

Stove operating instructions

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In order to maintain the kiln properly and for a long time and to avoid premature destruction, the owner of the kiln must carefully study the operating rules.

Stove drying

Before putting the stove into operation, it must be dried, because in the process of laying it absorbs a large amount of moisture into itself, which, if excessive rapid evaporation, can destroy the oven. To do this, in the stove bred a «light» fire, which is maintained for an hour, while the furnace door, the blowhole door and latches completely open. If there is a summer valve, it is better to cover it during drying, while watching the burning. During ignition, the summer valve should be open and when the fire will burn strongly, we close it. If burning becomes weak, then temporarily leave the summer valve open until the flame in the stove ignites. It is necessary to close it so that the warm gases warm up the entire design of the stove, and not just the top cover. When the walls of the stove stop sweating (you can check for moisture by removing the lid of the cleaning door), then you can close the stove door and increase the amount of firewood. Depending on the size and thickness of the stove walls, drying lasts from 3 to 8 days. If in the first period of drying the stove smokes, then you can increase the draft and stop the smoke output by burning paper through the cleaning door in the upper cap. An abundant amount of paper in the stove is unacceptable, because if it ignites, it can give a high temperature in a short period of time, which can lead to cracking of the stove. At the last stage of drying, the oven warms up to about 800C and after heating, all the oven doors are left open for several days. Do not forget that the room must be ventilated throughout all stages of drying. Drying the oven is also necessary if the stove has not been heated for a long time (for example, in winter time).

Stove inspection

Before the start of each heating, the furnace is cleaned of ash and slag. About once a month it is advisable to check the available soot places (for example, in the bottom cap through the cleaning door). If there is a secondary air supply system in the stove (holes on the side walls of the hearth), check the cleanliness of the holes located in the ash chamber. Before the start of the heating season, the oven should be inspected and repaired. Special attention should be paid to the integrity of the masonry and bricks, starting from the bottom of the stove to the top of the pipe. There are cases when the force of the frost can break the oven, especially the pipe. Therefore, the pipe in the attic needs to be whitewashed so that cracks can be seen. Check the condition of the stove and stove appliances, both before the start of the heating season and during operation.

Kindling and heating of the stove

Before starting the furnace, the valve of the fuel tank opens, and if the furnace is equipped with a grate, then the blowing door is closed. After igniting the fuel by closing the furnace door, the blowhole door opens again.

For ignition, it is advisable to use paper, birch bark, resin splinters. This will remove the cold air from the chimney, create thrust and ensure the ignition temperature of the firewood. In cold weather, if the furnace has not been used for a long time, start kindling with the summer running valve open, or in its absence, by burning paper in the upper cap behind the cleaning door. It should be noted that such an operation can be performed only in the absence of soot in the chimney or canals.

The space of the stove is filled with the full amount of fuel and burned for 1.5...2.5 hours, that is, until the walls of the stove are heated to the limit.

After ignition, dry firewood must be placed in the stove to obtain a working temperature of 800-900 °C.

Firewood should be dried for 1-2 years, and have a humidity of no more than 15%. When using raw wood, the loss of heat from combustion can reach, according to some sources, 34-57%, and also leads to rapid clogging of the stove and increased fire hazard due to the rapid clogging with soot. Part of the heat released during the combustion of fuel is spent on evaporation of the water contained in it. The heat spent on the evaporation of water is lost with the steam coming out into the pipe. It is desirable to have firewood of approximately the same thickness (5-10 cm.) and humidity, so that they burn in one period of time. Otherwise, it happens that not burned single logs long smolder and take away more heat than they give, since you can't close the pipe until they are completely burned, and thin firewood quickly fades. The same applies to fireplaces.

Fuel should be added at the time when most of the fuel has burned out and as quickly as possible with a uniform layer.

If smoldering remains of firewood have formed at the time of completion of the heating, then they can be thrown onto the grate as quickly as possible for accelerated combustion and at the same time you need to remember about the negative effect when the furnace door is open.

After the firewood burns out and the bluish flame tongues disappear, as well as the products of combustion covered with light coating, the door of the ash can and the valve of the furnace close, leaving a small gap for 10-15 minutes, after which the pipe is closed completely.

In some cases, in the absence of supply air to improve combustion slightly open the window, thereby ensuring the influx of air into the room.

The maximum heat dissipation of the stove is achieved by two stove starts per day. In winter, the furnace is heated, as a rule, twice a day (in the morning, in the evening), without overloading the stove. When it's not too cold outside, it is heated once. The stove door should be opened as rarely as possible during the heating. When it is opened, a large amount of air enters the stove, which is not involved in burn, which cools the stove. I.S. Podgorodnikov conducted tests and it turned out that when opening the door for 2-3 minutes, the temperature in the furnace dropped by 420 degrees (loss of up to 50% of fuel combustion efficiency).

