SFA Guide to
Lining Old Chimneys

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INTRODUCTION

The most appealing focal point in any room must be the fireplace. Be it an open fire, closed stove or room heater, the leaping flames and glowing coals are the real heart of the home.
However, for any fire to work successfully, it must be connected to a sound chimney and correctly sized flue. The functions of a chimney are to safely remove the products of combustion from the fireplace or appliance to outside without causing danger to the occupants of the house or setting the house itself on fire. A chimney works because hot air rises and always moves from high to low pressure. Factors such as running the appliance at a very slow rate or cold air leaking into the flue, will cool the gasses and affect the performance of the chimney. To keep the flue gasses warm, consideration must be given to the insulation value of the lining system chosen.

In houses built since the introduction of the 1965 Building Regulations, all flues must be built with liners during their construction. This is usually done with clay liners, which should last the life of the building. However, in houses built prior to 1965, lining was less common. Flues were usually "parged" (rendered) on the inside with lime mortar. This parging suffers attack from acids and tars produced during combustion and gradually deteriorates. The flue is then in poor condition, often leaking fumes or tars into the walls or other parts of the building. Sadly, many houses built since 1965 suffer similar problems due to badly installed flue liners and need further attention.

DEFINITIONS

Before proceeding further, it is important to understand the terms used when talking about chimneys. These are briefly as follows:

FLUE – The flue is the void or passageway through which the products of combustion are removed from the fire to the outside.

CHIMNEY – A chimney is the structure surrounding one or more flues.

FLUE LINER – The flue liner
is the material used to form the flue or flues within a chimney.

CHIMNEY TERMINAL– This is the pot, cowl or other method of finishing the top of the chimney.

FLUE PIPE – is a metal pipe used to connect an appliance to the flue in a chimney.

REASONS FOR LINING

There are a number of reasons why an old chimney may need lining.

1.The flue is leaking smoke and fumes into other rooms or parts of the building.

2. Condensates or tar are seeping through the chimney walls causing staining, either inside or outside the building (a common problem with wood burning stoves)

3. The flue is much too large for the type of fire or appliance being used.

4. The flue is too cold, particularly if on an outside wall, and is not drawing properly.
5. If the chimney was built since 1965, but with the liners fitted the wrong way up, tar and condensate leakage may occur.

6. The old flue surface is eroded and rough, causing frictional resistance to the flow of the gasses resulting in poor updraught

METHODS OF LINING

1. Rigid sections of clay or refractory liner installed by cutting into the flue wall or by lowering down from the top of the chimney.

2. Insulating concrete pumped in around an inflatable former by a specialist contractor.

3. Flexible metal liner in a continuous length lowered down the chimney.

4. Spray on coating by specialist contractor.

5. Ceramic coating by specialist contractor.

All of these methods have some advantages and some drawbacks. Their suitability will depend on individual circumstances. Good professional advice on the most appropriate system is essential.

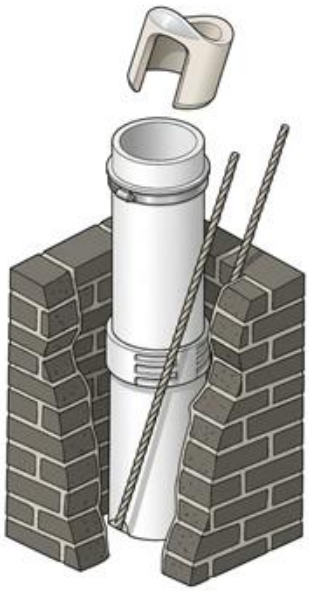
Before any new lining is installed it is essential to have the chimney thoroughly swept to remove all soot and tar deposits. This means with stiff polypropylene or steel scraper brushes. Preferably use a member of an accredited chimney sweep organisation who work to a Code of Practice and provide a certificate on completion. It is possible in some situations to ream out the old flue to take a larger liner than would otherwise fit. This work is done by a specialist contractor, who may also offer a video camera inspection of the flue.

In all cases it is advisable to use a system that has a recognised test approval and if a guarantee is offered it should be underwritten by insurance.

The following sections will look at each of the above in more detail:

RIGID REFRACTORY LINERS

This is the most traditional method of lining using refractory concrete, clay or ceramic liners of the same type commonly used in new build. There are also some pumice liners designed specifically for relining. The chimney has to be opened at frequent intervals to insert the liners, essential if there are bends in the flue. The resulting dust, mess and subsequent redecorating are not popular with the householder.



If the old flue is large enough and straight it is often possible to lower liners down from the top without opening the flue inside the house. Several specialist companies offer this system.

