

Office of the Deputy Prime Minister

***The Building Regulations 2000
Approved Document Part L1
Conservation of fuel and power in dwellings***

**CORRECTION
See enclosed**

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Amendments to Approved Document L1 (2002)

CONSERVATION OF FUEL AND POWER IN DWELLINGS

Raising performance standards for central heating boilers.

1. The following amendments to Approved Document L1 (2002 edition as amended and printed in 3rd impression 2003) come into effect on 1 April 2005. The amendments do not apply to building work in the following circumstances:
 - a) where a building notice has been given or plans have been deposited in relation to the work before 1 April 2005;
 - b) where an initial notice has been given in relation to the work before 1 April 2005;
 - c) where the contract for the provision of the work is entered into before 1 April 2005, provided that the work is completed before 1st July 2005; or
 - d) where a boiler is ordered or purchased before 1 April 2005, provided that it is installed before 1 July 2005.
2. For Table 2 on page 12, substitute:

Table 2 Poorest acceptable boiler SEDBUK to enable adoption of the U-values in Table 1, and reference boiler SEDBUK for use in the Target U-value Method.

Central heating system fuel	SEDBUK %
Mains natural gas	86
LPG	86
Oil	85 ¹

Notes to Table 2:

¹ For oil-fired combination boilers a SEDBUK of 82%, as calculated by the SAP 2001 method, would be acceptable.

Target U-value method

3. For paragraph 1.20 on page 14 substitute:

“1.20 For dwellings to be heated by boilers with SEDBUK equal to the relevant entry in Table 2, no adjustment to the Target U-value is necessary. Where the proposed

boiler has a SEDBUK that is better than the tabulated value, the Target U-value can be eased as appropriate by multiplying the Target U-value by the factor f_e where:

$$f_e = \frac{\text{Proposed boiler SEDBUK (\%)}}{\text{Reference boiler SEDBUK (\%)}} \quad (2)''$$

Carbon Index Method

4. For paragraph 1.27 on page 14 substitute:

“1.27 The aim in this method is to provide more flexibility in the design of new dwellings whilst achieving similar overall performance to that obtained by following the Elemental Method. The Carbon Index adopted in this method is defined in the SAP, and the requirement would be met if the Carbon Index for the dwelling (or each dwelling in a block of flats or converted building) is either:

- a) not less than 8.3 if a heating system with a boiler fired by natural gas or LPG is installed, or
- b) not less than 8.0 otherwise.

Examples of the relationship between SAP Ratings and Carbon Indexes are given at Appendix F. They are unchanged from those included in the original edition of the Approved Document and take account of boiler performance standards as of 1 April 2002. The examples still show how SAP Ratings and Carbon Indexes compare but they no longer illustrate ways of complying with the requirement.”

Replacement of controlled services or fittings

5. For paragraph 2.3 b) on page 19 substitute:

“2.3 b) Heating boilers. Where hot water central heating boilers are to be installed or replaced, providing a new boiler as follows:-

- (1) In the case of gas-fired boilers:
 - (i) in normal circumstances, providing a condensing boiler with a SEDBUK not less than 86%, together with appropriate controls following the guidance starting at paragraph 1.36.
 - (ii) in buildings which received design approval prior to 1 April 2005, in exceptional circumstances, providing a boiler with a SEDBUK not less than the appropriate entry

in Table 5 below. Appendix G gives the approved procedure for establishing where exceptional circumstances exist.

- (2) In the case of oil-fired boilers until 31 March 2007, providing a boiler with a SEDBUK not less than the appropriate entries in Table 5 below.
- (3) In the case of oil-fired boilers with effect from 1 April 2007:
 - (i) in normal circumstances, providing a condensing boiler with a SEDBUK not less than 86%, together with appropriate controls following the guidance starting at paragraph 1.36
 - (ii) in buildings which receive design approval prior to 1 April 2007, in exceptional circumstances, providing a boiler with a SEDBUK not less than the appropriate entries in Table 5 below. Appendix G gives the approved procedure for establishing where exceptional circumstances exist.
- (4) In the case of solid fuel boilers, providing a boiler having efficiency not less than that recommended for its type in the HETAS³³ certification scheme.