If the smoke ducts are located next to the ventilation ducts, then in the process of heating the stove, their grilles are closed. This stops the circulation of air cooling the chimney, which improves the flow of thrust.

If there are several stoves in the house, they should not be heated at the same time. This can lead to smoke, as the pressure in the room is lower than the atmospheric pressure. In addition, the temperature level fluctuates more than during their operation at different times. Therefore, one stove is heated in the morning and the other in the evening, which creates a uniform heating of the room.

Multi-storey stoves can be fired simultaneously or separately. In case of separate stoves on the floors, the gate valve of non-functional stoves should be closed.

Burning process

The process of fuel combustion is divided into three periods: ignition, intense burning and afterburning. In each period, a different amount of air is required for complete fuel combustion.

The largest amount of air for fuel burning is required in the stage of intensive combustion. It is known that firewood contains solid and volatile combustible substances. According to K.Myakel, "Stoves and Fireplaces", Stroyizdat 1987, it takes about 1.5 m³ per kilogram of wood to burn the solid fuel. For burning volatile matter 2.3 m³ per 1 kg. of firewood. In total, 3.8 m³ of air is needed for 1 kg. of firewood. This is the optimal theoretical value. In practice, the air consumption reaches 6-9 m³ per 1 kg. of firewood. In this case, the excess air is 1.6-2.4 times.

It should be noted that less air is required during periods of ignition and afterburning. If the same amount of air is supplied 6-9 m³ per 1 kg. of firewood, during the entire combustion reaction time, heat loss from underburning will amount to 3-5%, and burning of fuel in the afterburning period is 20-35% (according to Y.P. Sosnin and E.N. Bukharkin). The excess air will be more than 3 times in the ignition period and 8-10 times in the burnout period. However, if air is fed into the stove in an amount of less optimal, there is a shortage of chemical burning fuel. As a result, the energy contained in the fuel is not fully released (that is, the efficiency of removing energy from the fuel is reduced), as well as unburned volatile substances are **deposited in the form of soot on the walls of the stove**.

In the period of ignition and intense burning, the temperature in the furnace rises, in the period of afterburning decreases.

It follows from the above that **in the period of intense burning, the blowhole door must be opened so that the optimal amount of air enters the stove**. This can be judged by the color of the flame. It should be light yellow. If the flame is dark yellow with black smoke, then little air enters the fuel tank, burning reaction takes place with low efficiency and large deposition of soot on the walls of the furnace. A bright white flame indicates an excess of air, at which a strong hum of the furnace can occur, which indicates an uneconomical furnace process. In this case, it is necessary to close the blowhole door. In the period of burning out, when coals remain in the furnace, the blowing door can be completely covered. It does not make sense to regulate the combustion process by the stove valve, although it should be partially closed at the afterburn stage to reduce the traction of the pipe.

Remember that burning into carbon dioxide, with complete combustion, 1 kg. of carbon gives 8100 kcal of heat, and burning into carbon monoxide, with incomplete combustion (lack of air), will give only 2400 kcal, that is, you take only 29.6% of energy.

Precautions and fire safety measures

It is forbidden to heat the stoves during mass events in the room.

In public premises, the furnaces should be heated specially designated for this purpose people who have received instructions and comply with the safety rules established by the Fire Safety Rules of the Russian Federation and GOST 9817-82 "Household appliances operating on solid fuel". The same requirements must be fulfilled by every homeowner.

In a heated room, firewood should not be stored for more than one start of the furnace.

It is forbidden to overheat the stove (90 °C and above), increased overheating not only destroys the stove, but also causes increased fire danger.

It is not allowed to heat the stove at the construction stage of the building when there is no design thermal circuit, or to make a stove of less power than is required by the heat engineering calculation. In this case, as a rule, the stove is over-heated and destroyed. The same thing happens when the furnace is heated in winter with the direct-flow valve open. In this case, an attempt to heat the room leads to over-heating of the furnace, uneven heating of the walls and destruction of the furnace.

It is unacceptable to exploit the stove by untrained people during the construction of buildings, when collective irresponsibility operates. In this case, the stove may also receive various damages.

It is unacceptable to heat the stove with flammable substances (gasoline, acetone and others).

