioning.

The burner unit is fitted to the centre of the door on the boiler front. Burners by a number of manufacturers are used on the SCP Packaged boiler. Each type has been matched so that it complies with the characteristics of the boiler to ensure efficient combustion.

The burner manufacturers manual should be studied and its recommendations carried out.

NOTE: The SCP boiler - both the flow and return connections are on the top of the boiler. The “flow” (which carries the heated water to the system) is at the front and is provided with thermostats, combined altitude gauge and thermometer but on sizes above SCP 500 the thermometer and altitude gauge are mounted in a gauge panel.

The “return” (which leads the cooler water from the system into the boiler) is the nearest pipe connection to the back of the boiler. (See descriptive leaflet for technical reasons for this arrangement).

The gases of combustion are “exhausted” by the time they reach the back smoke box of the boiler and from that point are passed to the chimney. The back smoke box is fitted with a studded cleaning cover. The smoke box at the rear of the boiler is not insulated.

The front door is secured by double handles. The hinge pins are precision made and are fitted with an adjusting device for exact setting. (This is done initially in the factory before despatch). There are phosphor bronze bearing discs on the hinges to provide a rust free pivotal surface. This ensures that the door can be closed accurately with minimal effort.

HOW TO CLOSE THE DOOR TO ENSURE A GOOD JOINT

Follow these simple instructions

NOTE: This is an easy, but important, operation. If the door is not effectively closed and jointed some overheating of the boiler front could occur.

a) Close the door until joint touches.

- b) Start thread on stud opposite top hinge.
- c) Start thread on stud opposite bottom hinge.
- d) Bring all handles up to firm hand-tightness in diameter sequence.
- e) During use, tighten up on the joint if needed.

THIS IS AN ESSENTIAL OPERATION and should be confirmed correct immediately after commissioning and any subsequent opening and closing of the door. CAREFUL ATTENTION TO THIS DETAIL will ensure long life for the joint.

This maintenance might be once per heating season only - REFER TO SECTION 6.0

ALWAYS ISOLATE THE BURNER AT THE MAIN SWITCH BEFORE OPENING THE DOOR.

TO OPEN THE DOOR

Unscrew the handles.

DO NOT SWITCH ON again until the door has been closed and sealed according to the procedure described above.

NOTE: When the boiler is opened you will observe an inner ceramic seal, which should be checked and replaced when necessary.

2.0 EQUIPMENT

The standard SCP Hot Water boilers are provided with the following equipment:-

- (a) Oil, Gas or Dual Fuel burner appropriately sized for the boiler output. The burner is supplied complete with control panel in which are housed the necessary control box and other electrical equipment to fulfil the functions of the burner.

NOTE: The control panel is usually mounted on the burner or side of the boiler but on occasion where a floor mounted panel is required the installing contractor must position and wire the necessary burner interlocks.

- (b) Flow Thermometer
- (c) Pressure or Altitude Gauge
- (d) High Limit Thermostat
- (e) Control Thermostat
- (f) High/Low or Modulating Thermostat as necessary

2.1 SHUNT PUMP

When specified a shunt pump and valves can be fitted to:-

- (a) Ensure that the temperature differential across the boiler is below 25°C
- (b) Work in conjunction with an appropriately designed system to achieve and maintain a return temperature in excess of 60°C

NOTE: A return thermometer and/or flue gas thermometer are supplied when specified.

2.2. GAS BOOSTER

When it is necessary to boost the gas supply a suitable booster can be supplied complete with inlet and outlet pressure switches.

3.0. INSTALLATION

The boilers and associated equipment must be located in a dust and contamination free area unless the manufacturers have been advised otherwise.

The structure of the Plant Room may be subjected to Local Authority requirements.

3.1 SPACE REQUIREMENTS

- (a) Sufficient operating/maintenance space must be left around the boiler. A distance of one metre should be allowed at each side or between each boiler. A distance of one metre, plus any space for a free standing chimney should be allowed at the rear of the boiler. Because the boiler tubes must be cleaned from the front of the boiler the space must be greater, normal 1/2 metre less than the overall shell length.

Above the boiler space is required to pipe up flow and return connections and valves.