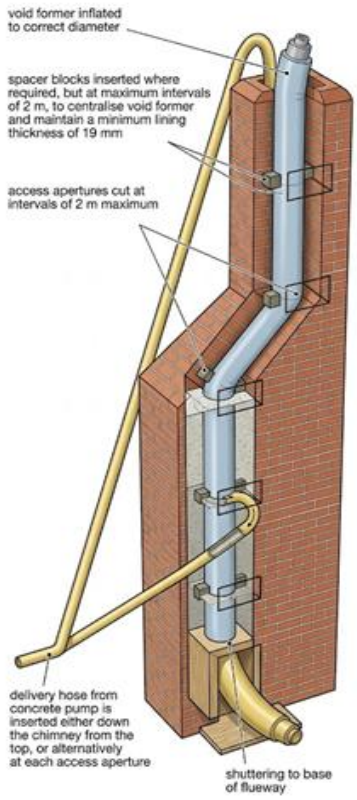
The liners must either have rebated and socketed joints or steel locking bands. (NB – rebated and socketed joints must be fitted the correct way up. Rebates are there to prevent any condensates running down the flue from leaking out, therefore the socket end must be uppermost and the spigot end fitting down inside the lower pipe). A possible drawback with this method is the wall thickness of the liner, usually 20-25 mm. Twice this dimension plus a clearance needs to be deducted from the size of the original flue, resulting in a much reduced flue cross section. For a nominal 225x225mm flue this probably means only a 150mm or 175mm flue can be achieved. This reduced size will be too small for an open fire so a closed appliance may have to be fitted. Clay liners used in this method must comply with BS EN 1457 : 1999.
Refractory concrete liners with a much higher insulation value and ability to withstand thermal shocks such as in a chimney fire are to be recommended, particularly for wood burning stoves. Liners made with pumice and high alumina cement are best and comply with Building Regulations.

Alternatively, the product should have a British Board of Agreement Certificate. Provided the correct flue size can be achieved, this is an excellent method of lining and should last the lifetime of the building.

PUMPED REFRACTORY CONCRETE

This system consists of lowering a rubber former or "sausage" down the chimney, inflating it slightly, and then pumping in a lightweight refractory concrete mix. When the concrete has set, the former is deflated and withdrawn, leaving a smooth flue, filling all voids and cracks and generally strengthening the chimney structure.

As with the rigid method in E above, the minimum wall thickness of this system is about 20mm, reducing the flue size within the existing chimney, which may limit the type of fire or appliance which can be used.



The critical factor with this system is in the skill of the installer who must ensure the mix is correct and the former is centralised within the old flue. There are various techniques used to achieve this. It is also a requirement of the Code of Practice for this system that the chimney be opened every two metres and at any bend to centralise the former. This may mean mess and disruption within the building and subsequent re-plastering and redecoration.

At present this system is not covered by British Standards nor Building Regulations. It is therefore important to ensure the Contractor is a member of an accredited chimney sweep organisation that works to a recognised Code of Practice.

The installation is permanent and if properly installed and regularly swept should last the life of the building.

FLEXIBLE METAL LINERS

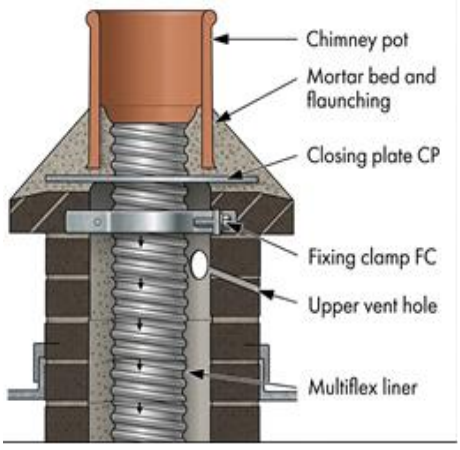
There are two distinct types of flexible metal liners available, and it is very important to distinguish between them.

SOLID FUEL LINER. This is a double skinned liner made from an extremely high-quality stainless steel, usually 904L or 316Ti (Titanium) grade. It is smooth on the inside, corrugated on the outside and must be installed the correct way up. It is specifically designed for relining flues for solid fuel and wood. Whilst stainless steel is a very tough material, it is still prone to corrosion due to the acidity of fumes from solid fuel, especially if condensation is present. Its anti-corrosion properties are also reduced if heated above 900ºC for more than about 15 minutes, perhaps as the result of a chimney fire.
There is presently no British Standard for solid fuel flexible liners. Building Regulations can be satisfied by referring to the HETAS Approved List or an approval by the CSTB (France), members of the European Union of Agreement.

GAS AND OIL FLUE LINERS . A light gauge single skin liner, only suitable for closed gas fires and boilers, some inset fuel effect gas fires and kerosene oil appliances. It should never be used with solid fuel or wood burning appliances. Flexible liners are relatively easy and clean to install. They are usually drawn down the chimney by rope from the top and will pass round most bends without opening up the flue. Support is provided by "hanging" the liner from a clamp or plate mounted at the top of the chimney. It should also be firmly clamped at the base before forming the connection to the appliance or flue pipe. Unlike rigid pipe, expansion and contraction will be taken up by the flexible construction of the pipe itself.

