



Comhshaol, Oidhreacht agus Rialtas Áitiúil  
Environment, Heritage and Local Government



## **Heating and Domestic Hot Water Systems for dwellings – Achieving compliance with Part L 2008**

### **Appendix: Guide to the Condensing Boiler Installation Assessment Procedure for Existing Dwellings**



CONTENTS	PAGE
1. INTRODUCTION	1
2. EXISTING COMMITMENTS	1
3. POSSIBLE INSTALLATION DIFFICULTIES	1
4. OUTLINE OF THE ASSESSMENT PROCEDURE	2
5. PURPOSE OF THE ASSESSMENT PROCEDURE	3
6. HOW TO CARRY OUT THE ASSESSMENT	3
7. FLUE TERMINAL SITING	7
8. EXTENDED FLUE LENGTHS	7
9. BOILER LOCATION	8
10. CONNECTION OF CONDENSATE DRAIN	8
11. ASSESSMENT FORM	9
12. TYPICAL FLUE TYPES	10
13. CONDENSATE DRAIN CONNECTIONS	12

# 1. Introduction

From 31<sup>st</sup> March 2008, all oil and gas fired boilers installed as replacements in existing dwellings must meet a minimum seasonal efficiency of 86%, where practicable. This requirement was introduced as part of the revision of the Building Regulations Part L “Conservation of Fuel and Energy” adopted in December 2007. Currently the only boilers achieving this performance level are condensing boilers.

This revision of the Building Regulations imposed no requirement in relation to solid fuel boilers.

This Guide contains the detailed guidance referred to in Paragraph 2.2 of Technical Guidance Document L – Dwellings to assess specific situations where the provision of condensing boilers is not practicable. It will be included as an Appendix in the document “Heating and Domestic Hot Water Systems for dwellings – Achieving compliance with Part L”, when published. The Condensing Boiler Installation Assessment Procedure is to be used in cases where it is expected that the installation of a condensing boiler as a replacement boiler in an existing dwelling may not be practicable. “Practicable” is taken to mean “capable of accomplishment after taking into consideration the existing state of technology and economic feasibility for the facility involved”.

This Guide has been written to help heating installers carry out a condensing boiler installation assessment, using the abovementioned procedure.

Throughout this Guide the term “householder” in the case of non-owner occupied dwellings shall be understood to connote the owner of the dwelling or their agent.

**This Guide must not be interpreted as a set of regulations or restrictions on installation practice, nor does it prevail over relevant installation standards or more specific instructions given by boiler manufacturers. The completed boiler installation however must be installed in accordance with Part J of the Building Regulations.**

## 2. Existing commitments

Installation of a condensing boiler is deemed not practicable where a prior contractual commitment in relation to the installation of a boiler was entered into prior to 31<sup>st</sup> March 2008.