- (b) When gas fired, due allowance must be made for bringing gas piping up to the boiler front and leaving space for the gas governor.

In addition, if a gas booster is supplied, leave space at the side or rear of the boiler.

3.2. VENTILATION

The permanent ventilation of the boiler house (not including doors and windows which may be closed) is essential.

Boiler house ventilation serves two essential purposes. One is to permit combustion air to flow freely to the burners from outside the building and the second is to maintain a clean atmosphere within the boiler houses at a reasonable temperature level.

Combustion air requirements are given below. The additional area required for air to give a satisfactory atmosphere in the boiler house depends on the amount of heat released from the piping and flue. The boiler itself is well insulated and the flue and piping should preferably be insulated so that the boiler house ambient temperature does not reach 26°C (80°F). This will ensure that the operation of the burner components is not affected.

The extra area must be disposed in two parts, one at low and the other at high level in such a way convection across the boilers will create the necessary air changes. It is important that the high level opening is not so close to the low level opening that short circulation of air, without ventilation across the boiler, can occur.

For boiler houses below ground level, arrangements should be made to induce fresh air if necessary - i.e. if the air access is restricted and a type which forms a “chimney” from the boiler house window to ground level.

A supply of dust free air is required into the boiler room for both combustion and ventilation. This must be through permanently open vents, filtered if necessary, preferably at both high and low levels.

- (a) Free inlet area of grills or louvres required for combustion air should not be less than:-

Low level - 9 sq. cm. per kW input

High level - 4.5 sq. cm. per kW input

See further notes on Page 6 for burner and ventilation requirements.

For gas fired installations further information is given in BS 6644:1990 and British Gas Guidance Notes.

- (b) MECHANICAL VENTILATION

Mechanical inlet with either mechanical or natural extraction must be used if the supply of air to the boiler room is to be by mechanical means. Natural inlet and mechanical extraction MUST NOT be used.

Where both mechanical inlet and extraction are used then the design extraction rate should not exceed one third of the design inlet rate. An automatic control system designed to cut off the fuel supply in the case of failure inlet or extraction fans should be installed.

3.3 BOILER BASE

The boiler does not normally need any special foundations but the area upon which the boiler is to stand must be capable of bearing the operating weight of the boiler but not less than 10 TONNES sq. metre.

The area upon which the boiler base is to be mounted must be level in both planes. An open floor drain under the boiler centre will be an advantage.

3.4 FLUES AND CHIMNEYS

Preferably flues and chimneys should be sized in accordance with design manuals to give a balanced draught condition at the boiler smoke outlet under load conditions although a small positive or negative condition can be tolerated.

Ducts and chimneys of circular section with a smooth internal surface are the most efficient but square section with the side of the square equal to the required diameter of a circular chimney can be used.

Individual chimneys and ducting should be used whenever possible for multi-boiler plants so that combustion conditions are not disturbed by the operation of the other boilers.

Use of short runs of ducting without horizontal runs with the minimum of bends before entering the main chimney at a steep angle will give the least loss of draught. Large radius bends should be used.

Generally, ducting should not be less in diameter than the boiler outlet connection size. In certain cases the gas velocity in the boiler outlet is in excess of 9.14 M/S (30 Ft/Sec) and unless a very simple short duct is used the diameter should be increased to prevent undue draught loss.

For general guidance, use a velocity of 6 M/S (20 Ft/Sec) for horizontal flues and 9.14 M/S (30 Ft/Sec) for chimneys above 12 m (40 Ft) high.

If two flues must enter into one common stack then they should be positioned to cause the least disturbance to the other gas stream.

Where ducts from two or more boilers join a header duct, the gas streams should be flowing in the same direction at the point of intersection with the header.

Header cross sectional areas should take account of the quantity of gas flowing at each intersection. Allow sufficient cleaning facilities in the duct work chimney.

Particularly with gas firing, allow for condensation in drain points in chimney and ducting.

Steps should be taken in designing to prevent or minimise condensation forming by using double skin and/or insulated ducting systems and suitably insulated brick stack or double skin steel chimney. This helps prevent condensation from gas fired plants and soot emission from oil fired plants.

