

**BAXI -SENERTEC UK**



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## **BRINGING IN CONDENSING TECHNOLOGY FOR OIL-FIRED BOILERS**

*Paul Hardy, Managing Director of Andrews Water Heaters, Potterton Commercial and Baxi-SenerTec UK, discusses the important breakthrough in successfully developing oil-fired condensing technology for larger commercial applications.*

Over the last few decades, condensing technology in commercial gas-fired boilers has been developed so successfully that we are probably close to maximising combustion efficiency as far as the laws of physics will allow. Until very recently, oil-fired technology in the commercial sector has not been able to deliver similar results. This is due to the fact that the process of condensing flue gases from burning oil is highly corrosive to metal and, as most traditional non-condensing boilers have heat exchangers constructed from a metal material, the application of condensing technology would quickly diminish the operating performance and life of the appliance.

Recent developments in the industry have enabled condensing technology to be applied to oil-fired boilers without affecting any of the internal components. Before examining how this has been achieved, the question must arise; if established manufacturers are already offering commercial oil-fired boilers that provide high seasonal boiler efficiencies in line with Part L2 of the Building Regulations, why does the industry need to perfect oil-fired condensing technology for larger commercial applications?

### **Leading Legislation**

The EU 20/20/20 policy states that by 2020 there must be a 20% reduction in carbon emissions. However, in the UK the Chancellor has made a legally binding commitment to achieve a 34% cut in carbon emissions by this time.

As a result, increasingly stringent legislation is being enforced to ensure all refurbishment work and the construction of any new buildings will be highly energy efficient to ensure the UK is on line to meet this carbon reduction target.

DECs (Display Energy Certificates) are just one of the measures that the Government has introduced. These are required for buildings with a total useful floor area of over 1,000m<sup>2</sup> that is providing a public service to a large number of people and that is occupied by a public authority/ institution. DECs show the actual energy usage (Operational Rating) of a building and must be on public display. These are accompanied by an advisory report on further measures that could be implemented to improve the energy performance of the building and although not enforceable, is valid for seven years. During this period, it is highly possible that building owners or managers will be replacing equipment such as boilers.

This is even more likely, as implementation of the EuP (Energy using Product) Directive demands even greater energy efficiency from heating and hot water systems with minimum efficiency levels required by law. The EuP regulations set the goal for all plant available in the UK to be as efficient as the current best 10% by 2016, with clear targets for 2010, 2013 and 2016. ICOM Energy Association, who are involved in negotiations with the DCLG (Department for Communities and Local Government) and are also the EC's (European Commission's) chosen consultants, expressed the belief that this figure was unachievable with oil heating in the UK, and only just reachable with gas boilers. With the risk that equipment not reaching the new EuP figure may not receive a CE marque, and therefore not be saleable in Europe, the industry could be facing considerable concerns in this area.

### **High Efficiency Oil Heating Innovation**

An innovation that takes us a step closer to meeting the requirements of the EuP Directive and other carbon reduction legislation is, therefore, an exciting development in the oil heating sector. A recent UK trade exhibition saw the launch of a high efficiency, high output steel pressure jet boiler with a patented carbon heat exchanger that can safely and efficiently condense and even clean the flue gases. There is currently no other oil-fired boiler on the market with the carbon heat exchanger vital for these boilers to operate in condensing mode.

With carbon making up part of the heat exchanger, the acidic condensate does not react with it or cause heat exchanger corrosion. The heating gases pass through the carbon block and the water is heated through the pipes (*see Fig. 1*). This allows heat to be recovered from the boiler flue gases to achieve higher efficiencies without degradation of the heat exchanger by acidic by-products of oil.