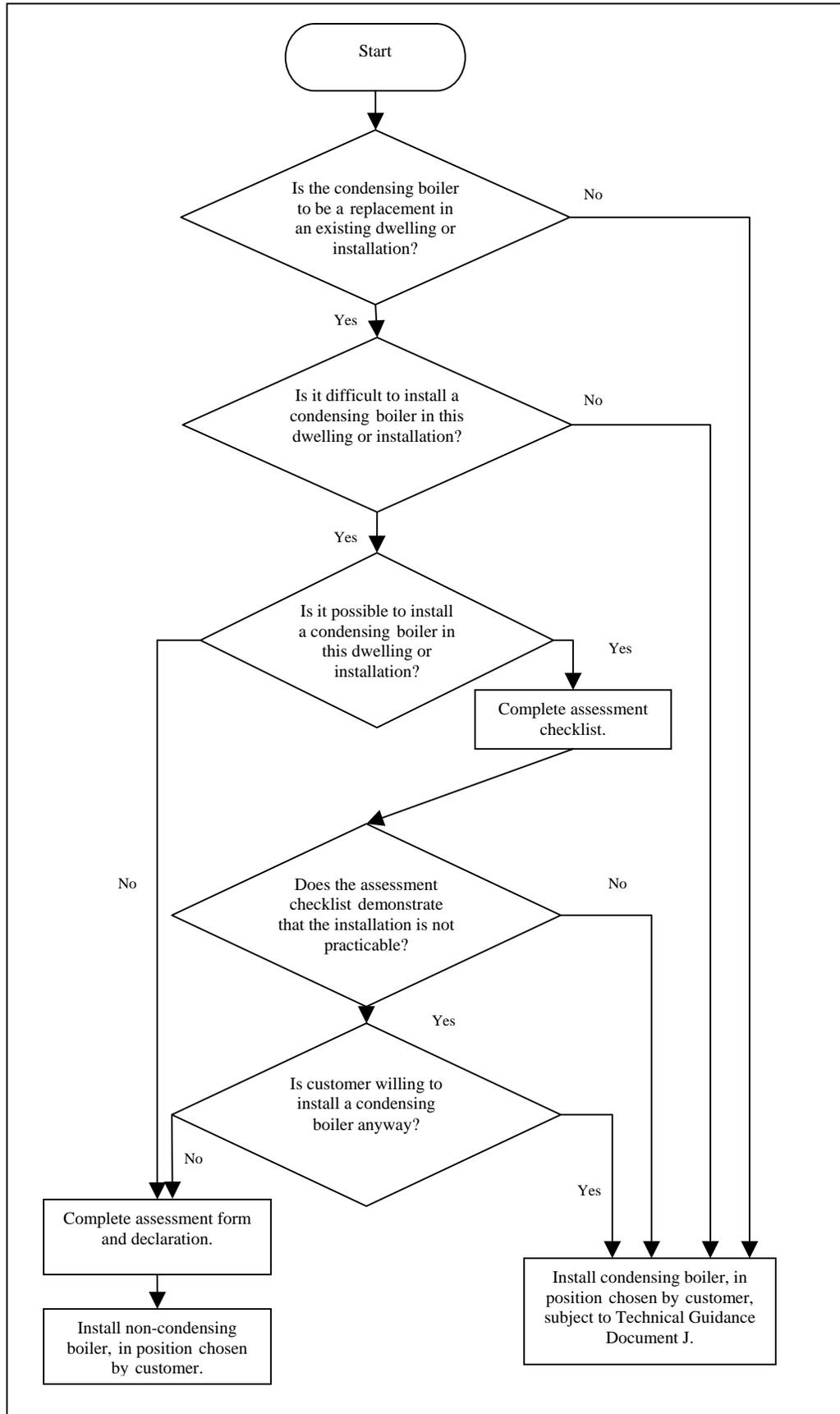
## 3. Possible installation difficulties

It is sometimes more difficult to install a condensing boiler as a replacement to 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 neighboring property, or to 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 must not be shared with any non-condensing appliance.
- A liquid condensate forms within the boiler, and must be discharged to a suitable drain or soak away.

There are a number of methods to overcome these difficulties, and the assessment procedure and associated guidance is based on estimation of the practicability of these methods.

#### 4. Outline of the assessment procedure



## 5. 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 would be accepted as reasonable provision in the circumstances.

In this case a correctly completed assessment form (see Sect. 11) is used to show whether or not use of a condensing boiler should be considered not to be practicable. The form is also downloadable from the Department of Environment Heritage and Local Government website at [www.environ.ie](http://www.environ.ie). It is not necessary to complete the form if a condensing boiler with a seasonal efficiency of 86% or greater is to be fitted.

The assessment gives a YES/NO answer to whether it is impracticable to fit a condensing boiler in a particular building for a specified fuel (natural gas, LPG, or oil). If the answer is 'NO', then a condensing boiler must be fitted unless some other way can be found to demonstrate that such a course of action would not be practicable in the particular circumstances. 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. The complete boiler installation should however be installed in accordance with Part J of the Building Regulations.

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. In all cases the installation of a boiler must be undertaken by a competent person, observing regulations and manufacturer's instructions.

