

How to test the safety and efficiency of flues and chimneys

Technical guidance for installers and trade



Introduction

This guide is intended to advise installers on the practices and procedures that must be followed in the commissioning and testing of flues and chimney systems serving solid fuel appliances. Some local authorities have standard checklists they require installers to complete. You are advised to check if this is the case for your installation.

The guide informs you on how to check that existing, relined or new flues discharge safely to external air. It is

restricted to natural draught flues intended for open-flued appliances. It informs you how to assess whether the flue in the chimney, the connecting fluepipe (and flue gas passages in the appliance) are free of obstruction and acceptably gas tight.

Tests on flues should be carried out at the most appropriate time during the building work. Where possible, smoke tests should be performed when the structure of a chimney is visible and before it has been plastered or dry lined.

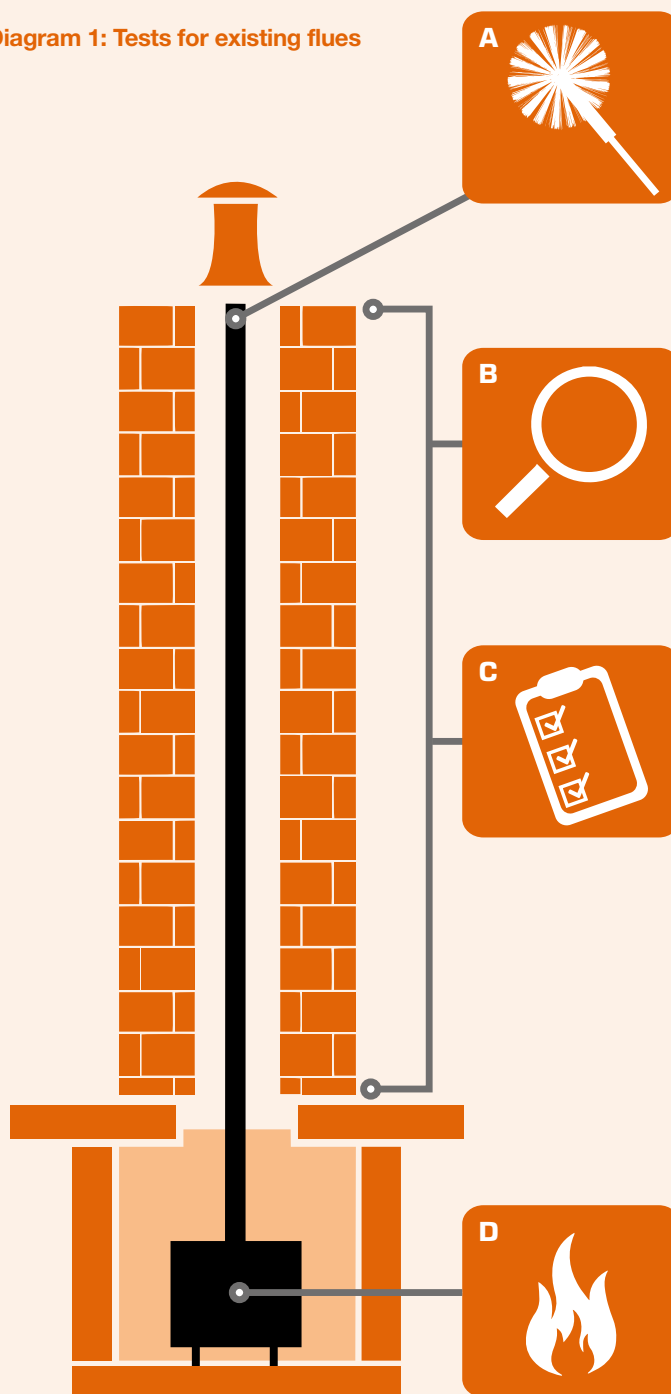
Tests for existing flues

It is important to carry out the following checks to ensure the chimney is not obstructed by nests, decayed internal brickwork or soot and tar (see diagram 1).

