HOT-WATER BOILER TO BURN CYLINDRICAL-SHAPE STRAW BRIQUETTES

Description

The boiler is designed for heating buildings and constructions located in rural area and equipped with heating systems of gravity or induced circulation. The boiler operates using a technology of burning cylindrical briquettes of straw with a diameter of 2 m and 1.9 m height in periodic mode.

Main fuel: straw briquettes with humidity of up to 20%.

Secondary fuel: firewood, woodworking waste (except sawdust) with humidity of up to 30%.

The boiler consists of a fire chamber encased with chamotte brick. Straight above the fire chamber there is a smoke-consuming heat-exchange tank with two flue tubes inside it.

In the top of the fire chamber there are coolers of the dome. The tube space of the heat-exchange unit and the dome coolers are connected to the heating system.

In the bottom of the fire chamber there mounted a double-slope grate on which a straw briquette is placed. Directly under the grate there is an ash chamber with trolleys inside for unloading ashes. At the front wall of the ash chamber there is a device to control feeding of air to the burning area, and the rear wall has doors to take out the ash trolleys.

To increase the efficiency of fuel burning, the boiler design provides an afterburner, placed at the entrance of the heat-exchange unit, as well as a device which eases cleaning of the smoke-consuming tubes during operation. The boiler is heat-insulated outside with a layer of mineral wool and encased with protective metal sheath.
The loading of fuel is carried out by using a special trestle-storage along an inclined quick-release stair that allows one to sufficiently simplify it and make it more fire-safe.

**Technical specifications**

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<tr>
<th>Spec</th>
<th>Value</th>
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<tbody>
<tr>
<td>Rated heat power, kW</td>
<td>600</td>
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<tr>
<td>Hot water operating pressure, MPA (atm)</td>
<td>0,4 (4,0)</td>
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<tr>
<td>Maximal temperature of hot water, K (ºC)</td>
<td>368 (95)</td>
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<tr>
<td>Dimensions (length × width × height), m</td>
<td>3,3 × 3,2 × 5,7</td>
</tr>
<tr>
<td>Weight, t</td>
<td>12,8</td>
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**Technical appraisal and economic benefits**

Calorific efficiency of straw is about 60 % from that of black coal. Thereby, in the regions having excess resources of straw, it is economically sound to use it as alternative renewable energy carrier. In doing so, funds spent from the region budgets for procuring an equivalent amount of coal can be used for other purposes.

Straw, as biomass in whole, is a CO₂-neutral fuel, i.e. when burning it there releases the same amount of hothouse gases as in the process of natural decomposition. So that’s why it is related to those fuels which cause hothouse effect.

**Application areas**

Low power engineering and heat supply. At the same time the boiler could successfully be used as part of small-scale grain-drying complexes, particularly in separate and hard-to-reach rural districts.

**Development stage**

A prototype model is available (joint development of Institute for Problems of Chemical & Energetic Technologies SB RAS and affiliated company “AGALIT” of RPC “POLUS”, Tomsk).

**Patent situation**

Patent was issued in the Russian Federation (2005); know-how is protected.

**Commercial offers**

License agreement, manufacture and supply contract.

**Estimated Cost**

Cost of a prototype at the price as of 2003 is 1,328,000 RUB including VAT (20%).

**Contacts**

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