## 6. How to carry out the assessment

- 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. The householder should specify the fuel to be used (natural gas, LPG, or oil). The task is to find the most practicable option for installing a condensing boiler, taking into account the position of the existing boiler if there is one.
- Some boiler positions and flue terminal positions are excluded from the assessment, as shown in Table 1. 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.
- 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 subject to compliance with Part J of the Building Regulations.
- 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 for structural reasons (e.g. pre-stressed or 'glass' wall).
- 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.

- The flue terminal position must meet the requirements given in Building Regulations Part J and the specifications referred to below.
- The assessment form is completed for the installation option that gives the most practicable option. It is necessary to show that all feasible options have been considered, and that the form shows the best scoring option. Any additional forms used to assess other options should be attached when the final, signed form is made available to the customer.
- When the assessment score total exceeds or equals 3, this is evidence that installation of a condensing boiler is not practicable and it is reasonable to install a non-condensing boiler instead of a condensing boiler. The validity of the assessment is also restricted to the chosen fuel for the new boiler. It is not acceptable, for example, to determine that it is not practicable to install an oil boiler but then to install a non-condensing gas boiler.
- Once the assessment is complete:
  - If the completed form indicates that it is not practicable to install a condensing boiler (for the chosen fuel shown on the form), it is open to the client to choose either a condensing or non-condensing boiler. However, since a condensing boiler is preferable, the householder should be invited to consider that alternative. Where a non-condensing boiler is chosen, the householder should be encouraged to choose an efficient boiler.
  - If the completed form indicates that it is practicable, a condensing boiler should be installed.
- Whether a condensing or non-condensing boiler is fitted, it need not be in the position shown on the assessment form.
- Completed forms should be left with the householder in case they are required for building control compliance purposes or when the dwelling is sold.
- For the full legal requirements, and guidance on compliance, refer to the Building Regulations Part L, and to the current edition of Technical Guidance Document L. These also give advice on how to deal with special cases such as historic buildings.

If an existing boiler is being replaced, see Checklist 1.

If there is no existing boiler, see Checklist 2.

**Table 1 Installation options to be EXCLUDED from the assessment**

Flue options for new boiler NOT to be considered	Comment
Flue and terminal positions that do not comply with Technical Guidance Document J of the Building Regulations.	All installations must meet statutory requirements.
A shared flue, unless specially designed to be shared by condensing boilers.	Existing shared ducts are usually unsuitable for connection to condensing boilers.
A flue passing through a wall or floor that must 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 8.
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.

<b>Boiler positions NOT to be considered</b>		<b>Comment</b>
Gas boilers:	where the boiler or extended internal flue is in a: <ul style="list-style-type: none"> <li>• lounge</li> <li>• lounge/dining room</li> <li>• principal living room that does not include a kitchen area.</li> </ul>	It is acceptable to install a gas boiler in any room other than the principal living room. See section 9.
LPG boilers:	where the boiler or extended internal flue is in a: <ul style="list-style-type: none"> <li>• lounge</li> <li>• lounge/dining room</li> <li>• principal living room that does not include a kitchen area</li> <li>• cellar or basement.</li> </ul>	
Oil boilers:	the only positions that ARE to be considered are: <ul style="list-style-type: none"> <li>• a kitchen,</li> <li>• a kitchen/dining room,</li> <li>• a utility room,</li> <li>• a purpose-made boiler room,</li> </ul> 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 9.

## 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 it will generally not be possible to connect the new boiler to the existing flue system, and other flue options must be considered. When considering other flue options, particularly in flats, wall construction may prohibit penetration (e.g. 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 (i.e. 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? ? If this is considered for the actual installation, 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 (e.g. pre stressed walls).
- f. Can an internal boiler position (i.e. 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? If this is considered for the actual installation, connection to services will be more difficult and frost protection is necessary.

## 7. 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 dwelling and also the neighbouring buildings.

- For the purposes of the Condensing Boiler Installation Assessment Procedure the flue terminal should be sited so as to satisfy the guidance given in Technical Guidance Document J to the Building Regulations.
- The installation should also be installed in accordance with I.S.813:2002 for gas installations and in accordance with BS 5410-1:1997 for oil burning appliances up to 45 kW.
- The position of the terminal should be such as to minimise the risk of nuisance from plumbing to adjacent properties or the re-entry of combustion products through openable windows, vents etc. of opposite or adjacent properties.

