

Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings

CONTENTS

- 1 INTRODUCTION
 - 2 POSSIBLE INSTALLATION DIFFICULTIES
 - 3 OUTLINE OF THE ASSESSMENT PROCEDURE
 - 4 PURPOSE OF THE ASSESSMENT PROCEDURE
 - 5 HOW TO CARRY OUT THE ASSESSMENT
 - 6 FLUE TERMINAL SITING
 - 7 EXTENDED FLUE LENGTHS
 - 8 BOILER LOCATION
 - 9 CONNECTION OF CONDENSATE DRAIN
- APPENDIX A: ASSESSMENT FORM

APPENDIX B: TYPICAL FLUE TYPES

APPENDIX C: CONDENSATE DRAIN CONNECTIONS

- Condensate drain points
- Condensate drain pipe installation
- Condensate drain termination

APPENDIX D: ASSESSMENT EXAMPLES

- D1 Victorian mid terrace house with kitchen in rear extension (no passage)
- D2 1960s semi-detached house with rear patio adjacent to lounge diner

1 Introduction

The Domestic Technical Handbook gives guidance on achieving the standards set in the Building (Scotland) Regulations and gives guidance for the efficiency of hot water central heating gas and oil boilers installed in new and existing dwellings. From 1st May 2007 condensing boilers with a SEDBUK[1] efficiency in band A or B, may be considered to meet the guidance given in the Technical Handbook unless in the case of existing dwellings there are exceptional circumstances that make this impractical or too costly.

Appendix A of this guide is the Condensing Boiler Installation Assessment Procedure, which is to be used in cases where it is expected to be impractical or too costly to install a condensing boiler.

2 Possible installation difficulties

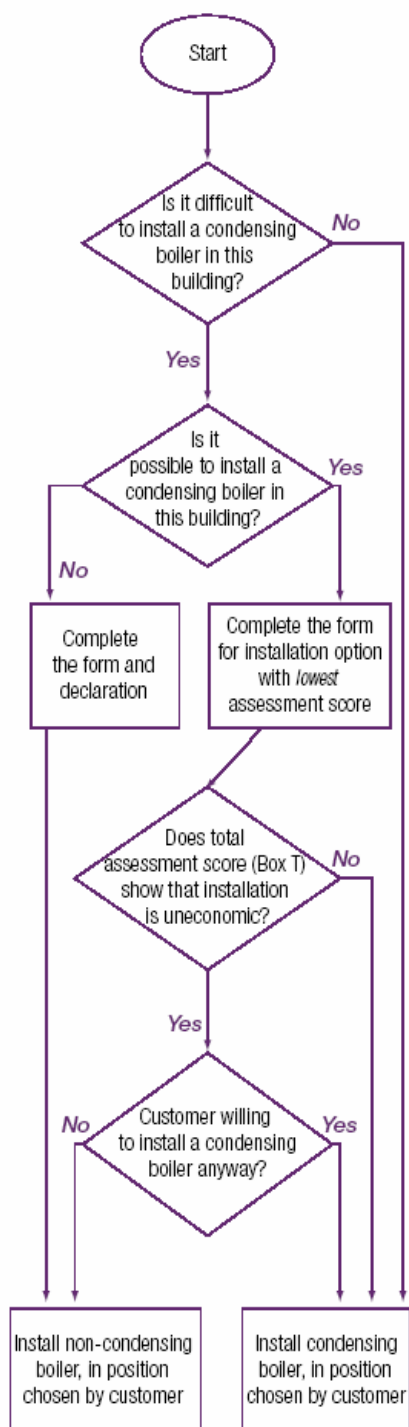
It is sometimes more difficult to install a condensing rather than a non-condensing boiler because:

- The flue gases discharged from the flue terminal are cooler and less buoyant, and usually form a visible 'plume'. They may cause wetting of surfaces too close to the terminal, or nuisance to neighbouring property, or people passing nearby.
- An existing flue designed for a non-condensing boiler is unsuitable for a condensing boiler (and vice versa), and the flue for a condensing boiler should not be shared with any non-condensing appliance.
- A liquid condensate forms within the boiler, and should be discharged to a suitable drain or soakaway.

There are a number of ways to overcome these difficulties, and the assessment procedure estimates the extra costs and compares them with typical fuel savings over the lifetime of the boiler.

[1] Seasonal Efficiencies of Domestic Boilers in the UK

3 Outline of the assessment procedure



4 Purpose of the assessment procedure

Where installation of a condensing boiler is expected to be difficult, an assessment should be carried out to see if a non-condensing boiler may be considered to meet the guidance given in the SBSA Technical Handbook Domestic. In this case a correctly completed form (set out in Appendix A of this guide) is used to show whether or not exceptional circumstances apply. It is not necessary to complete the form if a condensing boiler with efficiency in SEDBUK band A or B is to be fitted.

The assessment gives a YES/NO answer to whether it is reasonable to fit a non-condensing boiler in a particular building for a specified fuel (gas, LPG, or oil). If the answer is 'NO', then a condensing boiler should be fitted unless some other way can be found to demonstrate that a non-condensing boiler may be considered to meet the guidance given in the SBSA Technical Handbook Domestic. If the answer is 'YES' then either a condensing or non-condensing boiler may be fitted. Whatever the answer, the boiler does not have to be fitted in the position shown on the assessment form, which will have been chosen for least cost without regard for householder preference.

Completed assessment forms should be retained by the householder, since they may be helpful when the house is sold.

The rest of this Guide provides additional information on how to undertake an assessment and complete the form. It provides important information on what should, or should not, be taken into consideration, especially concerning arrangements for extended flues and condensate drains.

5 How to carry out the assessment

5.1 The simplest way to carry out the assessment is to imagine the building is empty, without furniture and fittings, and the householder is not present. But the householder has to tell you what fuel is to be used (natural gas, LPG, or oil). Your task is to find the lowest cost option (given by the lowest number of points) for installing a condensing boiler, taking into account the position of the existing boiler if there is one.

5.2 Some boiler positions and flue terminal positions are excluded from the assessment, as shown in Table 1 (Page 6). These options are NOT to be considered for the assessment procedure. However, this does not necessarily mean they contravene standards or regulations, and in some cases they may be acceptable to the householder.

5.3 If there is no difficulty in installing a condensing boiler, it is not necessary to complete the form and no further action is required. A condensing boiler should be installed, in any position chosen by the householder.