Where high gas outlet velocities are required from the chimney, particularly of oil fired installations a coned outlet can be used. The additional loss of draught due to this should be taken into account in the chimney design and burner selection.

Flues should be supported independently to prevent undue weight and forces due to expansion being transmitted to the boiler outlet flange.

Adequate doors should be provided in flues and chimneys for cleaning and inspection purposes.

Chimney sizes and height will need to comply with:-

- (1) Clean Air Act
- (2) Local Regulations

- (3) Consideration of adjacent buildings.
- (4) Transmission of noise, particularly low frequency sound pressure levels in quiet periods of the day or night, particularly if dwellings are very close.

3.5 ELECTRICAL SUPPLY

The boiler will be supplied suitable for the current characteristics as specified. All components integral with the boiler are pre-wired to a burner or side mounted control. Facilities are included in this panel for site wiring of external alarms, indicators etc. Normally the only site wiring required is to connect the correct fused electrical supply to the terminals in the control panel (3 Phase + N + E).

N.B. Floor mounted control panels must be positioned and site wired by the installing contractor.

When a gas booster is supplied a separate fused (3 Phase Four Wire) supply is needed and the installer must allow for wiring in the supply and burner interlocks.

3.6 SYSTEM

A separate primary cold feed tank is required for open vented systems. No special connection is provided at the boiler but it is recommended that this feed be connected into the heating return.

The vent pipework should be taken above the primary make up and expansion tank when an open vented system is used.

There should be no valve between the boiler and the safety valve. For independently pressurised systems the vent connection should be plugged.

When the system is not vented, a test cock should be fitted in the flow branch or pipe for checking the water level.

A screwed drain cock with hose union is fitted at the boiler rear.

The boiler flue outlet is flanged.

3.7 LIFTING

Two lugs are provided for lifting the boiler. All the lugs should be used, together with appropriate chains or slings. In addition, two jacking points are provided one each of the front and rear support plates.

3.8 FIRE PROTECTION

The fuel being used is very volatile therefore consideration should be given for the use of some, or all, of the following:-

- (a) Facilities exist in each boiler control panel to have an external manual or automatic device isolating the boiler in the event of smoke, heat or fire.
- (b) This facility can also isolate, via a solenoid valve, the oil supply to the burner.
- (c) The external device can be connected to switch off the oil ring main fuel pump.
- (d) Automatic closing of fireproof doors between plant room and rest of building.
- (e) Manual or automatic fire extinguishing, either as a foam or inert gas (halon) or carbon dioxide etc.)

3.9 FILLING THE SYSTEM WITH WATER

It is recommended that each system should be filled or re-filled with treated water and specialist firms will be able to advise in this respect.

Check all connections are made and tightened. Check instrument pockets are fitted and watertight.

Check spare sockets are fitted with plugs and are watertight.

Open all valves in heating circuit.

Open mixing or diverting valves half way. Gradually fill with water until the altitude gauge indicates the correct head and the header tank level is reached.

Vent the installation completely. Check the water level.

If the pressurisation unit is installed, refer to the makers filling instructions.

The complete filling and draining down of the heating circuit should be carried out by a Heating Engineer.

Care should be taken filling the boiler. Any debris from the system should not be allowed to deposit in the boilers.

It is therefore preferable to flush out the boiler through the drain connection to ensure that the boiler is clean inside.

For future servicing, ensure that valves are fitted adjacent to the boiler in the flow and return so that the boiler can be isolated from the system.

3.10 WATER FLOW AND RETURN TEMPERATURES

Consideration will already have been given to the system flow and return temperatures but please note:-

- (1) The flow temperature can be adjusted within the limits of the design criteria for the particular system and the requirements of the appropriate British Standard.
- (2) The return temperature should be controlled to not less than 60°C (140°F) at all times by the use of suitable by-pass/diverting controls.
- (3) Abnormal differentials between the flow and return in excess of 25°C should be the subject of special consideration.