To keep the oven running for a long time and do not require cleaning, do not burn garbage in it, especially polymers, rotten and wet firewood, varnished, painted wood, paper and cardboard. Substances arising during gorenje of these materials settle on the walls of the furnace (fireplace) and multiply the risk of fire, as well as clog the environment. There have been repeated cases when, for this reason, after a month of operation, the stove stopped working. When opening the stove, it was found that the 13 cm wide hood was completely clogged with soot stuck to the walls. In this case, it is necessary to gradually clean the walls of the caps from soot, and then burn the caps with dry small aspen wood, starting from the top.

Soot has a low thermal conductivity and therefore soot deposits on the walls of the stove reduce the useful heat output of the furnaces. In addition, soot deposits not only narrow the cross-section of chimneys, reducing traction, but also create a fire hazard, since soot is combustible.

It is strictly forbidden to heat the stove in a smoldering combustion mode with a closed blowhole door. This leads to clogging of the furnace, a decrease in its heat transfer and increased explosion hazard (due to the accumulation of [pyrolysis gases](#) in the hood from combustion processes with a lack of oxygen).

When loading new portions of fine dust-like fuel such as sawdust and shavings, rich in volatile compounds, it is forbidden to close the entire gorenje mirror (smoldering coals and will not be visible open fire). An explosive mixture is formed in the stove, which can lead to an explosion and destruction of any type of stove.

You can't heat a wood-burning stove with coal or coke.

Open fireplaces can be heated only with dry non-resinous (birch, aspen) logs with a length of no more than 2/3 of the depth of the furnace chamber. It is not possible to heat fireplaces with coniferous rocks (without a protective net), as when the resin of the wood is boils, coal is thrown out of the fireplace.

The purpose of the control items for the heating stoves

1. The valve of the stove, upper (when the firewood is burning, then it is open). After the heating, so that the smell of soot does not get into the room, the stove is first cleaned from the remnants of burning, and then the valve closes.
2. Summer running valve, lower (used when kindling the oven, then closes, or can be opened at the oven with a hob in summer use mode).
3. The blowhole door is always open and when the firewood is burned, blowhole door it closes. If you close the blowhole door, and the upper shutter at the time of smoldering remnants of combustion left open, then the smell of soot will not get into the room.

About firewood

«[Firewood](#) – lumps of wood, wood products intended for burning in the oven, fireplace, stove or fire to obtain heat and light».

According to [GOST 3243-88](#) the quality of firewood is rationed according to:

- wood species;
- nominal length and thickness;
- accounting gradation;
- the quantity of firewood in a lot with rot from 30 to 65 per cent of the end area shall not exceed 20 per cent of the volume of the lot;
- height of the remnants of the branches (not more than 30 mm.).

In Russia, as firewood for stoves are usually used: birch, oak, hornbeam, alder, aspen, pine.

The humidity of the firewood for the stove should not exceed 20%.

To achieve the required percentage of humidity by natural drying, freshly cut and chopped wood must be kept in a well-ventilated woodpile for up to 2 years.

Experience shows that a firewood aged for 1 year («standard» log - length of 50 cm. in «girth» 30 cm.) has a humidity on the surface of 20% and if such log is split in half, then in the inner part of the moisture meter will show much greater value (up to 35% humidity).

Firewood with high humidity (more than 20%) emits a lot of moisture during combustion and, according to some sources, can lose heat from 34% to 57%. At the same time, quite a large part of the heat released during combustion is spent on the evaporation of this very moisture from the firewood (they begin to hiss, smoke, crack) and steam out into the pipe. A large number of unburned soot particles, resinous deposits are formed and leads to increased fire risk.

The calorific value of 1 kg of firewood, regardless of the density of wood, is approximately 4 kW.

The weight of 1 m. cubic. of wood with a filled volume at a humidity of 20% is:

Oak – 750 kg;

Birch - 650 kg;

Aspen - 510 kg;

Pine - 520 kg;

Spruce - 450 kg;

Alder - 540 kg;

Apple tree - 740 kg;

Pear - 720 kg.

Solid (with high specific weight) wood is preferable for furnace, because it emits more heat and gives little ash (oak, apple, pear).

Such wood includes birch, but it, along with a very good heat release, (birch wood is considered «hot»), gives a lot of soot. In Russia, an aspen log was added to the laying of birch firewood to "burn" the furnace (remove soot).

Aspen burns very quickly and almost does not emit soot.

Pine easily ignites, burns quickly, but emits a lot of sooty and resinous deposits.

Alder was previously considered a "tsarist" tree. Alder firewood was used to heat the houses of rich people.

Pear, apple and cherry firewood is often used for cooking coals for barbecue because of their pleasant aroma.

Sources:

- A.E. Shkolnik: "Furnace heating of low-rise buildings".

- K.Myakel: "Stoves and fireplaces". Stroyizdat 1987

- Kuznetsov I.V.

- and others...