5.4 In rare cases, it will not be possible to install a condensing boiler anywhere in the dwelling. Complete the form, explaining why, and sign the declaration. Such cases are unusual, and apply only when there are no positions where a condensing boiler could be installed, even with an extended flue (horizontal or vertical, inside or outside the building). One example is a flat where an existing boiler is connected to a shared flue and it is not possible to pierce an external wall because of its (eg pre-stressed or 'glass' wall).

5.5 In nearly all cases it will be possible to install a condensing boiler, though with varying levels of difficulty and cost. All feasible options should be considered for whichever fuel has been chosen by the householder, in all the locations that would meet regulations and have not been listed as excluded in Table 1.

5.6 The flue terminal position should meet the guidance requirements given in Section 3 of the SBSA Technical Handbook Domestic.

5.7 If an existing boiler is being replaced see Checklist 1 (Page 7). If there is no existing boiler see Checklist 2 (Page 7).

5.8 The assessment form is completed for the installation option that gives the LOWEST points score. It is necessary to show that all feasible options have been considered, and that the form shows the lowest scoring option. Any additional forms used to assess other options should be attached when the final, signed form is made available.

5.9 When the assessment score exceeds 1000^[2] points, this is evidence of exceptional circumstances under which it is reasonable to install a non-condensing boiler instead of a condensing boiler.

[2] This points score may change in future.

Table 1 Installation options to be EXCLUDED from the assessment

Flue options NOT to be considered	Comment
Flue and terminal positions that do not meet the standards and guidance given in Section 3 of the SBSA Technical Handbook Domestic.	All installations must meet statutory requirements.
A shared flue, unless specially designed to be shared by condensing boilers.	Existing SE-DUCT's and U-DUCT's are unsuitable for connection to condensing boilers.
A flue passing through a wall or floor that should not be pierced for structural reasons.	An example is a pre-stressed or 'glass' wall in a block of flats.
An internal flue extension exceeding 4m (ignoring the part that passes through a loft/attic space).	Where an internal flue extension will need to penetrate a roof, the length of flue required passing through the loft attic space is excluded. See section 7.
A flue that passes through another dwelling, or another building in different ownership, or another fire compartment.	Applies particularly to flats where flue routes to suitable terminal positions may be limited.
A vertical flue pipe visible on the outside of the building facing the main approach direction (usually the front). This refers only to the flue pipe, not the flue terminal (a terminal may be positioned on any side of the building).	A vertical flue on the front of the building is likely to be aesthetically unacceptable to many customers.
Wall terminals that discharge under the roof of a car port.	These are more stringent flue terminal siting requirements which apply for the assessment procedure only. The distance of 2.5m from a facing wall, fence, building or boundary is given to reduce the possibility of wetting a surface, and to reduce the likelihood of complaints about the visible plume from neighbours. Where a plume diverter terminal is used, the distance should be measured in the direction of flue products. See section 6.
Wall terminals with horizontal discharge less than 2.5m from any wall, fence, building or property boundary facing the terminal.	
Wall terminals with horizontal discharge less than 2.5m from a car parking space and less than 2.1m above the ground.	
Wall terminals less than 2.1m above the ground with horizontal discharge of the flue products across a public footway, or a frequently used private access route, or a patio (hard surface area).	

Boiler positions NOT to be considered		Comment
Gas Boilers	where the boiler or extended internal flue is in a: <ul style="list-style-type: none"> •lounge •lounge/dining room •principal living room that does not include a kitchen area. 	It is acceptable to install a gas boiler in any room other than the principal living room. See section 8.
LPG boilers	where the boiler or extended internal flue is in a: <ul style="list-style-type: none"> • lounge •lounge/dining room •principal living room that does not include a kitchen area •cellar or basement. 	
Oil boilers:	the only positions that ARE to be considered are: <ul style="list-style-type: none"> •a kitchen, or •a kitchen/dining room, or •a utility room •purpose-made boiler room. and only where they are on the ground floor or in a basement. All other positions are NOT to be considered.	Oil boilers are larger, heavier and more suited to installation on ground floors or basements. Therefore suitable locations are more restricted than for gas boilers. See section 8.

Checklist 1

If an existing boiler is to be replaced, the questions to be asked are:

- a. Can a new condensing boiler be fitted in the same position as the existing boiler, without a flue extension?
- b. Can the existing boiler position be retained and an extended horizontal flue connected to a terminal on the same or adjacent wall?
- c. If the existing boiler position is retained, can a vertical extended flue be installed? (not on the front of the building – see Table 1).
- d. Can a non-balanced extended flue be used where the flue outlet would direct flue products to a permissible position?
- e. Can the boiler be moved within the same room, possibly to an internal wall, to achieve satisfactory flue and drain connection?
- f. Where the existing boiler is connected to a shared flue (SE-DUCT or U-DUCT) it will not be possible to connect the new boiler to the existing flue system, and other flue options should be considered. When considering other flue options, particularly in flats, wall construction may prohibit penetration (eg pre-stressed walls).
- g. Can the boiler be moved to another room to achieve satisfactory flue and drain connection?
- h. Can an internal boiler position (ie not on an outside wall) be used? Is it necessary to have an internal vertical flue which penetrates the roof? Connection to a suitable drain point may be more difficult in this case.
- i. Can the boiler be installed in an attic or loft area (gas/LPG boilers only)? If this is considered for the actual installation, special requirements for access will apply.
- j. Is there a suitable outbuilding? Connection to services will be more difficult and frost protection necessary.

Checklist 2

If there is no existing boiler, the questions to be asked are:

- a. Can a new condensing boiler be installed, without a flue extension?
- b. Can an extended horizontal flue be installed, connected to a terminal on the same wall as the boiler, or an adjacent wall?
- c. Can a vertical extended flue be installed? (not on the front of the building – see Table 1)
- d. Can a non-balanced extended flue be used where the flue outlet would direct flue products to a permissible position?
- e. When considering flue positions, particularly in flats, wall construction may prohibit penetration (eg; pre- stressed walls).
- f. Can an internal boiler position (ie not on an outside wall) be used? Is it necessary to have an internal vertical flue which penetrates the roof? Connection to a suitable drain point may be more difficult in this case.
- g. Can the boiler be installed in an attic or loft area (gas/LPG boilers only)? If this is considered for the actual installation, special requirements for access will apply.
- h. Is there a suitable outbuilding? Connection to services will be more difficult and frost protection necessary.

The validity of the assessment is also restricted to the chosen fuel for the new boiler. It is not acceptable, for example, to determine there are exceptional circumstances for installation of an oil boiler but then to install a non-condensing gas boiler.