Appendix E: Target U-value examples

8. Delete existing Appendix E on pages 45 to 47 and substitute new Appendix E as follows at page 3-5 in this document.

New Appendix G: Assessing the case for a non-condensing boiler

9. Add new Appendix G: "Assessing the case for a non-condensing boiler" as follows at page 6-8 in this document.

End Notes

10. Delete existing endnote 33 on page 52 and substitute:

"³³ HETAS Ltd, Heating Equipment Testing and Approval Scheme."
11. On page 52, under the sub-title "**Building Research Energy Conservation Support Unit**", below the existing endnote 35, add new endnote 38 :

"³⁸ Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings, ODPM 2005."

Table 5 Poorest acceptable boiler SEDBUK where condensing boilers are impractical.

Central heating system fuel	SEDBUK ¹ %
Mains natural gas	78
LPG	80
Oil	85 ²

Notes to Table 5:

¹ The poorest acceptable SEDBUK for a replacement back boiler is three percentage points lower than the relevant entry in the table.

² For oil fired combination boilers a SEDBUK of 82%, as calculated by the SAP 2001 method, would be acceptable

6. Delete footnote 32 on page 19.
7. Delete existing footnote 33 on page 19 and substitute new footnote 33:

"³³ HETAS Ltd, Heating Equipment Testing and Approval Scheme."

Appendix E: Target U-value examples

E1 For a dwelling with a hot water central heating system based on a gas or oil boiler, the Target U-value is given by:

$$U_T = [0.35 - 0.19(A_R/A_T) - 0.10(A_{GF}/A_T) + 0.413(A_F/A_T)]$$

where U_T is the Target U-value prior to any adjustment for heating system performance or solar gain, A_R is the exposed roof area, A_{GF} is the ground floor area, A_F is the total floor area (all storeys) and A_T is the total area of exposed elements of the dwelling (including the ground floor).

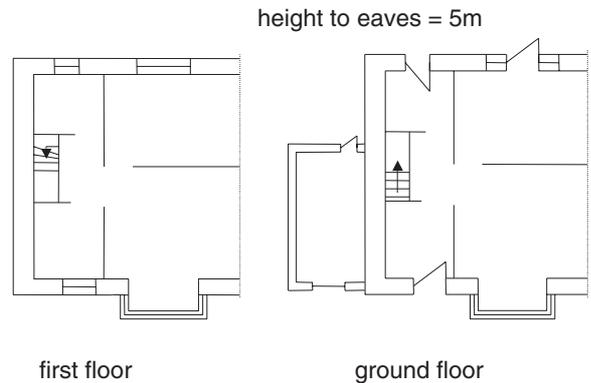
E2 A dwelling can comply by the Target U-value method if the Target U-value is not less than the average U-value, where the average U-value is defined as the area-weighted average U-value of all exposed elements of the dwelling. Exposed elements include walls, roofs, floors, windows and doors, including elements adjacent to unheated spaces.

Example 1 – A semi-detached dwelling

The dwelling in Diagram E1 has details as given in the following table. It is proposed to adopt the Target U-value method with the U-value of the walls a little higher (i.e. poorer) than would be required in the Elemental method. The walls are to have a U-value of 0.40 W/m²K. The area of windows and doors is equal to 25% of the total internal floor area and the SEDBUK efficiency of the gas boiler is 91%. The total area of North-facing glazed openings is 6.82 m² and the total area of South-facing glazed openings is 8.88 m².