3.11 BOILER PLANT NOISE LEVELS

Consideration should be given to sound control measures if it is anticipated that noise will be a problem due to any or all of the following:-

- (1) Direct transmissions through the building structure, e.g. roof top boilerhouse.
- (2) Sound transmission through the boilerhouse fabric, e.g. dwellings very close to the boiler house.
- (3) From the chimney, e.g. - where dwellings are located very close by the boilerhouse or above the chimney outlet. Generally, Natural Gas fired plant has low frequency sound pressure levels which may be disturbing to local residents if the boilers operate in quiet periods of the day or night.

The following are sound control measures which can be taken in respect of the points raised:-

- (a) Acoustic burner shroud. Also shroud for booster if fitted.
- (b) Acoustic air intake baffle or acoustic louvres
- (c) Heavy construction external wall, double glazing, heavy and close fitted doors.
- (d) Heavy construction flue surrounded. If possible, cavity all round chimney.
- (e) Anti-vibrators on boiler base or acoustic pads of cork or rubber (in conjunction with "G")
- (f) Peripheral gaps around pipes filled with soft acoustic material.
- (g) Anti-vibration connections to pipework.
- (h) Flue noise attenuator.
- (j) Heavy construction to suspend floor on ceiling.

4.0 BOILER OPERATION

The following procedure should only be taken with the burner commissioning engineer in attendance.

- (a) Check that the boiler and circulating pumps are vented.
- (b) Check that any independently pressurised system is operating correctly (Makers should adjust if necessary).
- (c) Check that dampers in the flue between the boiler and the chimney (if fitted) are in the open position and locked open if manually operated. If electrically operated check that the burner is interlocked electrically to prevent operation until the damper is open.
- (d) Check that the electrical installation with the appropriate wiring diagram for the boiler and burner, and also check fan rotation.
- (e) Check direction of flow of valves in a gas line, check for correction operation of the gas booster (if fitted) and remove transit packing from gas governors and fit governor, if supplied loose. (Large sizes only).
- (f) Check that the burner has not been damaged in transit or during installation, also that it is a suitable type for the gas available on site. The nameplate on the burner indicates for which type of gas it is designed.
- (g) Adjust boiler control thermostats to suit system design flow temperature. Set the limit thermostat at least 10°C above the control stat setting. If the main circulating pumps can be shut off whilst the boiler is operating residual heat in the boiler at burner shut down may increase the temperature above the limit stat setting. It is advisable to incorporate a pump over-run to dissipate residual heat.
- (h) Check the burner is correct for the fuel oil at site. If heavy oil, check supply temperature. Check the oil supply pressure is suitable. (Refer to Section 5.0).
- (j) Commission in accordance with burner makers requirements - see Section 5.0.

Prove controls, adjust stats in line with temperature indicated on the boiler thermometer.

- (k) Fire up at a rate to prevent damage to the refractory lined door. The burner must run for only short times until quarls are uniformly hot, throughout their thickness.
- (l) Adjust burner to give optimum combustion, check flame shape and penetration.
- (m) Instruct site staff on the correct operation of the plant, including going through the fault finding chart and advising how much of the “action” columns they can deal with.

4.1 OPERATING INSTRUCTIONS

General Notes for the boiler Attendant.

These instructions are the minimum necessary to enable an operator to start, run and stop the boiler. They cover also the simple routine servicing procedures necessary. Except where specifically noted, they are applicable irrespective of the fuel used.

If the heating system designer or installer has prepared operating and maintenance instructions specifically for the whole plant those instructions should be referred to first.

4.2. INSTRUMENT & CONTROLS

For normal operation the control thermostat/modulating potentiometer are set by the commissioning engineer at the required level. The limit thermostat is normally set a minimum of 10°C above this. A flexible lead is supplied with the boiler for wiring into the burner terminals by the installer prior to commissioning

Burner control circuit switch:

Switching the boiler ON: Boiler must be fitted with a separate

Setting the switch to the ON position will allow the boiler to be switched on/off by any external controls - e.g. a time switch. When external controls are in the ON position, the boiler will switch on/off at the dictates of the control thermostats.

In the case of a gas burner, if the boiler has been off for a long period, or the gas supply has been disconnected, ensure gas is purged to the boiler, and the main pilot gas cocks are turned on before switching to the ON position.

Control Thermostat:

The control thermostat should be set to 90°C.

Access to the control thermostat adjustment is gained by removing the circular disc on the front of the control panel.

