

WOOD BURNING CENTRAL HEATING COOKER BOILERS

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1. CORRECT USE OF APPLIANCE WHEN USING WOOD FUEL

For anyone interested in wood burning, there is much to learn; in the following text you will find guidance and information on the subject.

Before installing or using a wood burning appliance, carefully read the manufacturers installation procedure.

If you are in any doubt as to the soundness or suitability of your chimney, get it checked out by a qualified chimney sweep. **ALL WORK MUST COMPLY WITH CURRENT BUILDING REGULATIONS.**

Remember that on the initial light up of the appliance, large amounts of water may run from the appliance, this is quite normal and caused by massive condensation due to the fact that the boiler is cold and the newly established fire is hot.

Maximum temperature difference = maximum condensation.

Minimum temperature difference = minimum condensation.

Once the water temperature in the boiler starts to increase the temperature difference starts to decrease and so does the initial condensation.

1-1 GOOD WOODBURNING TECHNIQUE

If wood is burned at high temperatures a more complete combustion occurs, complete combustion means that most of the volatile hydrocarbons locked in the wood are released in the form of heat generally displayed as long yellow flame combustion.

The higher the combustion chamber temperature, the more complete the combustion process.

On range type cookers and boilers this creates an immediate problem because in general, the boiler water jacket surrounds the combustion chamber thus continuously limiting the combustion chamber temperature.

1-2 BAD WOOD BURNING TECHNIQUE

If wood is burned at low temperatures, then very little is achieved and incomplete combustion occurs.

Incomplete combustion is typified by wood tar deposits all over the internals of the firebox, flue ways and door glass.

The lower the combustion chamber temperature, the worse the combustion and the greater the build up of wood tar.

In really bad cases, wood tar and condensates can drip from the appliance on to the hearth.

1-1 GOOD WOOD BURNING TECHNIQUE

1. Increases the efficiency of the burn process.
2. Decreases your running costs.
3. Increases the life expectancy of the boiler.
4. Results in a clean appliance and chimney.

1-2 BAD WOOD BURNING TECHNIQUE

Decreases the efficiency of the burn process.

Increases your running cost.

Decreases the life expectancy of the boiler.

Results in a tar covered appliance and chimney.

1-3 LOADING AND RUNNING THE APPLIANCE

The fire is ignited in the usual way and air is automatically admitted through the air inlet flap controlled by the relevant setting of the thermostat knob.

When the fire is established, build it up slowly by adding a small quantity of wood, take care not to put too much wood on at once otherwise this will :-

Kill the fire.

Reduce the firebox temperature.

Create smoke.

Cause tarring.

Cause condensation.

When the combustion chamber is up to a high enough temperature, the wood oil starts to vaporise from the wood, and creates long yellow flames.

Secondary air is drawn in to mix with these flames and this further improves the combustion.

As the wood fuel burns away it slowly decomposes leaving a light grey coloured ash. As is the case with all fires, if it is allowed to die down too much, it will not be possible to recover it.

Try to keep topping the firebox up regularly but do not overload it so as to kill the temperature of it.

If you need to keep the appliance in for longer periods of time, try topping it up with smokeless fuel otherwise let it go out and re light it.

2. ABOUT WOOD FUEL

2-1 DO I KNOW HOW MUCH WOOD I WILL NEED TO BURN?

Roughly 1 lb of wood equals 1Kw of energy; therefore if you need 30Kw of energy per hour you are going to have to burn about 30 lbs of wood per hour.

Pine and Oak have different density therefore a tonne of Pine will take up substantially more volume than a tonne of Oak.

If you work out how many Kilowatt hours are required to keep your property warm then you should be able to work out the weight of wood required for a seasons heating.

2-2 DO I HAVE A RELIABLE AND PROVEN SUPPLIER OF WOOD AND DO I KNOW THE COST?

Once you have established your seasons requirement you can order your supplies from a local wood fuel supplier.

2-3 DO I KNOW HOW TO STORE THE WOOD?

Before any wood is burnt, it should have a moisture content of no more than 20%.

This can be achieved by drying outdoors for 12 months and then under cover for the second 12 months assuming that the wood has been cut, split and stored in such a way as to allow adequate air to circulate through the wood pile.

Ash is an exception to this rule as it can be cut early in the year and (providing it is stored correctly) burned in the autumn.

2-4 EQUIPMENT TO HELP ME GET THE BEST FROM MY WOOD BURNING APPLIANCE

There are many factors which will affect the running of your wood burning appliance but the most common problems are: -

WET WOOD

RUNNING THE APPLIANCE AT THE WRONG TEMPERATURE

INCORRECT INSTALATION

INCORRECT CHIMNEY

The main problem here is knowing

How do I know that the wood fuel is at the correct moisture content for burning?

How do I know if I am burning the wood at the correct temperature?

Two pieces of equipment will help here, a moisture meter will tell you what the moisture content of your wood is and a stove top thermometer will tell you what temperature your appliance is running at.