## 8. 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 are to be installed in accordance with Technical Guidance Document B.
- Extended flues must 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.
- Where an extended flue route is required it must pass to the outside without going through another dwelling or building (in different ownership).

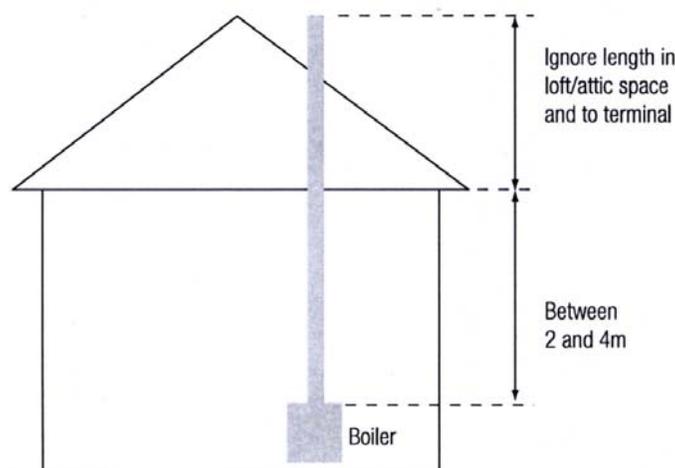


Figure 1. Extended flues in loft/attic

## 9. 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 consideration need be taken. When it is moved to another room 1 point is added in the assessment form.

Examples:

- No points apply if a floor standing boiler in a kitchen is replaced with a wall hung condensing boiler in the same kitchen.
- 1 point is added to the assessment total when a back boiler is replaced and the only feasible option is to install a condensing boiler in a different room.

It should be noted that when considering boiler locations for the purposes of the assessment procedure, obstacles such as furniture and fittings must 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.

## 10. 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 i.e. 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 must 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 must be insulated to minimise the risk of freezing.

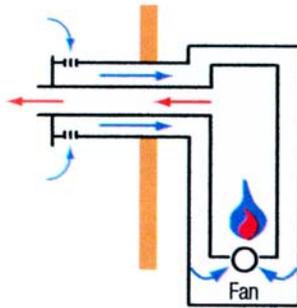
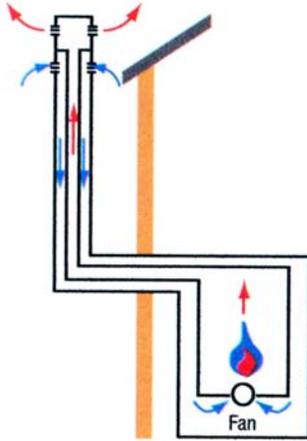
## 11. Assessment Form

<b>Calculation and Declaration Form</b>						
This form may be used to show that it is not practicable to install a condensing boiler for the purposes of complying with Part L of the Building Regulations.						
1	Address of property to be assessed:					
2	Dwelling type (tick one only)	Flat <input type="checkbox"/>	Mid-Terrc. <input type="checkbox"/>	End Terrc. <input type="checkbox"/>	Semi-D. <input type="checkbox"/>	Detached <input type="checkbox"/>
3	Existing boiler fuel (tick one only)	Ntrl Gas <input type="checkbox"/>	LPG. <input type="checkbox"/>	Oil. <input type="checkbox"/>	Solid fuel <input type="checkbox"/>	None <input type="checkbox"/>
4	New boiler fuel (tick one only)	Ntrl Gas <input type="checkbox"/>		LPG. <input type="checkbox"/>	Oil. <input type="checkbox"/>	
5	Existing boiler type (tick one only)	Wall Mounted <input type="checkbox"/>		Back Boiler. <input type="checkbox"/>	Floor standing. <input type="checkbox"/>	
6	Existing boiler position (tick one only)	Kitchen <input type="checkbox"/>	Utility Room. <input type="checkbox"/>	Garage. <input type="checkbox"/>	Living room. <input type="checkbox"/>	Bedroom <input type="checkbox"/> Other <input type="checkbox"/>
7	Is the most practical option to install the boiler in another room?	Yes <input type="checkbox"/>		No. <input type="checkbox"/>	N/A (no existing boiler) <input type="checkbox"/>	
8	If Yes to section 7, state new boiler position	Kitchen <input type="checkbox"/>	Utility Room. <input type="checkbox"/>	Garage. <input type="checkbox"/>	Living room. <input type="checkbox"/>	Bedroom <input type="checkbox"/> Other <input type="checkbox"/>
<b>Assessment of the practicality of installing a condensing boiler</b>						Yes =1, No = 0
9	Is the dwelling a flat or mid-terraced building?					
10	If a condensing boiler can be installed, but only in a different position from the existing boiler, is this position in another room (see table 1)?					
11	For the chosen boiler position, is an extended flue required (>2m)? <i>Note: see table 1 for flue options not to be considered.</i>					
12	Will a condensate pump or soakaway be necessary?					
13	<b>Total Assessment Score:</b>					
<i>If score is 3 or greater then the installation of a condensing boiler may be deemed not to be practicable.</i>						