Limit Thermostat:

The limit thermostat should normally be set 10°C above the control thermostat (access to the limit thermostat adjustment is gained from inside the control panel (isolate electrical supply before removing control panel cover). Note: Once turned down, the limit thermostat **cannot** be turned up to a higher temperature. If the boiler temperature exceeds this, the boiler will be switched off and the high temperature cut out light will be illuminated (the boiler will not operate until the limit thermostat is manually reset).

Burner Lockout Light:

If the burner lockout light is illuminated the burner control will have gone to lockout. To rectify this, press the illuminated button on the burner control box. If the burner goes to lockout several times in a short period, contact the Hartley and Sugden/Burner Service Department.

- (a) A sequence control box (usually mounted on the burner), which automatically governs the firing sequence (pre-purge), ignition, pilot or reduced start and provides for safety lock-out in the event of flame failure or other unsafe condition. This box will have a visible indication of lock-out and a manual re-set button.
- (b) For High/Low burners, an additional thermostat to control High/Low function. Set 5°C below control thermostat. (For Modulating burners this would be a potentiometer).

There may be special burner controls equipment or additional controls to be integrated with the standard burner control equipment. The function and setting of these would be covered by separate information. (Refer to Burner manufacturers literature)

The following is a list of such items:-

- (a) Sequence or cascade controls for multi-boiler plant.
- (b) Switching arrangement devised by the system designer to suit the needs of the system.
- (c) High and low pressure switches associated with independently pressurised systems.

4.3 STARTING UP AFTER CLEANING OR SUMMER SHUT-DOWN

4.3.1. Ensure that fuel lines are fully purged and that fuel is available at the burner at the correct pressure and temperature.

- (a) On a gas fired boiler if the boiler has not been run for some time or if a fuel supply pipe has been disconnected, purge the piping via the bleed nipple downstream of the burner governor.
- (b) On an oil fired boiler using Class “D” in conjunction with a single pipe supply system, bleed the burner pump at the pump air vent if the oil pipe has been disconnected.
- (c) On an oil fired boiler using Class “E” or “F” Oil ensure the fuel heaters and tracers have not been switched off - i.e. that the fuel supply is up to the necessary temperature.

4.3.2 CHECKS

- (a) Ensure fuel supply valves are open
- (b) Where a pump is incorporated in an oil fuel supply system ensure the pump is switched ON.
- (c) Check all switches - e.g. time switch and thermostats are in the “calling” for heat condition.
- (d) Switch ON electrical supply to burner at main switch.
- (e) Switch ON the burner mounted switch.

NOTE: Where Oil Class “E” or “F” is employed there may be a delay until the Oil in the burner fuel system attains the required temperature, as shown by the gauge on the burner pre-heated.

Settings must comply with the requirements of the burner manufacturer.

- (f) The burner control box should now monitor the burner through its prescribed sequence and eventually cause it to reach “main flame on.”

4.4 NORMAL RUNNING

The boiler will switch On/Off under the dictates of the thermostats. The boiler temperature at any particular moment can be seen from the boiler thermometer.

Allow boiler to reach its set temperature and then check burner flame through the sight glass, the flame should extend well into the combustion chamber. Also check the flame characteristics at the burner through the burner inspection window, refer to burner manufacturers instructions.

4.5. SHUT DOWN

If the boiler is to be out of operation for a long period - e.g. during the Summer, the boiler interior can advantageously, after thorough cleaning, be sprayed with an Oil/Graphite mixture and the boiler door then left fully closed. If the boiler is not sprayed, leave door fully open.

6.0 MAINTENANCE

WARNING

ALWAYS ISOLATE THE ELECTRICAL AND FUEL SUPPLY TO THE BOILER BEFORE COMMENCING SERVICING OF THE BOILER.

6.1 INTRODUCTION

It is essential that the boiler be kept clean both internally and externally. The frequency of cleaning the boiler heating surfaces will be dependent upon the type of fuel and usage.

It is the responsibility of the user to adopt a pattern of maintenance based upon his observations of the plant in his care.