Exposed element	Exposed Surface Area (m ²)	U-value (W/m ² K)	Rate of heat loss per degree (W/K)
wall	80.3	0.40	32.12
roof	44.4	0.20	8.88
ground floor	44.4	0.25	11.10
windows	18.4	2.2	40.48
doors	3.8	2.2	8.36
Total	191.3	-	100.94

Diagram E1: Layout of dwelling for Example 1



The Target U-value is:

$$U_T = [0.35 - 0.19(44.4/191.3) - 0.10(44.4/191.3) + 0.413(88.8/191.3)] = 0.474$$

which is multiplied by f_e , the ratio of proposed boiler SEDBUK divided by reference boiler SEDBUK (which is 86% for heating by mains gas), giving a Target U-value of:

$$U_T \times f_e = 0.474 \times (91\%/86\%) = 0.502$$

Since the area of glazed openings on the South elevations exceeds that on the North, the benefit of solar heat gains can be taken into account to ease the target U-value by adding ΔS to the target U-value, where:

$$\Delta S = 0.04 \times [(A_S - A_N)/A_{TG}]$$

and A_S = Area of glazed openings facing south;

A_N = Area of glazed openings facing north;

A_{TG} = Total area of all glazed openings in the building.

So $0.04 \times [(8.88 - 6.82)/18.4]$, or 0.004, is added to the Target U-value, giving a Target U-value of 0.506 W/m²K.

The average U-value for the dwelling is given by:

$$U_{avg} = \frac{\text{Total rate of heat loss per degree}}{\text{Total external surface area}}$$

These values are calculated in the above table, and in this case the average U-value is:

$$U_{avg} = \frac{100.94}{191.3} = 0.528 \text{ W/m}^2\text{K.}$$

Since the average U-value is greater than the target U-value the proposed design does not meet the requirements and modifications must be made to the design. The Target U-value method may still be used, however, if the average U-value is reduced or if the Target U-value increased (or both).

Some ways of modifying the proposed design in order to comply with the Target U-value Method are described below:

a) Reducing the U-value of the roof and the ground floor

If the U-value of the roof is reduced from the standard elemental U-value of 0.20 W/m²K to 0.15 W/m²K, and the U-value of the ground floor is reduced from 0.25 W/m²K to 0.20 W/m²K, the average U-value will be reduced by:

$$[44.4 \times (0.20 - 0.15) + 44.4 \times (0.25 - 0.20)] / 191.3$$

or by 0.022 W/m²K. This measure is sufficient to reduce the average U-value to not more than the Target U-value which meets the Target U-value.

$$\begin{aligned} \text{Average U-value} &= 0.528 - 0.022 \\ &= 0.506 \text{ W/m}^2\text{K} \end{aligned}$$

Since the final average U-value, 0.506 W/m²K, does not exceed the final Target U-value, 0.506 W/m²K, compliance with the Target U-value Method is achieved.

b) Reducing the total area of the windows and doors

If the total area of windows and doors is reduced from 25% of the floor area to 19% of the floor area, the average U-value will be reduced by (6% of 88.8) x (2.2 - 0.40)/191.3, or 0.050 W/m²K. This is sufficient to reduce the average U-value to below the Target U-value.

$$\begin{aligned} \text{Average U-value} &= 0.528 - 0.050 \\ &= 0.478 \text{ W/m}^2\text{K} \end{aligned}$$

Since the final average U-value, 0.478 W/m²K, is less than the final Target U-value, 0.506 W/m²K, compliance with the Target U-value Method is achieved.

c) Using insulated doors and reducing the area of the windows

If doors with a U-value of 1.9 W/m²K are used instead of 2.2 W/m²K the average U-value will fall by (2.2 - 1.9) x 3.8/191.3, or 0.006 W/m²K. This is not sufficient on its own to reduce the average U-value to below the Target U-value. If, however, the total window area is reduced by 20% then the average U-value will fall by an additional amount equal to: (20% of 18.4) x (2.2 - 0.40)/191.3 = 0.035 W/m²K.

The dwelling now satisfies the Target U-value Method.

$$\begin{aligned} \text{Average U-value} &= 0.528 - 0.006 - 0.035 \\ &= 0.487 \text{ W/m}^2\text{K} \end{aligned}$$

Since the final average U-value, 0.487 W/m²K, is less than the final Target U-value, 0.506 W/m²K, compliance with the Target U-value Method is achieved.

d) Specifying windows with lower U-value.

