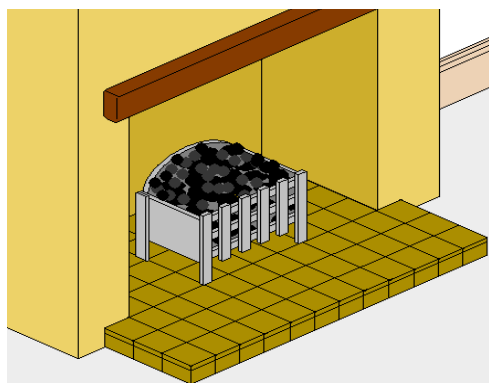


As an open fire burns it draws fresh air in from the room, not just around the burning fuel, but from the whole open 'face' of the fire - the entire width and height of the fireplace opening. Without a chimney having a flue cross-section big enough to carry all this air away, and a sufficient amount of fresh air entering to replace it, the fire will smoke into the room.

FLUE SIZE	MAXIMUM FIRE FACE	MINIMUM FRESH AIR ENTRY SIZE
150mm diameter (=0.018m ²)	0.124m ² (=352mm square)	0.009m ² (=94mm square)
180mm diameter (=0.025m ²)	0.178m ² (=422mm square)	0.013m ² (=113mm square)
250mm diameter (=0.049m ²)	0.343m ² (=586mm square)	0.025m ² (=157mm square)
300mm x 300mm (=0.09m ²)	0.63m ² (=794mm square)	0.045m ² (=212mm square)
400mm x 400mm (=0.16m ²)	1.12m ² (=1058mm square)	0.080m ² (=283mm square)

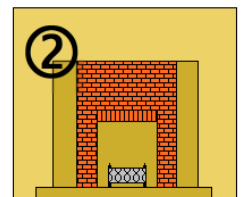
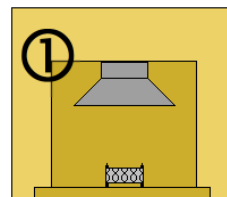
As a good general rule the fireplace face opening must not be larger than 7 times the smallest cross-sectional area of the flue, and there must be a permanent open air supply to the fire equal to at least 1/2 the cross-sectional area of the flue. (Buildings Regs. Eng & Wales, Document J, Section 2)

As well as smoke problems, the huge requirement for fresh air can lead to the 'cold back' syndrome, where, away from the direct radiation of the glowing fire, the room is actually made cooler as vast amounts of outside air are drawn in. This effect can be reduced by making the fire 'face' as small as possible and siting the air supply close to the fire.



BASKET FIRES (like the one shown on the left) worked well in draughty mediaeval halls with huge chimneys, but are near-impossible to make work with the narrow chimneys and well-sealed rooms of almost any house built since the eighteenth century. Their efficiency is poor, rarely above 10%, in fact the quantity of cold air they pull into a building can actually make them *negatively* efficient - lighting the fire makes the building, overall, cooler - though this can be an advantage in smoky pubs.

Installing a smoke hood or gather (diagram 1) is unlikely to improve performance as it doesn't significantly reduce the 'face', but building a smaller-faced opening inside the existing fireplace (2) can be made to work well.



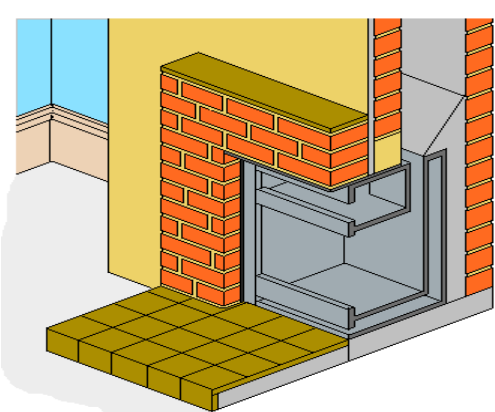
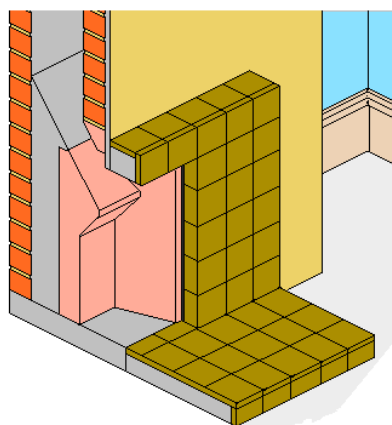
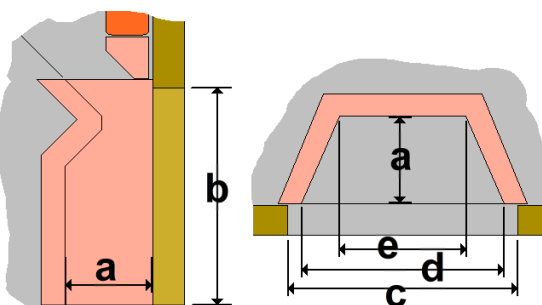
INSET OPEN FIRES reduce the open face to the very minimum and have a refractory fireback formed with angles to help radiate heat. This type of fire is unique to Britain and Ireland and is made to strict dimensions (British Standard 1251) to ensure that a wide range of fires, and even some closed stoves, can fit straight in.

Inset fires are moderately efficient (30 to 40%), if fitted correctly, and can become very efficient (over 75%) with certain types of wrap-round back boiler for central heating.

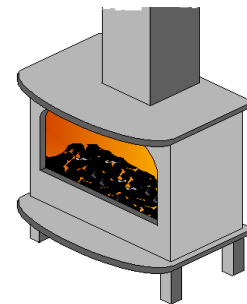
Cast-iron grates to fit standard insets range from the simple loose 'stoolgrate' with its fret front to quite sophisticated air-control open grates which can stay alight all night on certain fuels.

A nominal 16"/400mm fire (by far the commonest size) has dimensions:

- a Depth of fireback: 170mm
- b Height of fireplace opening: 560mm
- c Width of fireplace opening: 405mm
- d Width of fireback at front: 380mm
- e Width of fireback at back: 250mm



CONVECTOR FIRES, either freestanding or inset into the wall, have a metal casing open to the air at the sides, back, top and even underneath the fire. They can typically achieve efficiencies of up to 60%



FUELS: Bituminous coal, peat, lignite, soft coke and specially-formulated open fire briquettes are fine, but anthracite, hard coke and the harder briquetted fuels simply won't burn on an open fire. Wood burns best if the white 'cell powder' it produces is prevented from falling away but kept hot and allowed to burn, for this reason wood logs burn best simply laid on a flat hearth with no grate or basket. **SAFETY:** A mesh fireguard is a wise precaution, and essential whenever the fire is unattended or children or the infirm are about, especially as some fuels, notably wood, can occasionally 'spit' sparks.