6.2 PROTECTION OF BOILER OUT OF SERVICE

Please refer to Section 4.5

6.3 RE-ASSEMBLY

When re-assembling any dismantled components, clean all parts in a suitable solvent and examine them for wear, cracks or any other damage and renew as necessary. Assembly is generally a reversal of dismantling instructions unless otherwise stated. When assembling components it is advisable to fit new “O” rings, joints and gaskets.

After the completion of any maintenance operations the re-commissioning procedure must be followed to ensure the safety of the installation.

6.4 PERIODIC INSPECTION

The following inspections should be made between the main servicing periods:-

- (a) Examine the boiler casing panels for signs of damage, corrosion or other deterioration and for security.
- (b) Examine flue pipe and gasket for obvious signs of damage, corrosion, flue-leakages and for security. Similarly, inspect also the cleaning door t rear of the boiler.
- (c) Examine flue and chimney as far as possible for partial blockage, debris etc.
- (d) Keep the boilerhouse floor clean.
- (e) Examine all fuel and water valves, connections etc., for obvious signs of damage or leakage and for security.

- (f) If an open-vented system check:-
- (1) Level of water expansion tank
 - (2) Correct operation of ball valve
 - (3) All air vents

NOTE: No continuous make-up of water should be taking place.

- (g) Initially, examine the boiler interior after one month when using Class “D” Oil to determine necessity for boiler cleaning. When Class “e” or “F” oils are being used examine after two weeks. The amount of use, the number of cold starts involved and the mean operating temperatures all affect the rate of soot and scale formation.

A constant pattern will then be established to determine the frequency of cleaning required. With Gas, much longer periods between cleaning are usually possible. If condensation occurs due to low return water temperatures then a build up can occur more quickly. Establish a pattern to see if cleaning can coincide with service visits.

After a boiler is first commissioned, examinations should initially be more frequent and a reasonable, consistent pattern can be established.

- (h) On Oil/Gas burners, periodically remove photo-electric/ultra-violet cell and clean the window of the cell.
- (j) Flame shape and penetration.

In general the flame will penetrate towards the rear of the combustion chamber and tend to lift towards the rear end through the sight glass, check that the flame maintains the same form as originally set by the Commissioning Engineer. If the flame shape is obviously altered a Service Engineer should be called.

- (k) Refer to gas booster instructions if a booster is necessary. Generally a visual inspection is only necessary between service visits.
- (l) Report any occurrences which indicate that the boiler, the firing equipment or the system controls are not operating correctly.

Apart from the periodic inspections given it is necessary to carry out a complete check on the components, operation, cleanliness, combustion efficiency etc., of the fuel, burner and associated controls and components at regular intervals. When fitted, a gas booster can be covered by this service.

In the case of gas burners, this will include a check on the gas tightness of the gas control valves to the burner if a gas leak detection unit is not fitted.

These checks are best made by a qualified boiler/burner Service Engineer under a contract to carry out regular and correct maintenance of the plant. Our Service Department will give details of this service.

No adjustment of internal components is permissible on either Gas or Oil burners except by a qualified burner engineer. If flexible pipes are used for connecting the gas burner make a monthly leak test on these pipes. Because of the frequency of testing required, flexible pipes are seldom used.

6.5 BOILER CLEANING

Frequency of cleaning will be dependent on usage in conjunction with condition of boiler at the periodic inspections but the minimum requirements when using the various fuels are:-

Gas	Once per heating season
Oil BS Class (35 Sec.)	Twice per heating season
Oil BS Class E (250 Sec.) or F (1000 Sec)	3 to 4 times per heating season

NOTE: Lengthy periods between cleaning should only be resorted to when the periodic inspections prove that is possible.

To clean the boiler:-

- (a) Run boiler until burner automatically switches off under action of thermostat.
- (b) Switch OFF electric supply to burner. Where a plug-in connection is fitted in the cable from the boiler to burner, disconnect at this point. Switch OFF electrical supply to booster.

NOTE: Where excess oil Classes “E” and “F” are being used on a circulatory fuel system, ensure fuel pump(s) heatings and tracers are left in operation at all times.

- (c) Turn OFF all fuel shut-off valves.
- (d) Where rigid fuel pipes to burner are employed, e.g. gas burners, disconnect pipe(s) to allow the boiler door to open.
- (e) Unscrew boiler door handles and swing open door.
- (f) Clean the tubes using the brushes supplied.