Using windows with a U-value of 1.7 W/m²K instead of 2.2 W/m²K will reduce the average U-value by:

$$[(2.2 - 1.7) \times 18.4 / 191.3], \text{ or } 0.048 \text{ W/m}^2\text{K}.$$

This is sufficient to reduce the average U-value to below the Target U-value. Reducing the window U-value to 1.7 W/m²K is therefore sufficient to achieve compliance.

$$\begin{aligned} \text{Average U-value} &= 0.528 - 0.048 \\ &= 0.480 \text{ W/m}^2\text{K} \end{aligned}$$

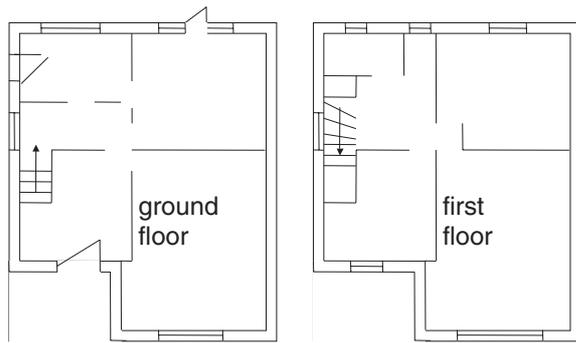
Since the final average U-value, 0.480 W/m²K, is less than the final Target U-value, 0.506 W/m²K, compliance following the Target U-value Method is achieved.

Example 2 – A detached dwelling

The example in Diagram E2 has details given in the following table. It is proposed to adopt the Target U-value approach with the walls having a U-value of 0.40 W/m²K. To compensate for this the floor U-value is reduced to 0.15 W/m²K, the roof U-value is reduced to 0.16 W/m²K and the window U-value is reduced to 1.7 W/m²K. The SEDBUK efficiency of the oil boiler is equal to the reference SEDBUK efficiency, given in Table 2 of Section 1, which in this case is 85%.

Exposed element	Exposed surface area [m ²]	U-value [W/m ² k]	Rate of heat loss per degree [W/K]
Wall	123.0	0.40	49.2
Roof	52.0	0.16	8.32
Ground floor	52.0	0.15	7.80
Windows & glazed doors*	24.1	1.7	40.97
Solid doors	1.9	3.0	5.7
Totals	253.0		112.0

*this includes 7.0m² of North facing glazing and 8.9 m² of South facing glazing

Diagram E2: Layout of dwelling for Example 2

The Target U-value is then:

$$\begin{aligned}
 U_T &= [0.35 - 0.19(A_R/A_T) - 0.10(AG_F/A_T) + 0.413(A_F/A_T)] \\
 &= [0.35 - 0.19(52/253) - 0.10(52/253) + 0.413(104/253)] \\
 &= 0.460 \text{ W/m}^2\text{K}.
 \end{aligned}$$

Since the heating system efficiency is equal to the base SEDBUK efficiency, no adjustment is made and f_e is equal to 1.

The adjustment to the Target U-value for solar gains is:

$$0.04 \times [(8.9 - 7.0) / 24.1] = 0.003 \text{ W/m}^2\text{K}$$

This gives a final Target U-value of $0.460 \text{ W/m}^2\text{K} + 0.003 \text{ W/m}^2\text{K}$, or $0.463 \text{ W/m}^2\text{K}$.

The average U-value for the dwelling is given by the following ratio:

$$U_{\text{avg}} = \frac{\text{Total rate of heat loss per degree}}{\text{Total external surface area}}$$

For this example, therefore, the average U-value is:

$$U_{\text{avg}} = \frac{112.0}{253.0} = 0.443 \text{ W/m}^2\text{K}$$

Since the average U-value is less than the Target U-value, compliance following the Target U-value Method is achieved.

Appendix G: Assessing the case for a non-condensing boiler

1. This Appendix sets out the approved assessment procedure for determining, for the purposes of the requirement in Part L1 of the Building Regulations, where practical considerations mean that it would be reasonable to install a non-condensing boiler. The assessment is applicable where boilers are to be installed in dwellings whose designs were approved before 1 April 2005.