5.10 Once the assessment is complete:

a If the completed form indicates there are exceptional circumstances, then in accordance with the guidance given in Section 6 of the SBSA Technical Handbook Domestic clause 6.3.12, it would be reasonable to install a non-condensing boiler (for the chosen fuel shown on the form). A condensing boiler is preferable and the householder should be invited to consider that alternative. A grant may be available that defrays some of the additional costs – contact the local energy advice centre, or the energy advice helpline of the gas or electricity supplier.

b If the completed form indicates there are not exceptional circumstances, reasonable provision is to install a condensing boiler.

c Whether a condensing or non-condensing boiler is fitted, it need not be in the position shown on the assessment form.

d The efficiency of the boiler to be installed, whether condensing or non-condensing, should not be lower than specified in the guidance given in Section 6 of the SBSA Technical Handbook Domestic clause 6.3.12.

5.11 Completed forms should be left with the householder in case they are required for building control compliance purposes and when the dwelling is sold.

5.12 For the full legal requirements, and guidance on compliance, refer to the SBSA Technical Handbook Domestic. This document gives guidance on how to deal with special cases such as historic buildings. The documents can be found on the SBSA website at www.sbsa.gov.uk

6 Flue terminal siting

It is necessary to site a condensing boiler flue terminal such that the plume of wet flue products does not impinge on or significantly affect the use of the householders' dwelling and also the neighbouring buildings.

- For the purposes of the Boiler Installation Assessment Procedure and the final boiler installation, the flue terminal to be sited in accordance with the requirements of Section 3 of the SBSA Domestic Technical Handbook. These requirements are specified for safety reasons and should always be followed.
- For the purposes of the Condensing Boiler Installation Assessment Procedure only, more stringent requirements apply (given below) to reduce the possibility of nuisance to neighbouring buildings.

Figures 1 to 4 illustrate these more stringent requirements.

Key differences are:

- Wall terminals should be sited a minimum 2.5m from a facing wall, fence, building, or the property boundary – compared with 0.6m.
- Terminals should not be sited under a car port roof.
- More restrictive requirements apply for wall terminals sited at low level. 'Low' means a terminal sited below 2.1m. This applies to:
 - public foot ways and frequently used access routes
 - car parking spaces less than 2.5m from terminal
 - patio (hard surface area).

Where a plume diverter terminal is used, the distance should be measured in the direction of flue products.

Where wall terminals are difficult to site, extended flue options shown in Appendix B should be considered.

Figure 1 Minimum distance from terminal

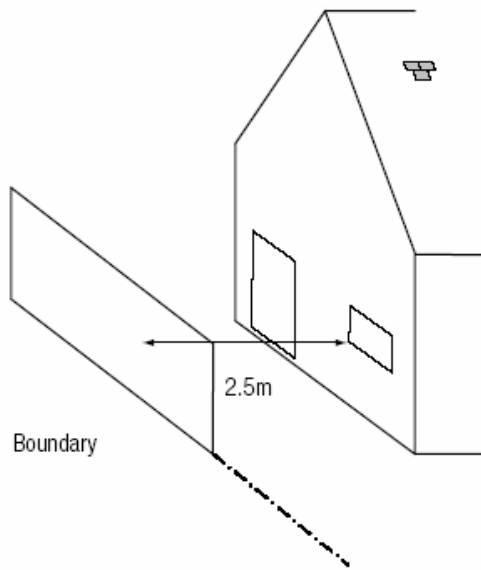


Figure 2 Not under a car port

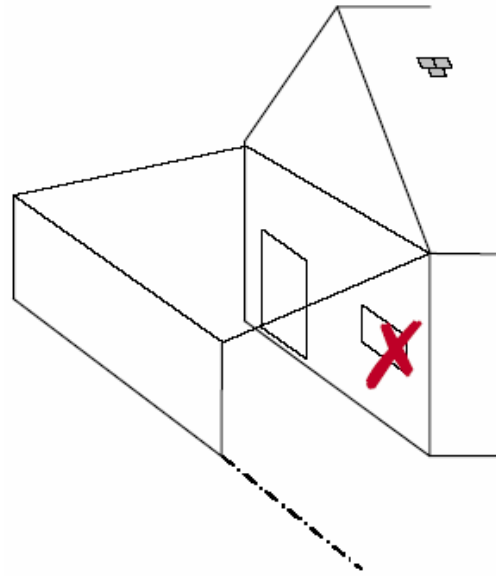


Figure 2 Avoid access routes and patios

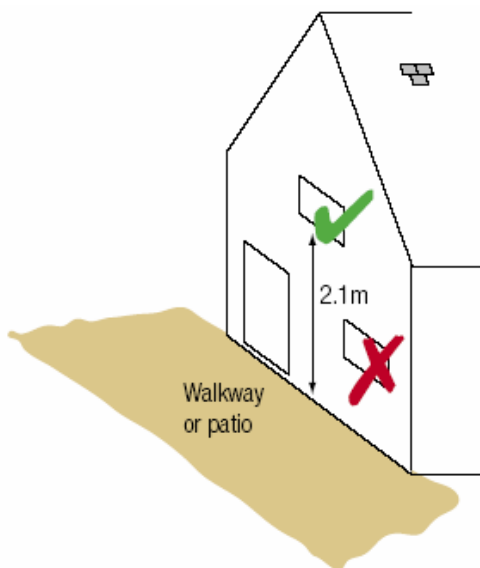
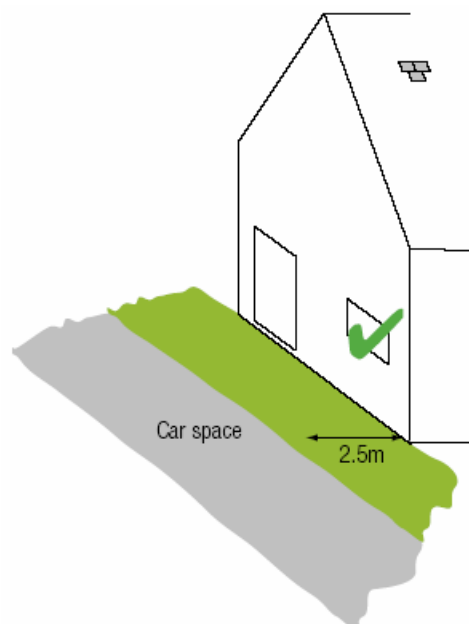


Figure 4 Minimum distance to car parking



7 Extended flue lengths

When considering extended flues, the following rules apply:

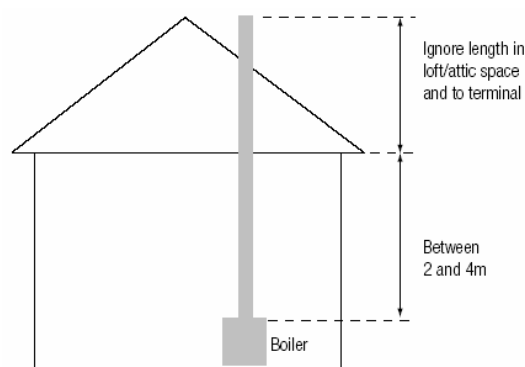
- When considering flue lengths, use the actual length NOT the equivalent length (which has an allowance for the resistance of bends and fittings).
- Distances are measured from the boiler flue outlet connection.
- Where separate flue and air ducts are used, the measurements apply to the flue duct.
- Extended flues cannot pass through another dwelling, building or fire compartment (refer Section 3).
- Extended flues should be longer than 2m to qualify as an extended flue.