- A) Sweep the flue to show it is free from obstructions and to enable better visual inspection and testing of the flue. Tar deposits should be removed. Debris falling down the chimney when sweeping should be examined for excessive quantities of lining or brick that indicate further repairs may be necessary.
- B) Visually inspect accessible areas to identify:
- Deterioration, flue joints or linings which may affect the flue's gas tightness and performance. Examine the interior of the flue and the exterior of the chimney including in the roof space. Look for smoke or tar stains on the exterior of a chimney breast that could indicate gas leakage or damage.
 - Modifications to the flue whilst out of service. This includes the fitting of a ventilator terminal that will prevent proper use of the flue.
 - Correct lining and lining sizes for the proposed stove.
- C) Carry out any necessary checks to show the flue is not restricted. Where the whole length of flue cannot be seen, carry out a coring ball test*.
- D) Carry out a smoke test* and (if appropriate) a flue spillage test* to check the gas tightness of the flue.

*All test methods are explained later in this guidance.

Diagram 1: Tests for existing flues

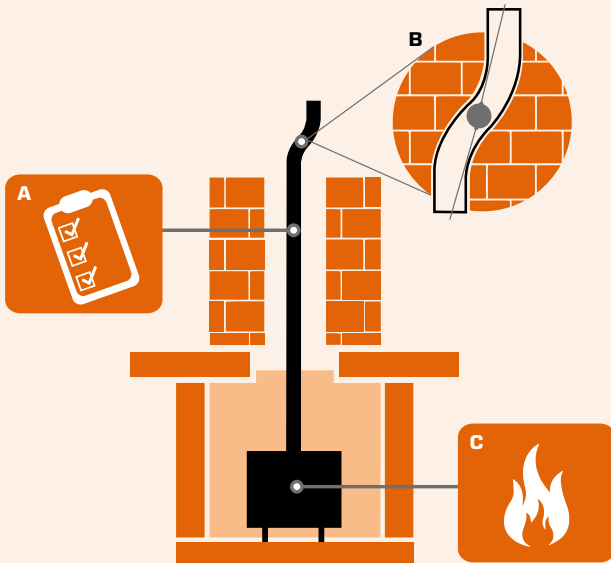


New masonry and flueblock chimneys

When constructing the chimney ensure the flue liners are installed, sockets face upwards and that joints are sealed to contain moisture and condensation in the chimney.

Ensure flues in new masonry chimneys are not obstructed. This is particularly important at bends, where building debris or excess mortar may have caused obstruction. The flues should be checked to prove that they have been correctly constructed and are free of restrictions and acceptably gas tight (see diagram 2).

Diagram 2: Checklist for new flues



A new flue can be checked by:

- A) Carrying out a visual inspection to check that the lining, liners or flueblocks are of the correct materials and of suitable size.
- B) Carry out any necessary checks to show the flue is not restricted. Where the whole length of flue cannot be seen, carry out a coring ball test (see section on coring ball test)
- C) Carry out a smoke test and (if needed) a flue spillage test.

New factory-made metal chimneys

A checklist for a new factory-made metal chimney is provided in BS EN 15287-1:2007. After inspection, the chimney should be subjected to a smoke test and if needed a flue spillage test.

Relined flues

A flue which has been relined should be checked to show that it is free from restrictions and is acceptably gas tight by using the same tests as would be applied in the case of a new flue.

Appliances

Where a solid fuel appliance is installed and connected to the

flue system, the complete system (appliance and flue) should be tested as outlined in this guidance.

FLUE TEST PROCEDURES

Coring ball test

A coring ball test is a heavy ball, with a diameter about 25mm less than that of the flue, which is lowered on a rope from flue outlet to the bottom of the flue. If an obstruction is encountered, the blockage should be removed and the test repeated. This test should be carried out before smoke testing when proving the minimum diameter of circular flues. It may also be used to check for obstructions in square flues. In this instance, a purpose-made coring ball or plate may need to be used.

