



A Big Thank You

We would like to thank you most sincerely for buying a Burley wood burning stove.

We appreciate that most people just want to sit in front of their Burley stove and enjoy the amazing flame picture and the warmth, without the least interest in how it works, like knowing that when you flick a light switch the light comes on without the need to know how electricity is generated.

A small number of you will however be as passionate as we are and will want to amaze and captivate all your friends with your encyclopaedic knowledge of why your stove is the most efficient in the world, the decisions made during its creation and how we can run over them in 40 tonne tanks.

Design

The *Fireball* stoves are designed by Graham Thornhill. Graham has a stove shop in Canterbury where he also sells Burley electric and gas fires, hence the association. During his 30 years of installing stoves he spotted many problems with the function and design of the products he was fitting, so decided to try and address all these shortcomings at once and create a 'super stove'.

Once many different prototypes had been made and tested, the designs finalised, patents applied for, and the stoves submitted to the test house for approval, Graham and I met to create a partnership. Although at that time Burley had no history of wood burning stoves, Graham preferred to go with a company that would throw itself 100% into his product, rather than run with a larger established company where his design could be diluted or swallowed up.

Problems with existing designs – 1st year chemistry lesson

The problem with burning coal or wood is mixing the correct amount of oxygen with the fuel. Fuels are hydrocarbons, the simplest form is methane (natural gas) which is CH₄ (one carbon atom to four hydrogen atoms). Gas is very easy to mix with oxygen (O₂) and in the right quantities gives 'complete combustion'.



With wood and coal however, stoves often rely on a more or less chance meeting between the hydrocarbon gases released by the fuel and the oxygen, which gives 'incomplete combustion'. This is polluting and fails to extract all the energy from the wood.



The *Fireball* stoves have a unique method, patented by Graham, of creating a swirling vortex within the stove to mix the gases together and help prevent incomplete combustion. This is so effective and combustion is so clean, that during approvals the test house thought their analysers had broken and sent them away for recalibration.

Mixing the gases

Most stoves have sliding air vents at the top and the bottom to introduce air. This is an extremely simple and tempting route to follow, but doing so would mean that the *Fireball* could not create the vortex required for complete combustion.

Within the *Fireball*, a tubular framework channels air from the intake at the rear, and around the fuel bed where it is preheated. The framework extends up each corner of the chamber where the hot air is injected horizontally along the sides of the stove to make a whirlwind, whipping the gases together.

Four stages of combustion for high efficiency

The *Fireball* is the most efficient stove in the world. At up to 89.8% it does not simply beat all other stoves by a small margin, but by a country mile. By comparison a 60% efficient stove will require 50% more fuel to produce the same heat. The *Fireball's* unique feature also ensures that as much heat as possible stays in your house.

Stage one

The first stage of combustion is where the wood is burned at temperatures below 400 degrees centigrade. At this temperature large amounts of creosote are produced which are deposited in the chimney and are a major cause of chimney fires. For this reason the *Fireball* does not have a setting to allow it to smoulder overnight.

Stage two

Once the combustion chamber exceeds 400°C the creosote created in stage one spontaneously combusts, this creates a chain reaction which rockets the temperature from 400 to 600°C as you are now burning your fuel rather than sending it up the chimney un-burnt. This is called secondary combustion.

Every aspect of internal design in the *Fireball* has been created to enable the 400 degree threshold to be reached and exceeded as quickly as possible. The air has been preheated, the walls of the stove are clad in insulating vermiculite board rather than cement, the glass is double glazed and there is vermiculite board in the base rather than an ashpan.

Stage three

The internal temperature created in the *Fireball* is so intense and the combustion so complete that most of the ash and charcoal is burnt. The ash and charcoal which is usually emptied from normal stoves still contains a lot of potential energy. It is charcoal that you put on your barbeque and that blacksmiths use to melt steel.

The *Fireball* can reduce 100kg of wood into just one pint of ash. This means you do not have to carry bucket loads of ash through the house each time you want to have a fire. A small scoop is provided for when a little ash needs removing, but you will find that the next time the stove is fired the level of ash will decrease anyway. Ideally you should leave a couple of inches of ash in the base of the stove on which the logs can lay.