- Extended flues that need to be longer than 4m need not be considered EXCEPT where the flue passes through a loft or attic space. In measuring the flue run, ignore any length that runs through the loft/attic space and from the roof to the flue terminal. See Figure 5.

Note that where an extended flue route is required, it should pass to the outside without going through:

- Another dwelling or building (in different ownership).
- A separate fire compartment: defined as a part of a building (which may contain one or more rooms, spaces or storeys) designed so as to prevent the spread of fire to or from another part of the same building.

Figure 5 Extended flues in loft/attic



8 Boiler Location

If an extended flue cannot be fitted to a boiler in the current boiler position, a solution is to move the new boiler to a location where the terminal siting restrictions are less restrictive. A change of boiler location is often necessary where a condensing boiler is to replace an open flue or back boiler, often mounted in an internal position away from an outside wall. For the assessment procedure, where a boiler is moved within the same room no additional points are applied. When it is moved to another room 350 points are added.

Examples:

- No points apply if a floor standing boiler in a kitchen is replaced with a wall hung condensing boiler in the kitchen.
- 350 points are added when a back boiler is replaced and the only feasible option is to install a condensing boiler in a different room.
- No points are given where the new boiler is not replacing an existing one.

It should be noted that when considering boiler locations for the purposes of the assessment procedure, obstacles such as furniture and fittings should be ignored. All boiler locations should be considered except those listed in Table 1.

Note that once the assessment is complete the boiler can be installed in any location to meet householder preferences provided it meets regulations and manufacturer's installation requirements.

9 Connection of Condensate Drain

All condensing boilers require connection to a drain to dispose of the condensate. Connections are typically to:

- internal stack pipe
- waste pipe
- external drain, or gully
- rainwater hopper that is part of a combined system ie sewer carries both rainwater and foul water
- purpose made soakaway.

Where no suitable drain point is available a soakaway can be considered. The soakaway should be located as close as possible to the boiler but clear of the building foundations (at least 1m and more if possible) and not in the vicinity of other services such as gas, electricity or water connections. The external pipe work should be kept to a minimum and not more than 3m in length. The pipe may be taken below or above the ground level. Any external condensate pipe work should be insulated to minimise the risk of freezing.

Appendix B shows detailed installation requirements for condensate drains including the use of condensate pumps and soakaways.

APPENDIX A.

CALCULATION AND DECLARATION FORM

This form may be used to show where there are exceptional circumstances which make it impractical or uneconomic to install a condensing boiler as recommended in the SBSA Domestic Technical Handbook

1. Full address of property assessed

Postcode

2. Dwelling type (choose option) Flat Mid-terraced End-terraced
Semi-detached Detached
3. Existing boiler fuel (choose option) None Natural gas LPG
Oil Solid fuel
4. New boiler fuel (choose option) Natural gas LPG Oil
5. Existing boiler type (choose option) Wall-mounted Back boiler
Floor-standing None
6. Existing boiler position (choose option) None Kitchen Utility room
Living room Bedroom
Garage Other
7. In the lowest cost option, is a new boiler positioned in a different room from the existing boiler position? Yes
 No
 Not applicable (no existing boiler)
8. If YES to 7, state new boiler position Kitchen Utility room Living room
Bedroom Garage Other
9. Determine points for property type and new boiler fuel from the table on the reverse of this form and insert in box A Box A
10. New boiler position in a different room from the existing boiler? If YES, insert 350 in Box B Box B
11. Extended flue (longer than 2m) necessary? If YES, insert 200 (for gas boiler) or 350 (for oil boiler) into Box C. Box C
12. Condensate pump or soak away necessary? If YES, insert 100 in Box D. Box D
13. **ASSESSMENT SCORE** (total of points in boxes A to D) Box T

14. Declaration (choose one option only)

Box X I declare that the boiler is being replaced under the original manufacturer's or installer's guarantee, within 3 years of the original installation date.

Box Y I declare that there are no feasible condensing boiler installation options (as defined by the assessment procedure) because:

Box Z I declare that I have considered all feasible boiler installation options in the property above, and the options defined in boxes A to D produces the lowest total T.

Signed

Date

Name (in capitals)

Status (agent or installer)

Notice to householder:

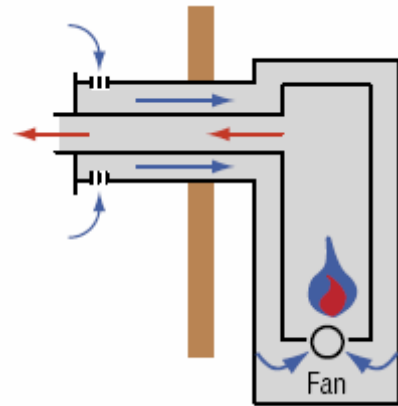
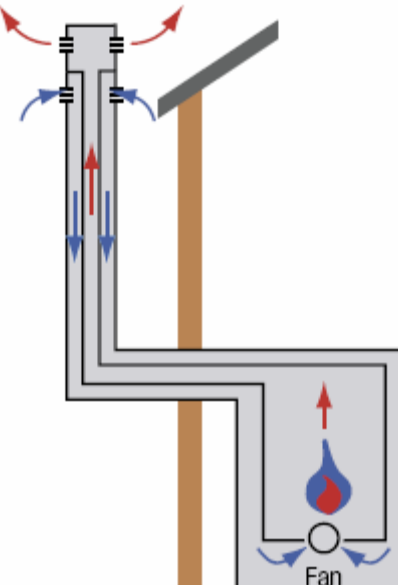
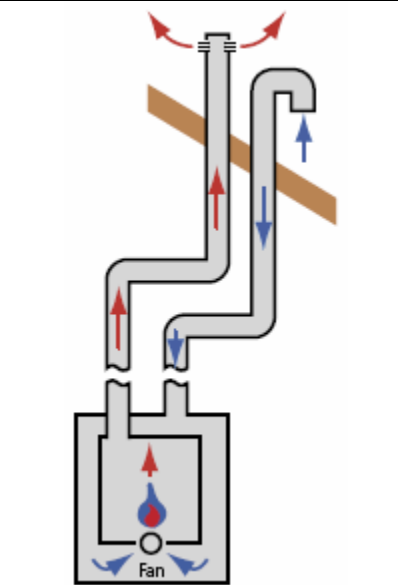
1. Where box X is ticked, a like-for-like replacement boiler is reasonably practicable.
2. Where box Y has been ticked or box Z has been ticked and the assessment score in section 13 exceeds 1000, this document may be used as evidence that installation of a condensing boiler has been assessed as impractical or uneconomic. Never less you may choose to exceed the Building regulations requirement if a suitable installation option can be found. Condensing boilers are more efficient and therefore save on fuel costs and cause less harm to the environment. You may be eligible for a grant that defrays some of the additional costs – contact your local energy efficiency advice centre, or the energy efficiency helpline of your gas or electricity supplier (phone number on back of bill)
3. You should retain this form. It may be required when you sell your home.