14	<b>Declaration Form</b> (tick one box only)	
Option A <input type="checkbox"/>	I declare that the boiler is being replaced under manufacture's or installers guarantee, within three years of the original installation date, OR	
Option B <input type="checkbox"/>	I declare that there are no feasible condensing boiler installation options (as defined by the assessment procedure) because:	
Option C <input type="checkbox"/>	I declare that I have considered all feasible boiler installation options in the property above, and that the option defined in sections 9 to 12 of this form produces the lowest total score.	
Signed: _____		Date: _____
Name (in capitals): _____		Status (agent or installer): _____
<b>Notice to the householder.</b>		
Where option <b>A</b> has been ticked, a like-for-like replacement boiler is reasonable.		
Where option <b>B</b> has been ticked OR option <b>C</b> has been ticked AND the total assessment score in section 13 is 3 or greater, this document may be used as evidence that installation of a condensing boiler has been assessed as not practicable. Nevertheless 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 should retain this form. It may be required when you sell your home.		

## 12. Typical flue types

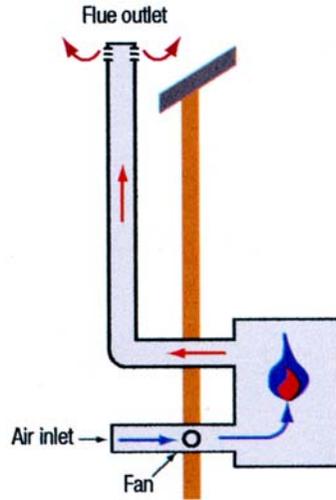
The following flue options are typical of what is available but other flue options may be considered provided that they meet regulations.

<p><b>Straight through-the-wall terminal</b></p> <p>A normal balanced flue terminal mounted directly behind a boiler on an outside wall.</p>	
<p><b>External concentric vertical flue</b></p> <p>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>	
<p><b>Twin-pipe extended flue</b></p> <p>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>	

**Non-balanced extended flue**

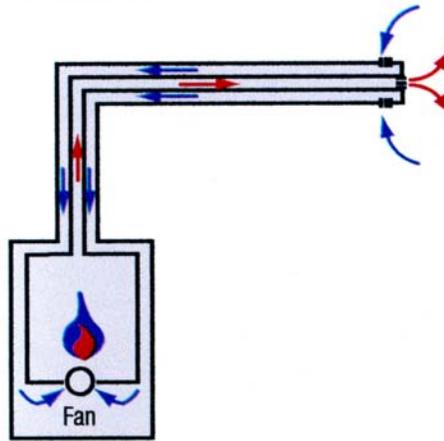
A flue system used with some gas boilers where the air intake and the flue outlets can be positioned in different wind pressure zones, described as type 'C5' in boiler standard IS EN 483. Separate ducts are used for air intake and flue products.

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 must be used which have been approved by the boiler manufacturer.