Stage four

As previously shown, soot is a by-product of incomplete combustion. The amount of soot created in the *Fireball* is very low, but most of the little that is produced and that manages to escape the fierce secondary combustion, is trapped by a stainless steel mesh in the top of the stove. This mesh is red hot and soot ignites on contact, extracting yet more heat and reducing air pollution to very low levels.

Room sealing

Most stoves take their air for combustion from the room in which they are installed. An open chimney or flue will suck all the hot air from your room once every hour, 24 hours a day, 365 days per year. This is an awful lot of heat being lost, which is replaced by cold air from windows and doors chilling your entire house.

As we resisted the use of sliding vents, the *Fireball* is airtight. With the use of our room sealing kit, you can draw cold air directly from outside, which after being burned in the stove, will vent up the flue. In this manner all the lovely heat stays in your home for longer and radiates outwards through the house.

Air vents

Legislation decrees that all wood burners over 5kW must have an additional air vent fitted in the room. If you room seal your stove however this is not required, preventing possible draughts and further heat loss.

Future legislation and house design

Over the next four years houses must be insulated to make them 'tighter' to reduce heat loss. This will most probably include a ban on ventilation from air vents and chimneys which will mean that stoves MUST be room sealed. Having a Burley *Fireball* stove keeps you ahead of the game.

Heat exchanger tubes

To extract the maximum amount of heat before it is lost up the chimney, tubes are welded through the combustion chamber. The hot gases are forced into contact with these tubes, whose large surface areas produce huge amounts of additional convected hot air into your room. These are so effective that the waste heat going up your chimney can be reduced down to as low as 122°C.

For those who don't like to see the convection tubes, there is a cover plate which simply clips on. The cover does not block the tubes, it just obscures them from view. Rather than make the cover an optional extra, we decided to save you the inconvenience of ordering one and include it as standard.

The heat output of your stove

Although your stove is rated as 3, 4, 5, 8 or 12 kW, this is only a nominal rating used for testing purposes. In reality the maximum heat to room outputs on Burley's stoves are:

Model	Nominal rating	Maximum output
9103	3kW	4.1kW
9104	4kW	5.3kW
9105	5kW	6.4kW
9108	8kW	11.7kW
9112	12kW	18.3kW

Maximum output doesn't mean filling it with as much wood as possible - that is over-firing. Maximum output will be a couple of medium sized split logs, burning well, with the air lever in a roughly central position.

The *Fireball* uses its high efficiency to punch above its weight by giving the output of a far larger stove therefore when a purchase is being considered, the maximum outputs should be compared to the nominal outputs of most other makes of stove.

DEFRA

DEFRA is an approval standard which a stove must pass before being allowed in smoke-free zones. One of the criteria is that it must not be allowed to smoulder as mentioned previously. All Burley stoves are DEFRA approved with the exception of the 9112. The 9112 will easily pass the standard, but we thought it unnecessary as the heat output is far too high for a town house. There is a small conversion plate on the back of each stove so you do not have to worry about ordering a DEFRA or non-DEFRA model.

HETAS

We are often asked if our stoves are HETAS approved, they are not. All that is required for inclusion on the HETAS list is to send HETAS a cheque, so we really did not think it was a meaningful standard or assurance of quality.

Wood or multi-fuel

Many people ask for multi-fuel stoves in the belief that they can burn any household rubbish, you can't. A multi-fuel stove is not as efficient as a wood burning stove. Wood is far greener, cheaper, cleaner and gives a much nicer flame picture. Our advice would be 'don't compromise, potato peelings are not a source of fuel'. We are sure that once you buy a wood burner you will only want to burn wood, but in the off-chance that you do want to burn coal, Burley produce a multi-fuel grate for some models which can be easily retro-fitted into the stove.

Plate steel or cast iron construction

Many stoves, particularly imports, are made from cast iron. Although cast iron is far cheaper to produce, castings are relatively brittle, and as cast stoves consist of many castings bolted together, they do not have the same physical strength or properties we required to allow total room sealing.