Points for Property type and fuel

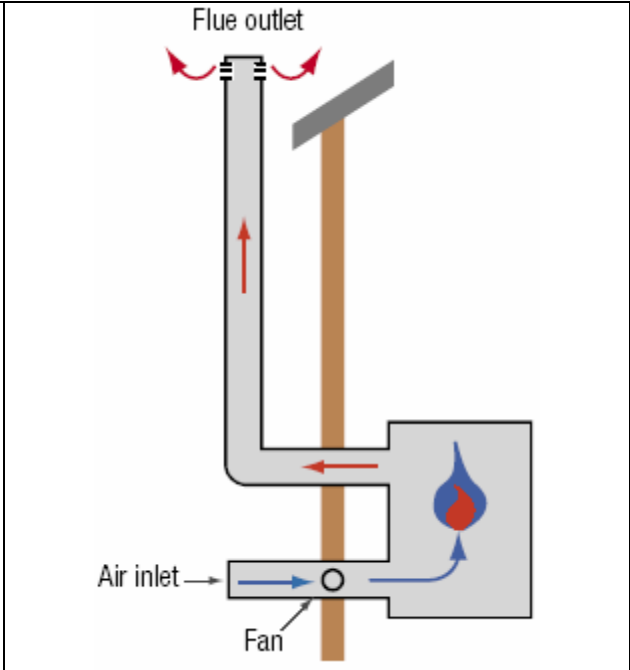
Building Type	Natural Gas	LPG	Oil
Flat	710	660	830
Mid-terrace	640	580	790
Others (end-terrace, semi-detached, or detached)	590	520	760

Appendix B: Typical flue types

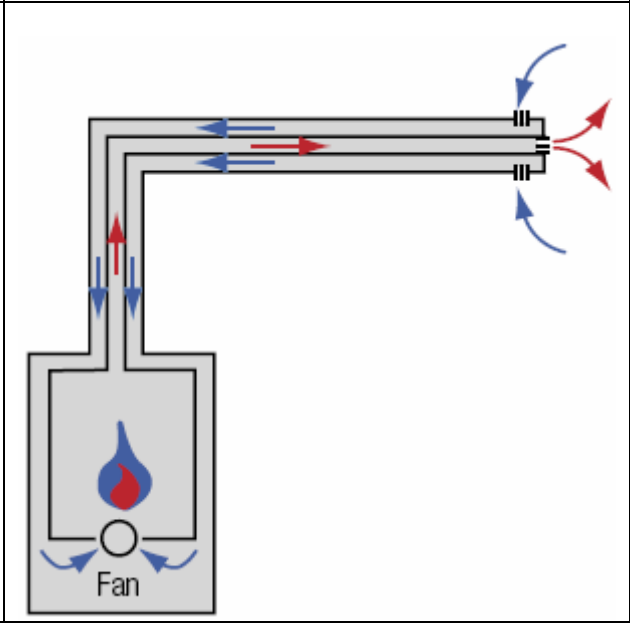
The following flue options are typical of what is available but other flue options may be considered provided that they meet regulations.

<p>Straight through-the-wall terminal A normal balanced flue terminal mounted directly behind a boiler on an outside wall.</p>	 A schematic diagram showing a boiler with a fan at the bottom. Two horizontal pipes pass through a vertical wall. The upper pipe has a red arrow pointing left towards the boiler and a blue arrow pointing right away from the boiler. The lower pipe has a blue arrow pointing left towards the boiler and a red arrow pointing right away from the boiler. Blue arrows at the wall indicate air being drawn in from the outside and exhausted to the outside.
<p>External concentric vertical flue The air inlet and flue outlet are adjacent and the terminal would normally be mounted at high level. Flue is mounted externally to the building.</p>	 A schematic diagram showing a boiler with a fan at the bottom. A vertical pipe runs up the side of the building. The pipe has a red arrow pointing up (flue) and a blue arrow pointing down (air inlet). At the top, the pipe is concentric, with the red arrow pointing outwards and the blue arrow pointing inwards. Red arrows at the top indicate air being drawn in from the outside and exhausted to the outside.
<p>Twin-pipe extended flue The air inlet and flue outlet can be adjacent or separated but the flue outlet would normally be mounted at high level. The air and flue pipes can have separate terminals or meet with a concentric terminal.</p>	 A schematic diagram showing a boiler with a fan at the bottom. Two separate vertical pipes run up the side of the building. The left pipe has a red arrow pointing up (flue) and a blue arrow pointing down (air inlet). The right pipe has a red arrow pointing up (flue) and a blue arrow pointing down (air inlet). At the top, the pipes are separated, with red arrows pointing outwards and blue arrows pointing inwards. Red arrows at the top indicate air being drawn in from the outside and exhausted to the outside.