The smoke test

If an existing flue is to be checked with a smoke test, it should first be swept. All doors and windows in the room containing the flue should be closed. The flue should be warmed for about ten minutes to establish a draught, e.g. with a blow lamp or electric heater. Flue testing smoke pellets are placed at the base of the flue, such as in the fireplace recess or the appliance if it is fitted, and then ignited. When smoke starts to form, the area around the base of the flue or fireplace opening should be sealed and any appliance door closed to prevent the escape of smoke. Smoke should be seen to issue freely from the flue outlet or terminal. When this is established, the outlet of the flue is partly sealed to leave a 50mm diameter opening to the atmosphere and the test continued for at least five minutes. The full length of the flue should then be checked for leakage. At the conclusion of the test the enclosures at the top and bottom of the flue should be removed.

Key points to be aware of when smoke testing

1. Warming of the flue to establish a draught may take more than ten minutes in the case of large or cold flues.
2. During a smoke test, smoke should not emerge from the outlet of any other flue, as this indicates leakage between flues. Smoke leakage from a faulty flue can emerge some distance away from the original fault. In such cases, the smoke could emerge from roof overhangs in the end of terrace dwellings or from window reveals in cavity walls.
3. Smoke pellets can create high pressures that could adversely affect natural draught chimneys. Some smoke leakage may therefore be seen during smoke tests and it can be a matter of expert judgement of whether leakage indicates failure.
4. Wisps of smoke visible on the outside of the chimney or near joints between chimney sections do not necessarily indicate a fault. If forceful plumes or large volumes of smoke are seen, this could indicate a major fault such as an incorrectly made connection or joint, or a damaged section of chimney that requires investigation and remedial action followed by a repeat of the test.

The flue spillage test

Air extract fans and whole house mechanical ventilation systems can potentially have an adverse effect on the functioning of a flue or chimney. This may cause dangerous flue gases to be drawn into the room containing the appliance. Fans should not be installed in the same room as solid fuel appliances. Where fans are in a different room they can still have an adverse effect on the flue performance, as such a spillage test is needed if you are doing either of the following:

- Installing an extract fan in a dwelling which contains a solid-fuel combustion appliance
- Installing a solid-fuel appliance in a dwelling which already has an extract fan, whether it is a new installation or a replacement for an existing appliance.

Spillage testing with a fan installed

A spillage test should be conducted on a day when the wind speed is 4m/sec or less. 4m/sec is classed as a gentle breeze and will extend a light flag and keep leaves and small twigs in constant motion.

When the appliance is burning in a stable, low output condition, close all windows and doors including internal doors apart from those doors between the extract fan and the appliance. Check the performance of the flue with the extract fan turned off then place a smoke-producing device (e.g. smoke match, puffer or joss stick) next to a likely point of spillage. Spillage is indicated by smoke being blown away from this area which may suggest a fault with the flue.

If there is no spillage, repeat the test with the fan turned on. For open fires pay particular attention to the area at the top of the fire opening where spillage is most likely to occur.

For closed stoves spillage can occur around the main door and air inlet ports. If spillage does occur switch off the extract fan and rectify the fault.

Confirm adequate ventilation has been provided for combustion as recommended by the appliance manufacturer and Building Regulations Approved Document J, adopting whichever is the larger volume.

If spillage still occurs consider one or both of the following:

- Increasing ventilation openings to the room with the extract fan
- Replacing the extract fan with one which has a lower flow rate.

Where a solid fuel appliance is situated in a room with adequate ventilation, it is unlikely that a fan with an extract rate of less than 25 l/sec. will adversely affect it.

Some solid fuel appliances have sensors which switch the combustion fan off if the chimney is blocked. You should be aware that these sensors are not designed to safeguard against spillage of flue gases caused by extract fans.

Other information

The following sites may be useful in obtaining further information:

- www.nace.org.uk
- www.labc.co.uk for building regulations and planning advice

This guide has been produced with support from our Hertfordshire Technical Forum Group.

Further technical guides

Guide to installing solid fuel stoves

LABC is a membership organisation representing all local authority building control teams in England and Wales who work with industry and building professionals to ensure compliance with Building Regulations. We are a not-for-profit organisation dedicated to promoting public sector expertise.

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