



Energy Efficiency Best Practice in Housing

Domestic Condensing Boilers – ‘The Benefits and the Myths’

Introduction

Condensing boilers are highly efficient boilers that have much lower fuel and running costs than conventional boilers. Take up has been slow ever since they were first introduced in the early 1980s due to a number of misconceptions and a general lack of awareness. Since then the technology has improved and there has been an increase in the number of trained installers.

The objective of this leaflet is to provide concise information on the benefits associated with condensing boilers and to help dispel the popular myths surrounding them. This should help those (particularly within local authorities and housing associations) who have to respond to critics and others as yet unconvinced by condensing technology.

In dispelling the misconceptions or ‘myths’ associated with condensing boilers, it is hoped that the barriers to specifying and installing condensing boilers will be finally removed. This will result in a sustained increase in market share throughout the UK, benefiting householders and the environment alike.



Benefits of Condensing Boilers

Condensing boilers offer tangible benefits by:

- Reducing carbon dioxide emissions and helping to combat global warming.
- Improving household efficiency thus reducing fuel bills.

Condensing boilers work on the principle of recovering as much as possible of the waste heat which is normally rejected to the atmosphere from the flue of a conventional (non-condensing) boiler.

This is accomplished by using an extra-large heat exchanger or sometimes two heat exchangers within the boiler which maximises heat transfer from the burner as well as recovering useful heat which would normally be lost with the flue gases. When in condensing mode (for condensing boilers do not condense all the time) the flue gases give up their ‘latent heat’ which is then recovered by the heat exchanger within the boiler. As a result the temperature of the gases exiting the flue of a condensing boiler is typically 50-60°C compared with 120-180°C in a current non-condensing boiler. At the same time an amount of water or ‘condensate’ is produced.

A condensing boiler will always have a better operating efficiency than a conventional non-condensing one, due to its larger and more efficient heat exchanger. The benefits of condensing boilers are therefore quite clear, and in order to encourage greater take-up of these benefits we now need to address the myths surrounding them.

The Myths Surrounding Condensing Boilers

Myth: They are only efficient when fully condensing

Response: Not true. Due to its larger heat exchanger, a condensing boiler does not have to condense in order to be more efficient. Typically a new gas condensing boiler will have a seasonal efficiency of between 84% and 92% compared with a new non-condensing boiler at 78% or an older boiler at 55-65%. See table below for typical annual fuel costs for condensing and non-condensing boilers.

The SEDBUK (Seasonal Efficiency of Domestic Boilers in the UK) rating is the average annual efficiency achieved in typical domestic conditions and is quoted in a series of bands (from ‘A’ at 90% or over, to ‘G’ at below 70%). The SEDBUK is linked to current Building Regulations in England, Wales^[1] and Scotland^[2], but not Northern Ireland^[3] and some boilers which are rated A-B are endorsed as ‘Energy Efficiency Recommended’.

Myth: They are too expensive

Response: In the past, condensing boilers were more expensive, mainly due to the materials used in the construction of the heat exchanger. However, as with all new things, the cost of technology reduces over time, and some regular condensing boilers can now be obtained for no more than a regular non-condensing boiler.

In some cases, the difference can be offset by grants that are available from local authorities, energy companies or via Energy Efficiency Advice Centres (EEACs) (see back page). The payback period will then be minimal (0-4 years) and the net savings in fuel costs will be greater in the long term.

Myth: They need larger radiators

Response: No change necessary. In most systems, radiators are already oversized for all but the severest weather. A marginal benefit of approximately 3% may be obtained from oversizing radiators for a new system, as this will allow slightly cooler return water to the boiler and maximise time spent in condensing mode, but this is usually uneconomic and impractical.

Myth: They are less reliable

Response: Not true. This was true with the early models of condensing boilers, but through improvements introduced as a result of this early experience, the components in modern condensing boilers are as reliable as those in the equivalent non-condensing models.