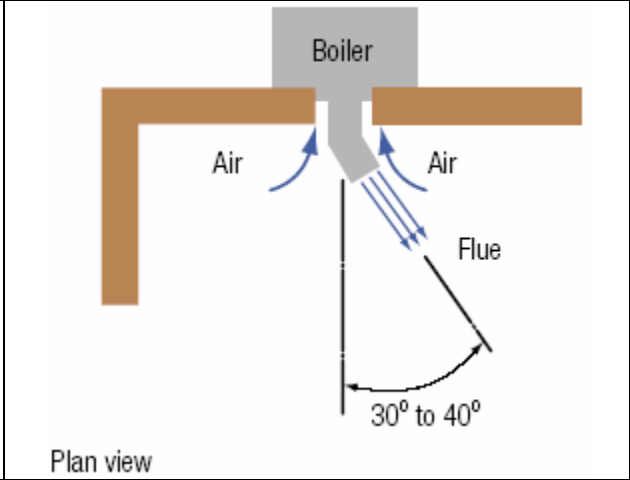
Non-balanced extended flue A flue system used with some gas boilers where the air intake and the flue outlets can be positioned in different wind pressure zones, described as type 'C5' in boiler standard BS EN 483. Separate ducts are used for air intake and flue products. Typically the flue products would discharge at a higher level than the air inlet position. This option is only available for some boilers, which require special certification for use in this way. Also specially designed flue components should be used which have been approved by the boiler manufacturer.



Extended horizontal flue The flue and air pipes either concentric or twin are extended horizontally from the boiler to the external wall. Whilst in many cases this would be connected to a wall terminal, it could also connect to an external concentric vertical flue.



Plume diverter terminal A wall terminal that directs all the flue products at an angle. The terminal will usually direct the products at an angle greater than 30°. It is particularly useful where a terminal needs to be sited in an internal corner. A plume diverter terminal can usually be sited closer to the corner than a standard wall terminal.



Appendix C: Condensate drain connections

CONDENSATE DRAIN POINTS

During normal operation of the boiler condensate will be formed in the heat exchanger and flue. The condensate formed depends on many factors, although over four litres a day is not untypical. This condensate is acidic, with a pH of between 3 and 6, and should be disposed of correctly.

Suitable drain points:

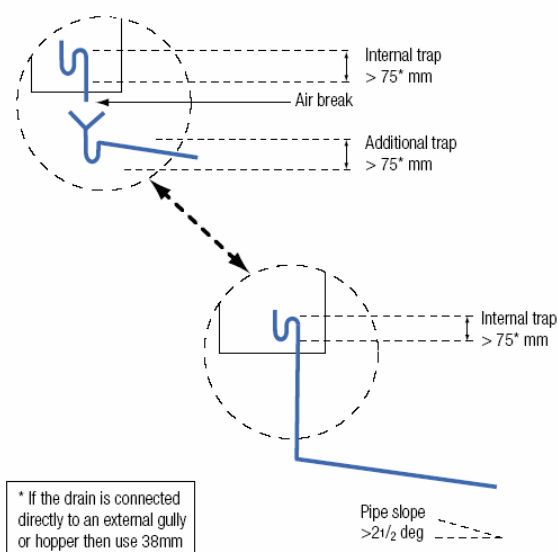
- internal stack pipe
- waste pipe
- external drain, or gully
- rainwater hopper that is part of a combined system, ie sewer carries both rainwater and foul water
- purpose made soakaway

Where possible connections should always be made to internal drain points (stack pipe or waste pipe). External termination points are more likely to become blocked by, for example, freezing, leaves or general debris.

CONDENSATE DRAIN PIPE INSTALLATION

Condensate traps The guidance within the SBSA Technical Handbook recommends a trap in the pipe where it is terminated directly to the outside or before it connects to another waste pipe. If the drain pipe is taken directly to a gully or rainwater hopper, a water seal of no less than 38mm is required. When connected to another waste pipe the water seal should be at least 75mm, to prevent foul smells entering the dwelling. Many boilers include a trap within the boiler to prevent combustion products entering the drain; however, this may not have a sufficient seal depth to meet the building regulations. Unless the manufacturer's instructions state otherwise an additional trap of either 38mm or 75mm, depending on the intended connection, will be required with an air break between the traps (see Figure C1).

Figure C1 Condensate trap alternatives



Condensate pipe length should be kept as short as possible – externally run condensate drainpipes should be limited to 3m to reduce the risk of freezing. When an appliance is to be installed in an unheated location such as a garage, all condensate drains should be considered as external.

Condensate pipe fall at least 2½ deg away from the boiler.

Bends should be kept to a minimum. Similarly the number of fittings or joints external to the dwelling needs to be minimised in order to reduce the risk of condensate being trapped.

Fixing Should be adequate to prevent sagging. A maximum spacing of 0.5m for horizontal and 1.0m for vertical sections should be adequate.

Pipe sizes Follow boiler manufacturer's instructions. If there are no guidelines then a minimum nominal diameter of 22mm should be used when run internally in a dwelling and a larger diameter is recommended for externally run pipe to reduce the risk of freezing (at least 32mm nominal diameter).

Pipe material The drainpipe material should be resistant to acid as the condensate is slightly acidic. Suitable materials for the condensate drainage pipe are plastics as used for standard wastewater plumbing systems or cistern overflow pipes (copper and mild steel pipes and fittings should not be used).

Condensate siphons Many boilers have a siphon fitted as part of the condensate trap arrangement. This provides intermittent discharge of the condensate which will significantly reduce the risk of condensate freezing where part of the pipework is run externally. If an appliance does not include a siphon then external pipework is best avoided to reduce the risk of freezing. If this is not possible then external pipework should have a minimum nominal diameter of 32mm.

Condensate pumps Where a boiler is sited in basement or a drain point cannot be reached by gravity a condensate pump can be considered. Suitable units are now becoming available. Pump manufacturer's instructions should always be followed.

CONDENSATE DRAIN TERMINATION

Connection to internal stack (preferred) The stack to which the condensate pipe is to be connected should be in a material that is resistant to condensate, such as the plastic materials suggested for condensate pipes.

Check whether the boiler incorporates a trap with a minimum condensate seal of 75mm. If this trap has a seal of less than 75mm, then an additional trap of 75mm should be fitted. In this case a visible air break is necessary between the boiler and the additional trap. (Figure C2).

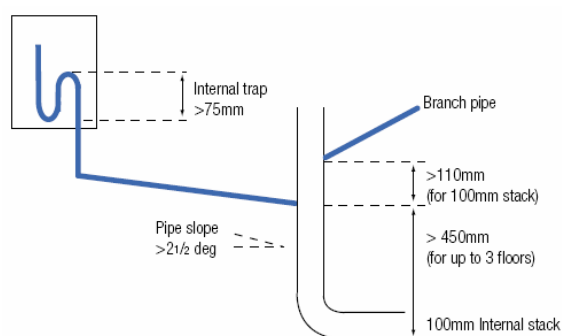
The condensate drainpipe should not discharge into the stack lower than 450mm above the invert of the tail of the bend at the foot of the stack for single dwellings of up to 3 storeys. If this is not visible then the height should be measured from the lowest straight section of stack that is visible. For multi storey buildings this distance should be increased.