NOTE: Where any hard scaling is present, use a proprietary cleaning medium to soften and assist removal.

- (g) Remove rear cleaning doors. Clear loose soot from the smoke outlet box and

thoroughly clean the box. Clean and examine boiler backplate, no hard deposits should be present. Remove any build up occurring between the projecting tube ends.

- (h) Check condition of cleaning door gaskets. Re-fit door ensuring it seats correctly on the gasket, tighten the nuts.
- (j) If disconnected, plug in boiler/burner electrical connection.
- (k) It is recommended that when the boiler has become thoroughly hot a combustion efficiency check is made by the Service Engineer.
- (l) If the boiler is not immediately to be used, switch OFF electrical supply to burner and turn OFF fuel supply. Where using oil Classes "E" and "F" do NOT switch off fuel heaters and tracers.
- (m) Switch off electrical supply to booster.

6.6 SUMMER SHUT DOWN

Refer to Section 4.5

6.7 ENTERING THE BOILER

CAUTION The following **SAFETY** measurements **MUST** be taken **BEFORE** attempting to open access covers:-

- (a) All external services - water, drain must be safely visibly closed.
- (b) Electricity must be isolated from all the boiler ancillary equipment.
- (c) Post **DANGER** notices at all isolators and access points saying "**WORKERS IN BOILER.**"
- (d) Open boiler vent port to atmosphere.
- (e) Drain boiler.
- (f) Open all access covers and allow boiler to ventilate.

WARNING

Boiler water may contain chemicals which would give off fumes AFTER the boiler has been drained. Precautions must be taken to ensure that the internal temperature and air permit reasonable breathing.

- (g) It is necessary to have an operative "standing by" outside the boiler.

Dependent upon the condition of the unit it is advantageous to hose down the inside while it is still warm. Any further cleaning may be done with a wire brush or as required, to restore the surface to a clean condition after which it should be thoroughly washed with water, prior to re-fitting the manholes using new joints.

Tubes, combustion chamber, as well as front and rear smokeboxes must be wire brushed and scraped completely clean.

6.8 MOUNTINGS AND FITTINGS

All items, particularly the SAFETY VALVE should be inspected annually or in accordance with the manufacturers instructions.

6.9 INSURANCE INSPECTION AND ANNUAL STRIPDOWN

SERVICE SCHEDULE

ANNUAL STRIPDOWN

H.P. HOT WATER BOILERS

METHOD STATEMENT

The boiler is required to be off line and isolated by means of double isolation. It is to be depressurised, drained and vented. Liaise through the customer with the Insurance Company's Surveyor to establish his full requirements.

Site Safety Procedures are to be adhered to at all times.

1. Remove all smoke box doors to expose the fire tubes. Clean the tubes if required, using cleaning brushes or cleaning machine, and clean the furnace tube(s) as required. Bag any soot and waste materials, these are to be disposed of by arrangement with the customer, or removed from site. Reseal the smoke box doors with new seals. The doors are to be left open for the surveyor's inspection.
2. Remove the boiler manhole/mudhole doors to give access to the water side of the boiler. Advise of any scale build up within the boiler so that arrangements can be made for its removal. See Procedure 6.9.10 & 11
3. Clean and inspect the safety valve in situ. (At the discretion of the surveyor and the client the safety valve may be removed from the boiler on a bi annual / three year basis for a complete off site overhaul, bench test and issue test certificate).
4. Remove the boiler drain valve, strip and check seal faces, lubricate valve rack, re-assemble and repack.
5. Liaise with the Insurance Company's Surveyor during his inspection.
6. Close up the water and gas side of the boiler, reassemble the valves and refit to the boiler, using new jointing materials and anti seize paste on joints and fixings.
7. Arrange with the client for the boiler to be refilled.
8. During refilling, and prior to the boiler being re-pressurised, check to ensure that the Low Pressure Safety Switch and Low Water Level Sensor are in good operating order. (To meet the requirement of HSE Guidance Note PM5).
9. Make out a service report noting any defects or points of concern. Present report to the client's engineer for signature.