The solid fuel liner can be left with an air space as insulation. This may be satisfactory for open fires with relatively high flue gas speeds and temperature which will reduce the likelihood of condensation. A better solution is to back fill around the liner with a loose fireproof insulation material such as Perlite, Vermiculite or Leca granules. Some systems offer an insulation wrap, well suited to the large voids found in inglenook situations where back filling would be impractical. (Fibreglass insulation should not be used). Insulation is essential with wood burning stoves due to the high incidence of condensation problems.

In all cases a small ventilation hole (usually 15mm) should be provided at the top of the chimney stack to allow any residual moisture to escape. Always follow the manufacturers installation instructions carefully.



Care should be taken when sweeping flexible metal liners as the use of an incorrect brush can damage the inner skin.
Only polypropylene brushes of the correct diameter and with a plastic ball top should be used.
Where possible use a member of an accredited chimney sweep organisation who will be trained in the techniques required.

SPRAY ON LINING SYSTEMS

This system is applied by passing a revolving spray head slowly through the old flue which applies a special coating to the flue walls. The spray head is capable of negotiating bends and the rate of passage through the flue determines the thickness of the coating, usually 7mm. This system is carried by specialist skilled contractors. The flue is thoroughly scoured clean first and is inspected with a closed-circuit TV camera to check all is OK. A video recording can be made for reference purposes.

The advantage is a relatively thin lining, leaving the maximum possible cross-sectional area for the new flue and giving the widest choice of fire or appliance. A good solution to the problem of badly installed or cracked clay liners. A ten-year guarantee may be available but make sure this is underwritten by insurance.

CERAMIC COATING

The most recent development in chimney relining involves applying a ceramic type lining material. The base of the chimney is plugged and held in position by a cable attached to a winch on the chimney top. Liquid lining material is poured into the chimney to completely cover the plug which is then pulled to the top of the flue. The plug forces the lining material onto the internal surface sealing any cracks any fissures and leaving a smooth coating. Several coats can be added if necessary. The lining material may only be 4mm thick and so does not reduce the overall flue size by a large factor.

Several manufacturers offer this method of lining and the materials used may incorporate glass fibre and resin hardeners to provide strength and resistance to acid corrosion. Usually, a 10 year guarantee is available.

INSULATION

As previously mentioned, for a flue to work successfully, it must be kept warm. The draw up a flue is directly related to the difference in temperature between the flue gasses and the air outside. The more efficient the appliance, the more critical this becomes. An old chimney serving an open fire where a high proportion of the heat went up the chimney may have worked satisfactorily but install a modern high efficiency stove or room heater and serious problems could result due to the reduced flue temperature and resulting condensation. Care must be taken to ensure the new lining will give improved insulation appropriate to the type of fire to be used. Generally, for solid fuel and wood burning the space around the new lining should be filled with insulating material such as Perlite, Vermiculite or Leca. Better still the lining material itself should have a high insulation value e.g. liners made with pumice.

FLUE SIZING

To clear the smoke and fumes from a fireplace or appliance the flue must be correctly sized. If it is too small an insufficient volume of air will pass through it – resulting in a smoky fire. Too large a flue will cause cooling of the flue gasses, slowing down the flow with similar results.

Type of Fire	Flue Size	Taken From:
400 / 450mm open fires	225mm (min 200mm)	Building Regulations 2010
Large open fire	155 of opening size (WxH)	And BS EN 15287-1
Closed appliance	150mm	

All the above should be increased by 25mm if there is a bend in the flue.

The above table gives recommended flue sizes for most types of fireplace and appliances. For chimneys less than 5 metres high use one size larger than quoted. Always refer to manufacturer's installation instructions for their recommendations.

Since April 2002 appliance installation and chimney lining is regarded as a controlled service and is classified as 'building work'. As such, consent must be obtained from your Local Council or you should employ an HETAS or OFTEC Competent Person who is exempted from this rule. Additionally, all new and relined chimneys must carry a Notice plate describing the type of flue and suitability.

CHIMNEY TERMINATION

An open topped chimney pot or open stack with no pot fitted will allow some rain into the flue. With old unlined flues this moisture was absorbed into the porous mortar and brickwork of the chimney top and then evaporated by the warmth from the flue gasses. This usually caused few problems.

Once the flue is lined with a smooth impervious liner the rain can run down the flue and may reach the bottom. This can prove both messy and unpopular. Some form of chimney terminal that will keep out the rain without impairing the performance of the flue is therefore desirable.

For small solid fuel open fires and closed stoves the MARCONE, LOUVRE, H POT OR BARREL shape will prove most effective. For larger open fires the Slab Top or Dovecote is generally most suitable.

Appliance installations should always be carried out by a qualified installer. This leaflet is for guidance only and should only be used for reference purposes.

NOTES

Always buy solid fuel from an Approved Coal Merchant

Our team of specialists are always available to give advice on all aspects of solid fuel heating including installation, maintenance and spare parts. Other guides are available on request.

Phone 01773 835400 for details

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