

Commercial Wood Pellet Biomass Boiler 195 kW - 975 kW

Hoval

Responsibility for energy and environment

The following text is provided to assist with specification of commercial sized wood pellet boiler systems with a rated output of between 195 kW and 975 kW. The text is not a full system design and should only be read as a solution for equipment supply with additional layout, fuel storage and hydraulic design advice coming from the Technical Department of Hoval Ltd at Newark. Where the design requires a fully packaged solution then the boiler and buffer scope shall be as below.

DESCRIPTIVE SPECIFICATION

1. Skid Mounted LTHW Wood Pellet Boiler

- a. The boiler shall be of the STU type as manufactured by Hoval Ltd, Nottinghamshire, UK and be designed to combust biomass wood pellets exclusively in order to generate hot water for space heating or DHW production at a temperature of up to 85 °C at an operating pressure of up to 3.5 barg. The boiler shall be manufactured from high quality carbon steel and shall comprise a tube bundle located within a circular welded water jacket located above a cast retort into which the wood pellet fuel is fed by a motorised cast (not welded) screw auger. The furnace and water jacket shall be housed within a fully insulated boiler frame and refractory lined hinged door which shall include a glass window through which the combustion process can be viewed.
- b. The boiler shall incorporate burn-back protection via advanced fuel feeding control, thermally activated water dowsing to the fuel feed auger and a fire rated damper valve with twin proximity switches in the fuel transfer section. Additional waterside thermal protection, independent of power supply, should be provided to prevent boiler water temperature exceeding 110 °C. The boiler door should be fitted with a micro switch. The boiler shall incorporate full automatic ignition and assisted ash removal. The boiler return water temperature will be controlled via an integral mixing valve and 'A' rated boiler circulating pump. The boiler shall be capable of controlled modulation from 100% to 30% of rated output, or lower.
- c. The boiler controls shall be of the PLC FlameTronix® type and incorporate a touch screen interface designed for automatic operation and a clear 'easy to use' display. The display will detail boiler performance (firing rate, flue gas temperature, % oxygen level in the flue gases) in real time and include both boiler flow and return temperatures. It will highlight and display any fault or alarm condition and incorporate historical or trend information and be capable of interfacing with BMS systems to export running information and alarms. Remote monitoring shall be available as an option. The boiler controller will include a copy of the panel wiring diagram, along with full operation and maintenance instructions in PDF format all accessible via the screen display. The control panel will include an emergency stop button.
- d. Inverter drives shall be fitted to vary the speed of the motors driving the fuel feed auger(s) and the combustion air supply. Boiler controls shall continuously monitor boiler performance to deliver optimum combustion conditions under all firing rates. This shall include oxygen (excess air) adjustment via a lambda probe along with monitoring combustion chamber and exit flue gas temperatures.
- e. The boiler skid package including boiler, fuel stoking auger and control system shall be factory tested and part commissioned prior to delivery.
- f. The boiler shall be CE approved and the manufacturer shall hold ISO 9001 certification.

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DESCRIPTIVE SPECIFICATION continued

2. Buffer Vessel

a. It is essential to the boiler performance, to avoid the possibility of local overheating on rapid load reduction and to avoid unnecessary boiler starts that the boiler manufacturer shall provide a matched buffer vessel. The buffer vessel shall be sized to allow a minimum of 10 litres per kW of boiler thermal output.

To facilitate active buffer control the buffer vessel shall have at least 3 pockets for temperature sensing at different heights.

b. The boiler shall be compatible with other renewable energy technologies as well as gas or oil fired peak load and back-up boilers. The boiler manufacturer shall be capable of offering advice on system integration.

3. Storage and Fuel Handling

a. The boiler manufacturer shall provide the wood pellet storage and handling systems.

b. The boiler manufacturer shall provide directly employed commissioning and installation teams and provide on-site training at point of commissioning.

PERFORMANCE SPECIFICATION

i. The boiler shall deliver a thermal efficiency of at least 90% at full output. The efficiency shall be at least 85% at part load.

11K temperature differential or 2 kPa (19 mbar) at a 20K temperature differential.

ii. The boiler shall have a specific water content of at least 2.4 l/kW of nominal output.

iv. The boiler shall deliver low particulate emissions, should be listed as an 'Exempt Appliance' under the UK CAA and comply with the proposed RHI phase 2 air quality limits. The boiler shall be capable of operating at full output

while producing less than 30 mg/MJ of particulate matter (PM) and no more than 150 mg/MJ of NOx. The boiler should be capable of achieving ultra low PM emission (<3 mg/MJ) with a matched ceramic filter system.

iii. The boiler shall have a resistance to flow of 6 kPa (61 mbar) or less at an

v. Standing heat loss, at 70 °C mean water temperature, shall be lower than 0.4% of full output.



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