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Boiler Type		New non-condensing	New condensing
Seasonal Efficiency (SEDBUK)		78% (Band D)	90% (Band A)
Typical Annual Fuel Costs	Flat	£197	£175
	Bungalow	£249	£220
	Semi-detached	£289	£254
	Detached	£396	£347

Myth: They are difficult to install

Response: Not true. The only difference compared with non-condensing boilers is the requirement for a condensate drain.

A competent installer will have no problem in deciding on a suitable location for the drain and fitting a normal, plastic overflow pipe. Flue locations will also need consideration – see myth on ‘plumbing’.

Myth: They are harder to maintain

Response: Not true. The only minor difference is the need to ensure that the condensate drain is clear when servicing.

Myth: They cannot be fitted to existing systems

Response: Not true. Condensing boilers are suitable for replacing most existing boilers. As with any replacement boiler, the effectiveness of the control system and type of hot water cylinder should be assessed when conducting a site survey. Consideration should also be given to cleaning and flushing the system before fitting a new boiler; see GIL 59 page 6, note 3 for further information.

Wall hung condensing boilers are readily available, with extended fluing options if required.

Myth: They have limited availability

Response: Not true. The number of manufacturers offering both regular and combination condensing boilers is increasing all the time, with major players offering dozens of different models.

Myth: The plume is a nuisance

Response: Because the flue gases leaving a condensing boiler are cool, they tend to produce a noticeable mist or plume of water vapour around the flue terminal itself (as they condense upon contact with the atmosphere), especially under cold conditions. This is not a problem and in fact indicates that the boiler is working as intended. However, consideration should be given to boiler and flue location prior to installation so that the plume will not be too close to neighbouring properties or windows, doors and paths regularly used in the winter.

Myth: The condensate is a problem

Response: Not true. With modern systems, only about one litre per hour of condensate is produced, which has a pH in the range of 3.5 to 5 – about the same acidity as tomato juice. As previously discussed, this is carried to a normal drain by means of a simple plastic overflow pipe.

CHeSS

The Central Heating System Specifications (CHeSS) are a set of ‘basic’ and ‘best’ practice specifications for the components of domestic wet central heating systems that are critical to energy efficiency. For further information see GIL 59 where the ‘basic’ and ‘best’ specifications are described. The specifications take into account recent changes to Building Regulations (see Refs [1], [2]).

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References

- [1] The Building Regulations 2000. Approved Document L1, Conservation of Fuel and Power in Dwellings, 2002 Edition.
- [2] The Building Standards (Scotland) Regulations 1990, 6th amendment (September 2001) Technical standards to Part J, Conservation of fuel and power.
- [3] The Building Regulations (Northern Ireland) 1994. Technical booklet F, Conservation of fuel and power (December 1998). *To be updated.*

These documents can be obtained from
The Stationery Office, London
Tel: 0870 600 5522, web: www.tso.co.uk

The Government's Standard Assessment Procedure for Energy Rating of Dwellings, 2001 Edition, is available from:
www.bre.co.uk/sap2001
or ring **0845 120 7799**

For information on grants to offset the cost of condensing boilers, contact your local Energy Efficiency Advice Centre on
Freephone 0800 512012
or look at the Save Energy website at:
www.saveenergy.co.uk

For comparing individual boiler efficiency results and SEDBUK figures see the website:

www.boilers.org.uk

The ‘Little Blue Book of Boilers’ is useful in identifying energy efficient models of gas, LPG and oil fired boilers. To order a free copy, contact the Energy Efficiency hotline on: **0845 727 7200**

Energy Efficiency Best Practice in Housing programme documents

The following Energy Efficiency in Housing programme publications may be ordered from the website: **www.est.org.uk/bestpractice** or ring **0845 120 7799**

GPG 284: Domestic Central Heating and Hot Water: Systems with Gas and Oil-fired Boilers, March 2000

GPG 301: Domestic Heating and Hot Water, February 2002

GPG 302: Controls for domestic Central Heating and Hot Water, September 2001

GIL 59: Central Heating System Specifications (CHeSS) July 2002

GIL 83: Domestic boiler Anti-cycling Controls, March 1998

- Seasonal Efficiency of Domestic Boilers in the UK (SEDBUK) flyer
- Whole House Boiler Sizing Method, March 2000

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