The connection to the stack should not be made in a way that could cause cross flow into any other branch pipe, or from that branch pipe into the condensate drainpipe. This can be achieved by maintaining an offset between branch pipes of at least 110mm on a 100mm diameter stack and 250mm on a 150mm diameter stack.

Connection to external stack If the termination is to be to an external stack then in addition to the requirements for connecting to an internal stack, extra care is necessary in order to reduce the risk of the drain becoming blocked due to the condensate freezing. The length of pipe external to the dwelling should be kept as short as possible and not more than 3m. Any trap in the drainpipe should be fitted within the dwelling. In exposed locations the pipe should be protected with waterproof pipe insulation.

Connection to internal waste pipe Termination can be made via an internal discharge branch, such as connections to a kitchen sink, washing machine or dishwasher drain. This is likely to be the most convenient method of connection and hence most frequently used.

Figure C2 Condensate connection to internal stack



It can be connected upstream or downstream of sink waste trap (or other machine connection). If practical it should be connected to the upper part of the pipe wall. If it is connected upstream of sink waste trap, then an air break is necessary between the sink trap and the boiler trap. This is usually provided by the sink waste pipe itself as long as the sink has an integral overflow. (Figure C3).

If the drain is connected downstream of the sink waste trap, and the boiler does not have an integral trap with a seal of at least 75mm, then an additional trap of at least 75mm should be fitted. An air break should be included between the traps. (Figure C4).

The trap and airbreak should be above the level of the sink to prevent flow from the sink into boiler or airbreak.

Connection to washing machine drains are preferable to a kitchen sink as this reduces the amount of solid waste and fats in the drain branch that could cause blockage or restriction at the point where the condensate drain is connected.

Connection to external drain point

If the condensate drain cannot be connected to an internal drain then direct connection to an external gully or rainwater hopper can be considered.

A rainwater hopper should be connected to a combined system ie sewer carries both rainwater and foul water. The open end of the pipe should be terminated in the gully or rainwater hopper below the grid level but above the water level. Condensate should not be disposed of in 'grey water' systems ie systems that reuse water (except water from toilets) used in the home.

Figure C3 Connection to internal sink waste (upstream of sink trap)

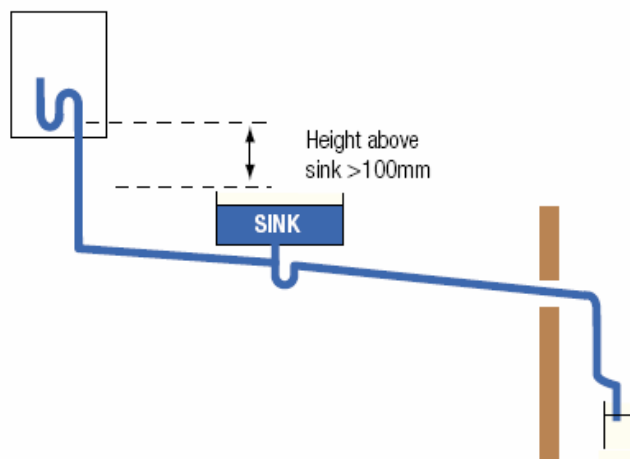


Figure C4 Connection to internal sink waste (downstream of sink trap)

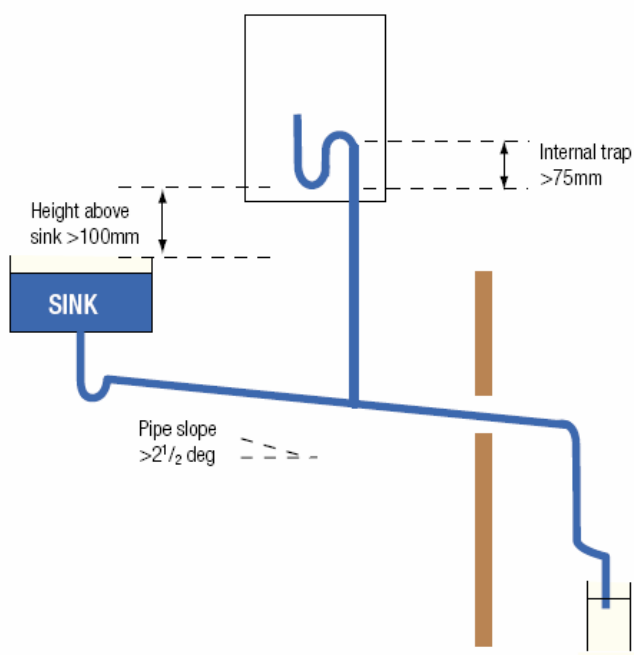
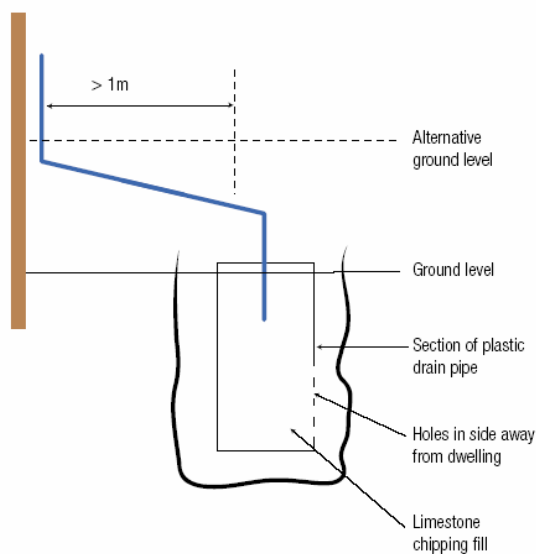


Figure C5 Suggestion for condensate soakaway drain



Connection to soakaway If none of the previous solutions are possible then a purpose made soakaway can be used. The soakaway should be located as close as possible to the boiler but clear of the building foundations and not in the vicinity of other services such as gas, electricity or water connections. The position and presence of a soakaway should be taken into account when carrying out a risk assessment for installation of an oil storage tank. The external pipework should be kept to a minimum and not more than 3m in length. The pipe may be taken below or above the ground level.

An example of a suitable design of soakaway is shown in Figure C5. The necessary size for a soakaway depends to a large extent on the soil conditions although unlike a rainwater soakaway the soil does not have to accommodate large water volumes over short periods. A size approximately 200mm in diameter and 400mm deep, filled with limestone chippings, will normally be sufficient.