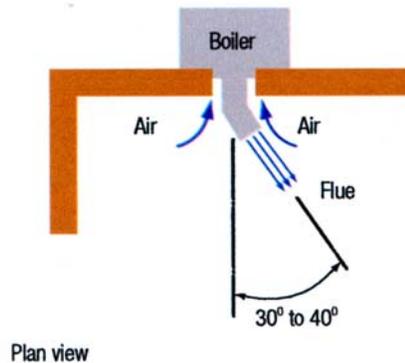
**Extended horizontal flue**

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.



## 13. 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 slightly acidic, with a pH of between 3 and 6, similar to tomato juice, and must be disposed of correctly.

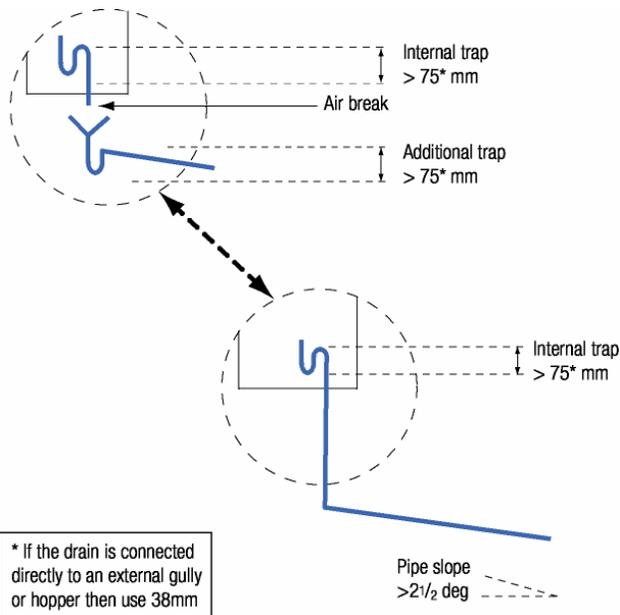
Suitable drain points:

- 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.

Figure 2 Condensate trap alternatives



### CONDENSATE DRAIN PIPE INSTALLATION

**Condensate traps** Building regulations require a trap in the pipe whether 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 must 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 2).

**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 2<sup>1</sup>/<sub>2</sub> 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** Must 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 must 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 must always be followed.

## CONDENSATE DRAIN TERMINATION

**Connection to internal stack (preferred)** The stack to which the condensate pipe is to be connected must 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 must be fitted. In this case a visible air break is necessary between the boiler and the additional trap. (Figure 3).

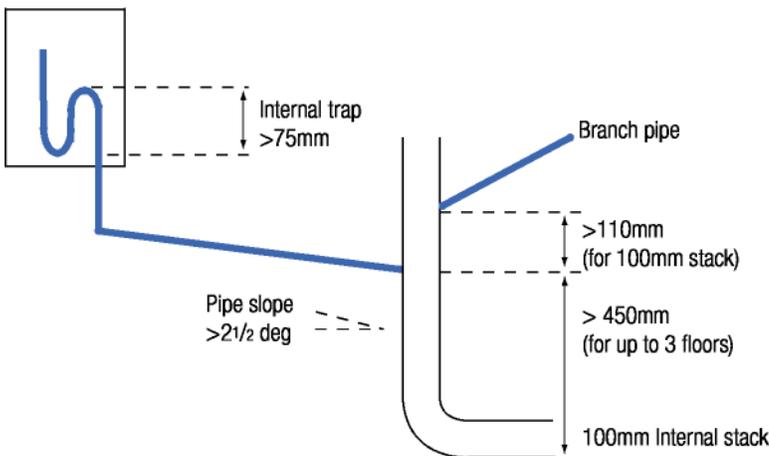
The condensate drainpipe should not discharge into the stack lower than 450mm above the invert of the tail of the bend at the foot of the stack for single dwellings of up to 3 storeys. If this is not visible then the height should be measured from the lowest straight section of stack that is visible. 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 must 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 3 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 4).

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 must be fitted. An air break must be included between the traps. (Figure 5).