This range of one-piece steel shell forced draught high efficiency boilers achieve outstanding performance using advanced three pass combustion chamber technology, coupled with a state of the art flue gas heat recovery heat exchanger. The appliance is a combination of low temperature boiler and an external condensing heat exchanger which can be used with both gaseous and liquid fuel burners. The external carbon style heat exchanger incorporates a series of carbon blocks, a feeding pump, safety devices and flue connection. It can increase the efficiency significantly, compared to this type of low temperature boiler without the carbon heat exchanger, typically by as much as \*8.55% with oil, resulting in a net efficiency of 102.5%, at 30-40°C.

Flue gases leaving the low temperature boiler are guided through the vertical channels of the condensing heat exchanger. Water channels inside the carbon block transfer heat by the cross flow principle. The end caps on the carbon block divert the water flow in either direction. (*see Fig. 2*) A series of single carbon blocks are hydraulically interconnected. (*see Fig. 3*) The integral feeding pump feeds a proportion of the heating return circuit through the heat exchanger. The pump is selected on the basis of the flow rate required through the heat exchanger to optimise heat recovery from the flue gases. The compact dimensions of both the 98kW and 131kW models means that these boilers can be quickly and easily installed.

### **A Complete Solution**

The new carbon condensing oil-fired technology can be retrofitted to compatible cast iron sectional boilers, offering a cost-effective method of improving energy efficiency so that a large number of buildings can comply with energy performance regulations.

This can be highly beneficial for the many sites in non gas regions where cast iron sectional boilers have been the heating equipment of choice for a large variety of commercial buildings and public facilities including, for instance, schools. But it is not just older boilers that can benefit from this technology. At least one leading manufacturer reports an unprecedented rise in orders for replacement cast iron sectional boilers in the first quarter of 2010, perhaps in response to the particular severity of last winter.

Many existing older buildings have plant rooms designed around these type of boilers and are constrained by a tight budget and/or short timescale within which to complete the work. In these situations, to replace with a similar installation is the quickest, least disruptive, most cost effective and quite often, the only option. Therefore, the introduction of this new condensing technology to greatly increase the energy efficiency of cast iron sectional boilers, can greatly contribute to the improved energy performance rating of of both new and existing buildings.

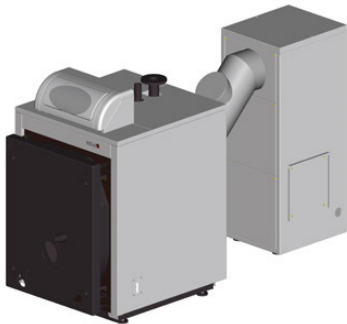
\*10% increased efficiency with gas firing

/ENDS

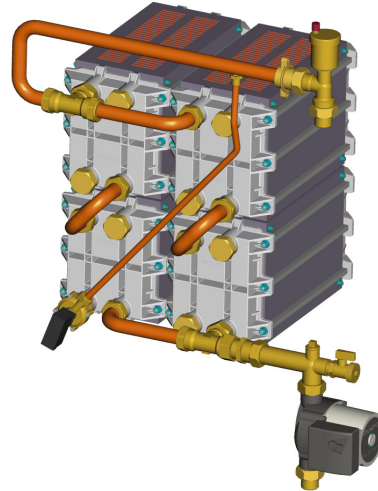
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Fig 1: Heat Exchanger Assembly

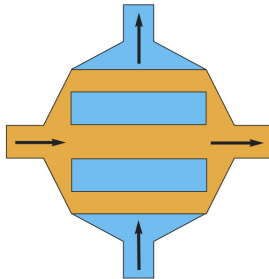


**Potterton Commercial LogoCondense**



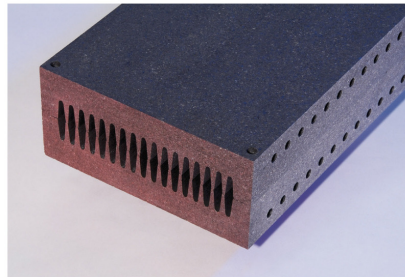
**Fig. 1**

Fig 2: A cross-flow heat exchanger



**Fig. 2**

Fig 3: Carbon Heat Exchanger Block



**Fig. 3**

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