Both of these are available from us.

3. ABOUT CHIMNEYS

3-1 DO I HAVE A CHIMNEY SUITABLE FOR WOOD BURNING?

Check on your chimney; look around your locality at other chimney terminals to see if there is a localised problem of down draughting, if there is a problem you may well see a mixture of H cowl and other types of anti downdraft terminals.

If you have bought a house and have no experience as to the performance of the chimney be very careful, ask the previous owners and try to gather as much information as possible before you commit yourself.

Most chimneys on properties built before 1965 need lining and insulating with special materials which are designed to reduce the build up of tar on the walls of the flue, or to withstand the tremendous heat generated when such tar catches fire.

Generally, pre 1965 unlined chimneys are not suitable for wood burning.

If wood burning appliances are used on these chimneys the following may happen:

Tar builds up on the brick faces of the internal chimney walls, this build up can take from 12 months to 5 years, and as time passes the tar gets thicker and thicker. In really bad cases the tar can work its way through the chimney walls into the plasterwork of adjoining rooms staining the wallpaper or plaster and causing a pungent wood smoke smell which can contaminate the affected rooms.

If a chimney in this state catches fire the results are severe, causing bricks and mortar to crumble and drop down the chimney, and tar to ooze through the affected walls.

Often, with a chimney fire of this nature it could well be necessary to remove the complete chimney stack taking out and replacing all walls affected by the tar contamination.

Similar damage can also occur on some types of twin wall stainless steel chimneys, causing distortion and flue gas leakage.

Wood must not be burned on any appliance in a smoke-controlled area unless the appliance is specially designed and approved according to statutory requirements.

4. ABOUT PLUMBING DIAGRAMS

Along with everything else that has been mentioned in sections 1 - 3 correct plumbing installation is absolutely critical.

There are several important objectives that the plumbing system must achieve and we list them as follows: -

4-1 SAFETY

4-2 CONVENIENCE

4-3 EFFECTIVENESS

4-4 CONTROL OF CONDENSATION

Control of Condensation is critical; if it is not effectively dealt with then the results can be catastrophic.

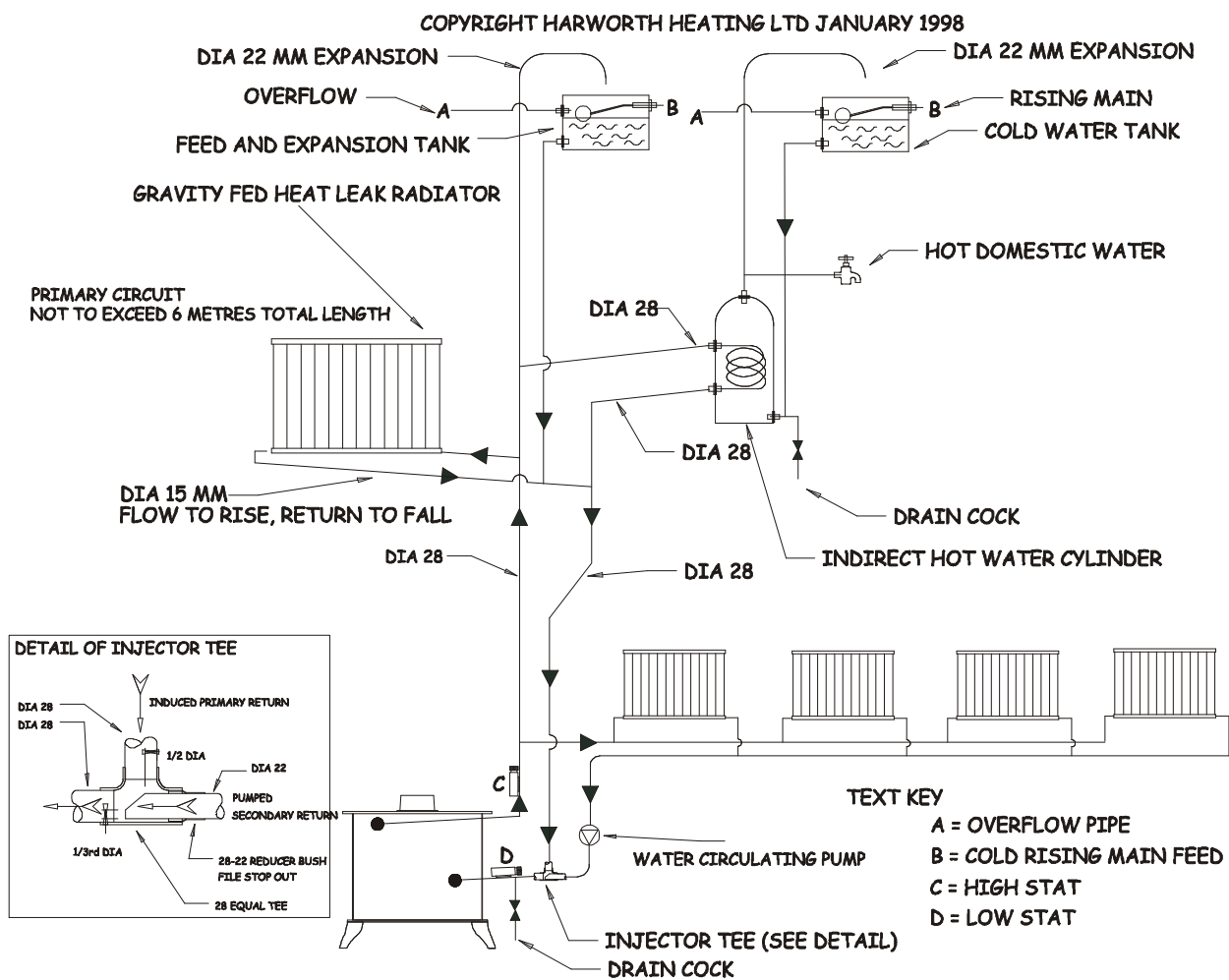
Remember that on the initial light up of the appliance, large amounts of water may run from the appliance, this is quite normal and caused by massive condensation due to the fact that the boiler is cold and the newly established fire is hot.