2. The chart summarises the steps in the assessment procedure. In determining the position within a dwelling where a condensing boiler could be installed at lowest cost obstacles such as furniture or fittings should be ignored. If the assessment shows that this cost is too high then, in accordance with paragraph 2.3b) of this Approved Document, it would be reasonable to install a non-condensing boiler.

3. Paragraphs 2.9 to 2.11 in the Approved Document give guidance on how to deal with historic buildings.

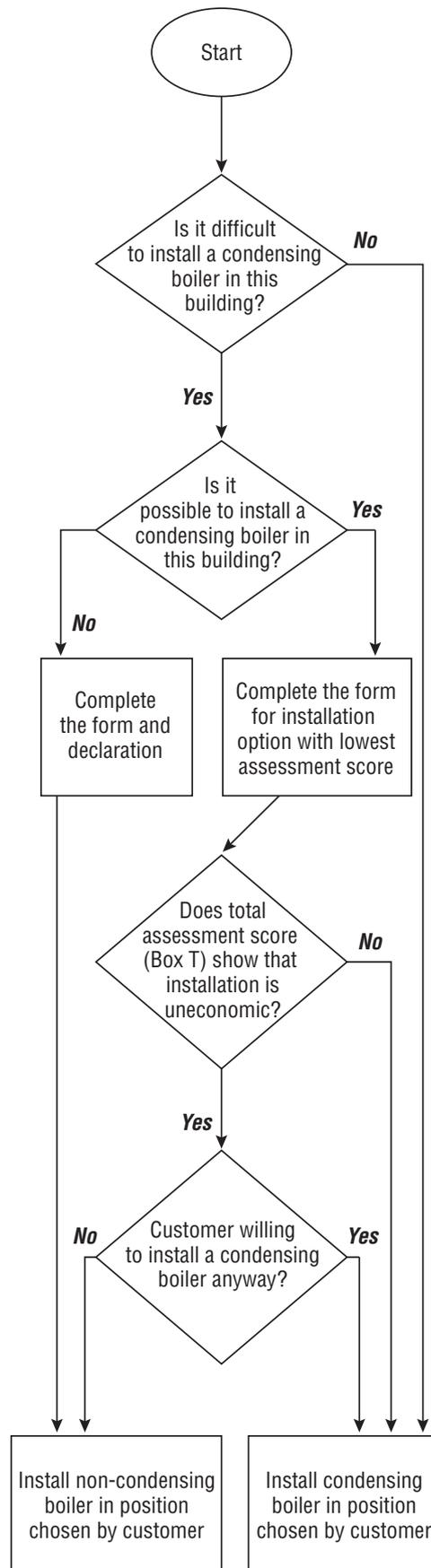
The assessment procedure

4. The assessment should be carried out following the detailed guidance given in the Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings³⁸ (the Guide). It should consider all feasible condensing boiler installation options (subject to the restrictions given later) for whichever fuel has been chosen by the householder (natural gas, LPG, or oil). For the purposes of the assessment, boiler positions preferred by the householder are not relevant. The lowest cost position should be found, and recorded on the form.

5. An assessment score exceeding 1000 points indicates that exceptional circumstances exist. In these circumstances the installation of a condensing boiler is not considered necessary to meet the requirements of the Building Regulations. (Householders may still choose to install a condensing boiler and they may be eligible for a grant³⁹ that defrays some of the additional costs).

6. The assessment result is restricted to the chosen fuel for the new boiler, and is not valid for a different fuel.

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



³⁸ Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings, ODPM 2005.

³⁹ See Note 3 in the "Notice to Householders" on the calculation and declaration form.

