

## Section 01. Innovations in Engineering

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### The Boiler Operation

The boiler is a unit, work of which is aimed at obtaining a steam with a value of pressure above atmospheric or heated water by the heat released during the temperature decay of fuel. The purpose of the boiler is heating water for heating, ventilation and hot water supply of residential, public and industrial buildings.

Hot water boiler KV has a furnace device for organic fuel burning and convective heating surface, in which movement and heating of water and waste gasses cooling takes place.

The combustion efficiency and the efficiency of the boiler depend on the boiler design and the organization of the combustion process. In this paper, we consider design decisions, and general rules of the effective operation of the KV boiler.

The design of the boiler ensures its effective operation. The boiler furnace must have a sufficient volume for combustion of the loaded fuel volume. The volume of combustion chamber is an important parameter that determines the amount of mechanical underburnt fuel. With insufficient volume of the combustion chamber, fuel particles discharged from the fuel layer by the flow of air cannot burn fully and are carried to the convective packages. It results the blockage of convective packages by sticky particles underburnt fuel.

Convective packages of boiler KV cool furnace exhaust gases. Convection heating surface must be sufficiently developed to ensure the reduction of flue gas temperature not lower than the so-called dew point (for solid fuels in the range of 180-200 °C). It is not advisable to cool flue gas lower this temperature because it may cause condensation which can lead to sulfur corrosion of the heating surface and the boiler failure.

Hydraulic diagram of the KV boiler determines the reliability and efficiency of it. Multi-way movement of water through the screens and panels of the boiler is achieved by installing plugs and partitions in the manifolds; their quantity also regulates the speed of the heat carrier in the boiler. The reliability of all tubes of the boiler is provided with water velocity in the lift pipe - 0.8...1.6 m/s. Proper selection of water speeds gives the minimum hydraulic resistance of the whole circuit of the boiler and minimizes the deposition of salts, sludge and process of scale formation. Hydrodynamic mode of operation should eliminate the pressure drop below acceptable. To avoid burst pipes it is forbidden to increase pressures above allowable.

Boiler auxiliary equipment, its proper selection and full compliance with the operation parameters, is one more factor that determines whether the boiler is reliable and efficient.