

TECHNICAL BULLETIN

PRODUCT: GREENSTAR GAS BOILERS (NATURAL GAS)

PUBLISHED GAS RATES:

Amendment to information in our installation manuals

The Gas rates which are published in our manuals for Natural Gas (Mains Gas from the grid) boilers are calculated based on G20 test gas which has a Net Calorific Value (NCV) of 34.02 and 37.75 Gross Calorific Value (GCV).

The average accepted calorific value for Natural (Mains) Gas is 38.76Mj/m³ metric or 1040Btu/ft³ imperial (gross).

Therefore due to the lower calorific value (CV) of G20 test gas, the stated heat input of our appliances is achieved with a lower-than-published gas rate when calculated using the average accepted calorific value of Natural (Mains) Gas.

The gas rate (G20 test gas) which is published in our current manuals can be converted to the gas rate which would be required to provide the stated heat input when using natural gas by using the following calculation:

$$\text{Required Gas Rate (m}^3\text{/hr)} = \text{Published Gas Rate (m}^3\text{/hr)} \times 0.974$$

A tolerance of +5% to -10% can be applied to this calculated figure when gas rating a Greenstar boiler.

The actual heat input should be calculated using the CV of the gas supplied to the property (this will be stated on the utility bill) or by using the accepted average value as above.

The net heat input is available on the appliance data label and in the appliance installation instructions.

Calculating Appliance Heat Output (kW):

For E6 & G4 gas meters (which display index readings in m³), **the following calculation should be applied:**

$$kW_{gross} = \frac{a \times b \times c}{d}$$

Where:

- a** = number of seconds in one hour
- b** = cubic metres (m³) from timed meter index calculation
- c** = number of kW/m³ (Natural/Mains Gas)
- d** = 120 seconds + number of seconds until the next digit appears on the meter index

To determine the number of kW in 1m³ of Natural (Mains) Gas or LPG divide the CV of the gas by 3.6 (therefore,

when using the accepted average CV of Natural Gas: **c = 10.76**). With some of these values substituted, the calculation for Natural (Mains) Gas is:

$$kW_{gross} = \frac{3600 \times m^3 \times 10.76}{\text{time } d \text{ (in seconds)}}$$

For U6 Diaphragm meters (which display readings in ft³) **the following calculation should be applied:**

$$Btu/hr_{input} = \frac{3600 \times 1040}{\text{time (1 rev of the test dial in seconds)}}$$

Where:

1040 = CV of Natural (Mains) Gas in Btu/ft³

To calculate the imperial measurement as kW (gross):

$$kW_{gross} = \frac{Btu/hr_{input}}{3412}$$

The ratio of GCV to NCV is dependent on the fuel type; Natural (Mains) Gas is approximately 1.11:1. Therefore, the following calculation can be used to convert GCV to NCV:

$$kW_{net} = \frac{kW_{gross}}{1.11}$$

The following example uses typical values in the case of a Greenstar 30i NG boiler on a Mains Gas E6 meter with a Published Gas Rate of 3.24 m³/hr:

$$\text{Required Gas Rate} = 3.24 \times 0.974 = 3.15 \text{ m}^3\text{/hr}$$

$$kW_{gross} = \frac{(3600 \times 0.105 \times 10.76)}{(120 + 2)} = 33.33 \text{ kW}$$

$$kW_{net} = \frac{33.33}{1.11} = 30.03 \text{ kW}$$

In the above example, the timed meter index calculation presented a lower gas flow rate than the published 3.24m³/hr, however, because the NCV of the Natural (Mains) Gas being used is higher than that of G20 test gas, the boiler still achieved an acceptable 30kW_{net}.

The data table in our manuals will be revised to provide gas rates based on Natural (Mains) Gas with a CV of 1040Btu/ft³.

Whilst it is always our intention to fully assist, it is essential to recognise that all information given by the company in response to an enquiry of any nature is provided in good faith and based upon the information provided with the enquiry. We recommend that advice should always be checked with your installer or contract partner. Consequently, the company cannot be held responsible for any liability relating to the use or repetition of such information or part thereof. In addition, whilst making every reasonable effort to monitor the performance and quality of our supply, installation and service network, we do not accept responsibility for the workmanship or operation of any third party company that the company may have promoted either in conversation, e-mail or other communication. Similarly, the views and opinions expressed in communication with individuals within the company may not reflect that of the business as a whole.