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 must 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 4 Connection to internal sink waste (upstream of sink trap)

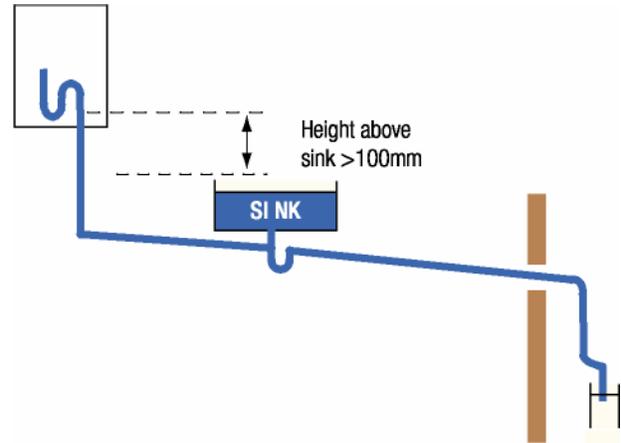
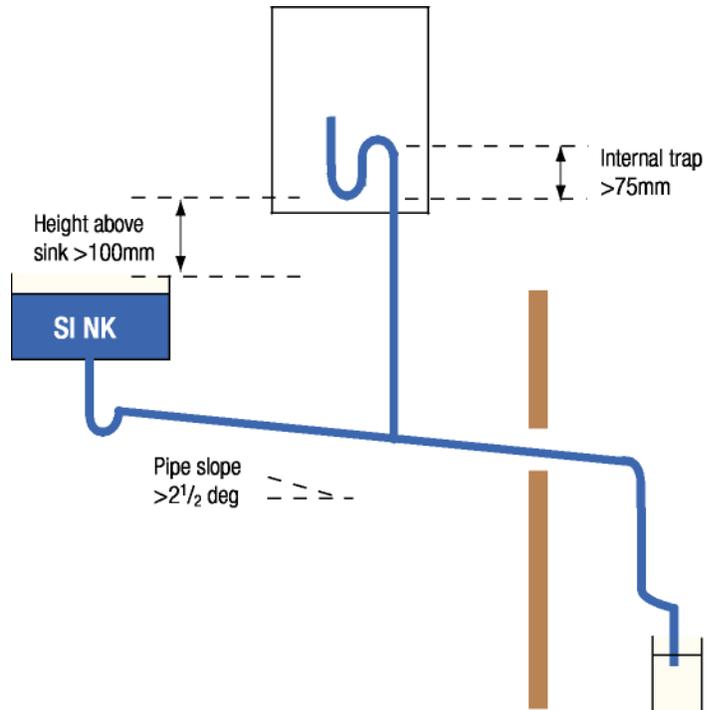
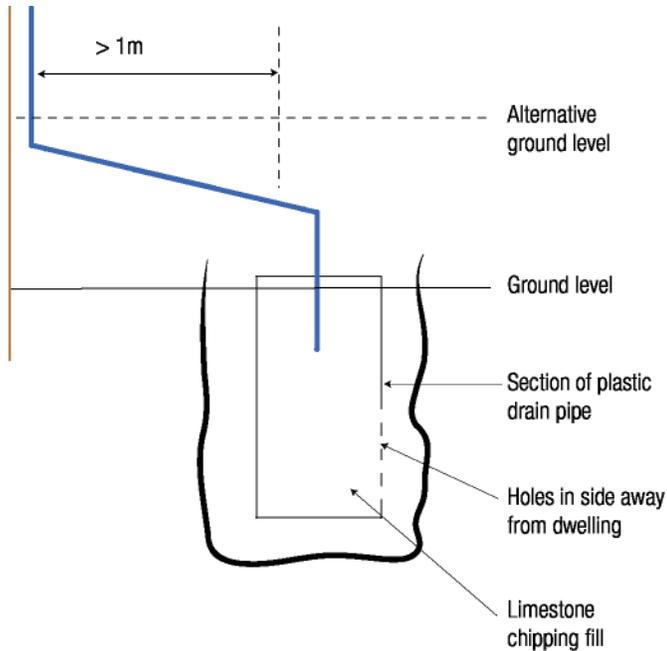


Figure 5 Connection to internal sink waste (downstream of sink trap)



**Figure 6 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 must be taken into account when carrying out a risk assessment for installation of an oil storage tank. The external pipework must 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 6. 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.