Once the water temperature in the boiler starts to increase the temperature difference starts to decrease and so does the initial condensation, the quicker the temperature differential starts to decrease then the quicker the condensation stops occurring. To make sure that this condensation is kept to an absolute minimum the plumbing system must have certain design features built in to it, if it doesn't your appliance warranty will be null and void.

The critical temperature is 61 deg C: this means that water returning back into the appliance must always be at a temperature of 61 deg C and there are several ways to achieve this, the most common being a return water thermostat attached to the return water pipe near to the appliance set at 61 deg C.

Another way is to fit a thermostatic valve designed to maintain the return water temperature at 61 deg C.

4-5 TYPICAL PLUMBING SCHEMATIC.



DESCRIPTION OF PLUMBING SCHEMATIC

(Pipe sizes will vary according to appliance output)

There are several important features in the design of this circuit; one of them is use of an injector tee, which allows primary gravity circulation to occur when the pump is not running and induced gravity flow to occur when the pump is running.

To reduce the necessity of running four pipes from the boiler, it is possible to fit the injector tee at first floor level and then to fit a flow and return only to the boiler connected diagonally as shown.

Another feature is the use of adjustable clip-on pipe thermostats.

Item D is an adjustable, clip-on pipe stat set at 61 deg C. LOW STAT

The low stat is designed to switch the pump off when the return water is lower than 61 deg C

Item C is an adjustable clip-on pipe stat set at 85 deg C. HIGH STAT

The high stat is designed to switch the pump on when the flow water is over 85 deg C

Both of these pipe stats are wired in with the water circulating pump.

5. BE WISE BEFORE THE EVENT

This is an extract from a report sent to a customer who made a warranty claim after a boiler failure.

The appliance was just two years old.

- 1. The boiler is completely contaminated by a substantial thickness of condensed wood tar from top to bottom and is displaying typical signs of misuse and incorrect installation.*
- 2. The wood tar condensate has caused a restriction in the cross-sectional area of the flue way creating a potential hazard.*
- 3. The wood tar condensate in the lower second flue pass has caught fire.*
- 4. Substantial fire damage has occurred to the boiler water jacket.*
- 5. Substantial fire damage has occurred to the outer flue panel*
- 6. Substantial fire damage and metal distortion has occurred to the internal flue separator.*
- 7. There are no manufacturer faults on the fabrication of the boiler.*
- 8. There are no water leaks in the main firebox area the only water leaks found were those illustrated in the photographs where tar contamination was excessive.*
- 9. The appliance has not been used correctly.*
- 10. The appliance has not been installed correctly.*
- 11. The appliance has not been commissioned correctly.*

5-1 RECOMMENDATIONS.

Send a copy of this report to: -

The customer and advise them not to use the new replacement appliance until:-

1. A fully qualified installer has commissioned the appliance and filled in a new warranty form.

Fully qualified means HETAS registered engineer who has done the HETAS wet installer course.

1a. To fit a suitable ACASO 3 PORT LOADING VALVE 61 DEG C.

2. The chimney serving the appliance has been examined for wood tar deposits.

In view of the volume of condensed wood tar found in the appliance, it is highly likely

that the chimney will be contaminated.

Wood tar contaminated chimneys pose a major fire risk.

Advise Customer:-

To obtain a wood stove thermometer to make sure that the appliance is operated at the correct temperature.

To obtain a wood moisture gauge to make sure that the wood is at the correct humidity level. (Less than 20%)

Wood fuel should not be burned at low temperatures.

Tar leaks onto front control pane



Tar on loading door glass



6. IMPORTANT NOTES

6-1 All work carried out on any of the work mentioned above must comply with Building Regulations and relevant local bylaws.

6-2 Engineers carrying out installation work must be classed as (competent persons)

In this case HETAS operate the competent person scheme