Completion of the assessment form

- 1 First, complete section 1 of the form.
- 2 If a defective boiler is being replaced within 3 years of the date of original installation under the original manufacturer's or installer's guarantee, tick box X and sign the declaration in section 14 of the form, omitting sections 2 to 13. Otherwise, continue below.
- 3 Complete sections 2 and 3 of the form.
- 4 Decide what fuel is to be used for the new boiler (gas, LPG, or oil), and complete section 4 of the form.
- 5 If an oil-fired boiler is to be installed before 1st April 2007, then proceed to section 14 of the form, omitting sections 5 to 13. Otherwise, continue below.
- 6 Complete sections 5 and 6 of the form.
- 7 Consider ALL feasible condensing boiler positions and extended flue options, taking no account of householder's preferences. In some positions special condensate disposal arrangements may be necessary. Some installation options are NOT regarded as feasible for the purpose of this assessment procedure, and should NOT be considered. They are listed in Tables G1 and G2. (They do not necessarily contravene standards or regulations, and in some cases they may be acceptable to the householder but they are not acceptable for the purposes of the assessment. Further advice on the bases of Tables G1 and G2 is given in the Guide).
- 8 If there are no feasible condensing boiler installation options proceed to section 14, omitting sections 7 to 13. Such cases are unusual and a clear explanation should be inserted in section 14 following the advice in the Guide. Otherwise, continue below.
- 9 Complete section 9, inserting points from Table G3. Where a change of boiler fuel is proposed, the assessment should reflect this decision.
- 10 Complete sections 7, 8, and 10 to 13 for the installation option that gives the lowest assessment score in section 13. Evidence may be required that all feasible options have been considered and that this is the lowest scoring option, so forms used to assess other options should be attached when the final, signed, form is made available.
- 11 Complete and sign the declaration in section 14, ticking one box only. Supply the completed form to the householder for use when the house is sold and retain a copy for building control compliance purposes.

Table G1 Flue and terminal installation options that are NOT to be considered.

Flue and terminal positions that do not comply with Approved Document J of the Building Regulations.
A shared flue, unless specially designed to be shared by condensing boilers.
A flue passing through a wall or floor that must not be pierced for structural reasons.
An internal flue extension exceeding 4m (ignoring the part that passes through a loft/attic space).
A flue that passes through another dwelling, or another building in different ownership, or another fire compartment.
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).
Wall terminals that discharge under the roof of a car port.
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, route, or a patio (hard surface area).

Table G2 Boiler positions NOT to be considered

1 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.
2 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.
3 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.

Table G3 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 G: Assessing the case for a non-condensing boiler

L1 ASSESSING WHERE NON-CONDENSING BOILERS COMPLY

CALCULATION AND DECLARATION FORM

This form may be used to show that a non-condensing boiler is reasonable provision for the purposes of complying with Part L of the Building Regulations.

1 Full address of property assessed: _____

 Postcode: _____

2 Dwelling type (tick one only) Flat Mid-terraced End-terraced Semi-detached Detached

3 Existing boiler fuel (tick one only) Natural gas LPG Oil Solid fuel None

4 New boiler fuel (tick one only) Natural gas LPG Oil

5 Existing boiler type (tick one only) Wall mounted Back boiler Floor standing None

6 Existing boiler position (tick one only) Kitchen Utility room Garage Living room Bedroom Other None

7 In the lowest cost option is the new boiler positioned in a different room from the existing boiler position? Yes No Inapplicable (no existing boiler)

8 If YES to section 7, state new boiler position Kitchen Utility room Garage Living room Bedroom
 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? (see 7) If YES insert 350 in box B	Box B
11 Extended flue (longer than 2m) necessary? If YES insert 200 for gas boilers, or 350 for oil boilers, in box C	Box C
12 Condensate pump or soakaway necessary? If YES insert 100 in box D	Box D
13 ASSESSMENT SCORE TOTAL of points in boxes A + B + C + D	Box T

14 Declaration (tick one box only)

Box W I declare that the boiler to be installed is oil fired and will be installed before 1st April 2007, OR

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, OR

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 option defined in boxes A to D produces the lowest total T.

Signed _____ Date _____

Name (in capitals) _____ Status (agent or installer) _____

Competent person scheme _____ Competent person registration number _____

Notice to householder:

- Where Box W has been ticked, a non-condensing oil boiler may be installed before 01 April 2007.
- Where box X is ticked, a like-for-like replacement boiler is reasonable.
- 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. **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 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).
- 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