Appendix D: Assessment examples

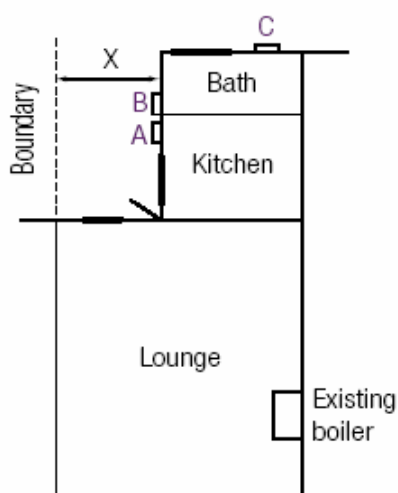
D1 Victorian mid terrace house with kitchen in rear extension (no passage). Additional single story ground floor bathroom extension. Replacement required for existing open flue gas back boiler in ground floor lounge. It is assumed that extended flue options are >2m long. Two separate cases are shown, where the distance of the terminal to the neighbouring boundary (X) is either 1.5m or 2.5m.

OPTION	DESCRIPTION	Points	
		X=1.5	X=2.5
A	Move boiler to kitchen – will require vertical extended flue over 2m where distance of terminal to neighbouring boundary is only 1.5m. Gravity drain possible.	1190	990
B	Move boiler to bathroom – will require vertical extended flue over 2m where distance of terminal to neighbouring boundary is only 1.5m. Gravity drain possible.	1190	990
C	Move boiler to bathroom – wall terminal would be directed across patio. Requires vertical flue over 2m.	1190	1190
D	Move boiler to bedroom wall – will require vertical extended flue over 2m where distance of terminal to boundary is only 1.5m. Insufficient wall space for wall terminal on end wall. Gravity drain possible.	1190	990
E	Move boiler to bedroom airing cupboard – will require vertical extended flue over 2m as no outside wall. Gravity drain possible.	1190	1190

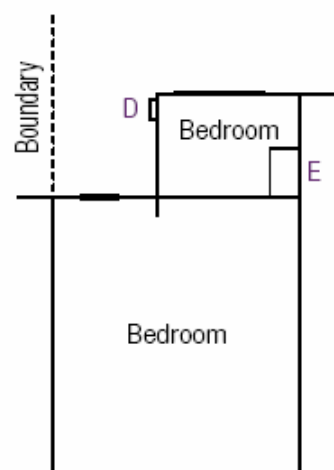
Where X = 1.5m a non condensing boiler may be consider to meet the guidance given in the SBSA Technical Handbook Domestic.

Where X = 2.5m or more a condensing boiler should be installed.

Note for OPTION C – if there were no patio adjacent to the bathroom, and the garden extended at least 2.5m, a wall terminal could be specified. Points = 640 + 350 = 990. A condensing boiler should be installed.



Ground floor plan



First floor plan

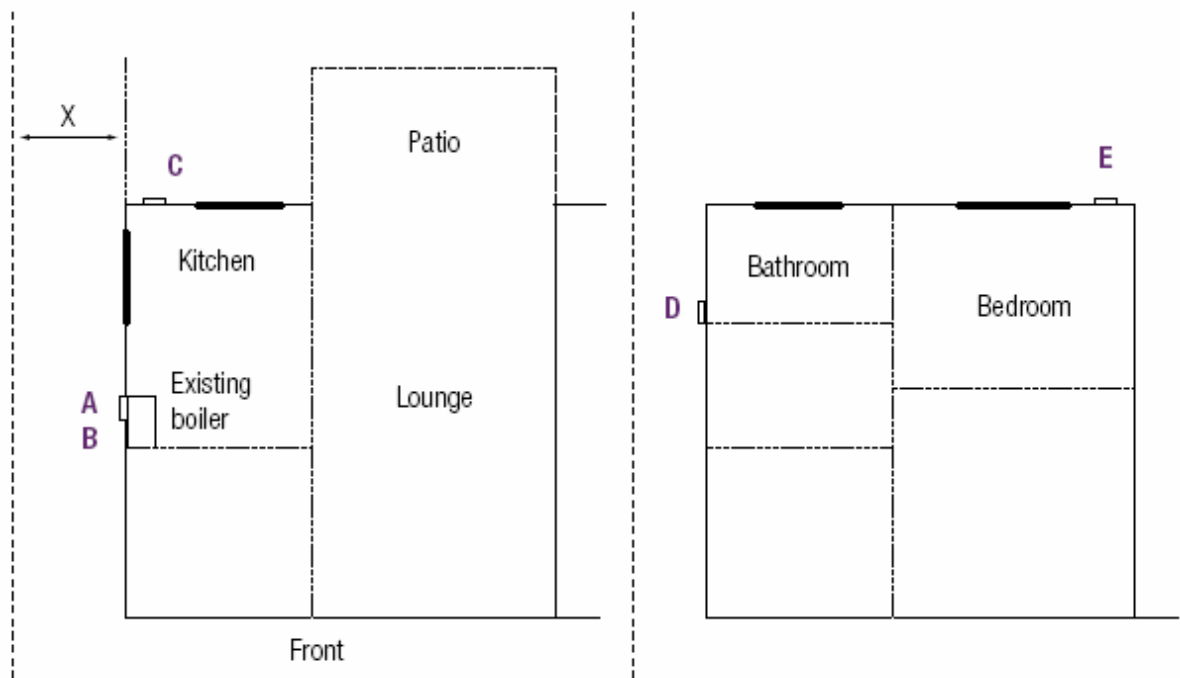
D2 1960s semi-detached house with rear patio adjacent to lounge diner

Replacement required for existing wall-hung gas boiler. Side passageway (X) = 1.5m. No garage on plot. It is assumed that extended flue options are >2m long.

OPTION	DESCRIPTION	Points
A	Replace boiler in same position. Extend flue to rear wall (more than 2m). No existing terminal position since distance of terminal to neighbouring boundary is only 1.5m. Gravity drain possible.	790
B	Replace boiler in same position. Fit vertical external extended flue. Gravity drain possible.	790
C	Move boiler to end kitchen wall. Gravity drain possible.	590
D	Move boiler to bathroom. Wall termination on end wall not possible due to window size. Use vertical balanced flue. Gravity drain possible.	1140
E	Move boiler to bedroom. Wall terminal on rear wall. Gravity drain possible	940

For natural gas boiler – Lowest points option is 590 points. A condensing boiler should be installed

Note for OPTION D – if distance to neighbouring boundary (X) were 2.5m or more (rather than 1.5m), a wall terminal could be specified. Points = 590 + 350 = 940. A condensing boiler should be installed.



Ground floor plan

First floor plan