Our plate steel sections are 5mm and 8mm thick and are welded by robots. Hand-crafted is lovely when it comes to knitwear, but in a stove there is no comparison to welding by robots. Just take a few minutes to look under the top where it meets the side and admire the perfect airtight welds. Not only has the weld been applied in exactly the right place in exactly the right thickness, but the steel sections have actually been melted and fused together to make a virtually indestructible construction.

Glass door

As two of the main reasons for buying a stove are to be mesmerised by the flame picture and to defrost your backside in the radiated heat after a long winter's walk, Burley wanted the largest possible window. Due to its size the window has to withstand massive temperature fluctuations and thermal shock so it is actually ceramic and not conventional glass. Ceramic glass is very expensive, despite this your stove is double glazed which also helps keep it clean and promotes secondary combustion. A good fierce burn will clear most deposits from the glass and cleaning with a ceramic hob cleaner before each firing will largely restore it.

Wooden handles

After testing many materials we finally found natural wood to be the best for handles. Although for safety we supply a glove which should always be used, the handles stay remarkably cool.

Single lever air control

Having a sealed stove allowed us to develop very simple and instant control. Rather than having to fiddle with several vents to balance where the air is entering the stove, the one lever will accurately allow you to set your desired rate of burn. A roughly central position will give you maximum heat to fuel output.

Instructions for lighting your stove

Light a firelighter and place it in the base of the combustion chamber. Create a mesh of kindling three or four layers thick on top of the firelighter, placing strips crossways then longways leaving gaps between. Place a couple of small to medium sized split logs on the top near the back. Open control by sliding to the right. Close the door, positioning the stud in the semi-circular notch on the end of the metal handle, thereby leaving the door ajar. Once the wood has caught, close the door fully. When the fire is burning well, slide the air lever to a more central position. Sit back with cup of tea and smile.

Refuelling

When refuelling is required, to prevent smoke from possibly entering the room, open the door ajar and allow the pressure to equalise before slowly opening the door fully. Place fuel towards the back of the stove.

Moisture meter

Inside your 'Thank you' pack you will find a moisture meter. These are remarkably useful and a must for every stove enthusiast. Wood should be aged in a dry area until the moisture content is below 18%. How long this takes will depend on the dampness of the wood and the drying conditions, but if you split your wood before drying, most wood will be ready in a year or so. Kiln dried logs can usually be burned immediately, but they are expensive and not particularly 'green'. Avoid the bags of logs sold in garage forecourts like the plague.

If your wood merchant is supplying you with seasoned 'stove ready' logs, before he tips them in your driveway, produce your moisture meter with a flourish and watch the colour drain from his face.

Deciding where to sell the Fireball

Burley decided to sell through reputable retailers and not on the internet. We want you to enjoy your purchase and tell your friends how great it is, in that way we sell more stoves. The retailer can offer you a wealth of experience, advice, service and peace of mind. If you break the money saved from buying on the internet across the life of the stove you are literally looking at a couple of pence per day, a bargain compared to having to live with the wrong product or installation problems.

Going the extra mile

We don't want you to be pleased with your Burley stove, we want you to be delighted. We listen to our customers and constantly make improvements where possible. We try to enhance your enjoyment by providing a 'Thank You' pack which is full of useful extras. We have real people in our office in England who can speak to you knowledgeably should you have any questions or problems. Please let us know when we are getting it right, we love all the nice feedback which customers leave on www.whatstove.co.uk.

Not going the extra mile

One of your reasons for buying a stove may be to reduce your carbon footprint. Burley are proud to not only manufacture our stoves in Britain, but where possible to source British components. We insist that our steel is not just rolled in Britain (which allows it to say 'British steel') but is smelted in Britain. We have a constant policy of energy reduction which includes producing most of our own electricity.

By buying British you have ensured that money generated in the country stays in the country and secures British jobs. The money you have spent on your stove will be distributed, via Burley, to our staff, our local suppliers, and from there into the wider community. Eventually some of it will even come back to you. That knowledge, along with your Burley *Fireball* should give you a very warm feeling indeed.

Thank you again, we hope your Burley stove will give many years of service and pleasure.

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