

## Investigations of Furnace Outlet Gases Combustion for High Temperature Treatment of Carbon Materials

As a result of high temperature coke treatment Electro-Thermal furnace produces outlet gases with the temperature of 2500-2700 °C. These gases contain oxides of sulfur and nitrogen, ash and hydrogen. Presence of hydrogen leads to necessity of additional burning of furnace gases whereupon the temperature rises. To purify these gases it is necessary to cool them.

The task of investigation is calculation of the burning away process of outlet gases, determination of the compound of combustion products and their temperature after burning away process in the waste-heat boiler with the help of "TERRA" device.

Schematic diagram of the waste-heat boiler is shown in Figure 1.

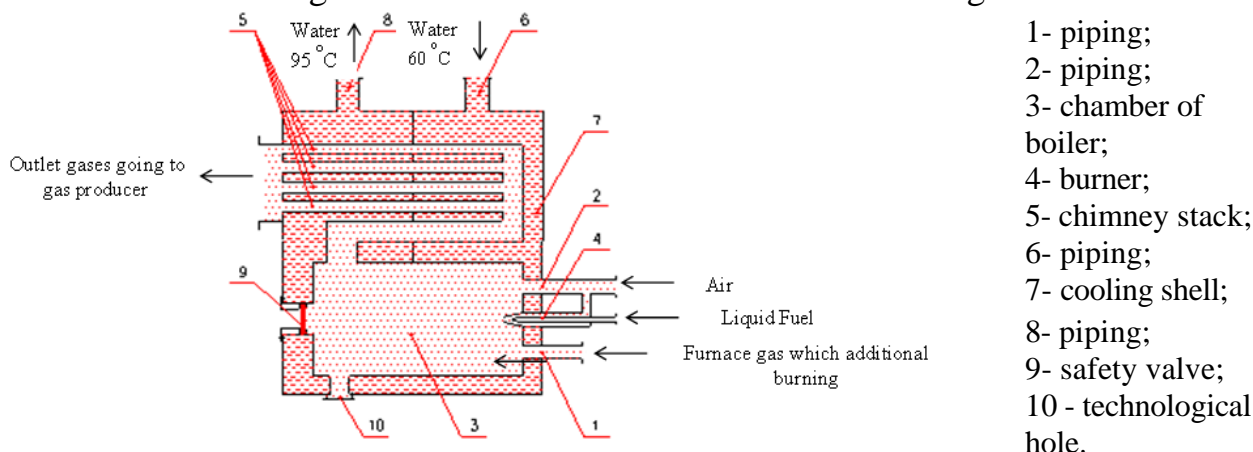


Figure 1. Schematic diagram of the waste-heat boiler

The compound of combustion products and quantity of air in mass in accordance with requirements of the program "TERRA" has the form:

$N_2=0,398$ ;  $A=0,0008$ ;  $C=0,356$ ;  $CH_4=0,0009$ ;  $CO=0,031$ ;  $H_2=0,095$ ;  $S_2=0,118$ .

$L_v^{a\ sum}=4,453$  kg.

As a result of calculation the compound of combustion products and their temperature were determined.

The temperature of combustion products is 2418,9 K.

The compound of combustion products in mass fraction is the following:

$H_2=0,0076$ ;  $H_2O=0,0853$ ;  $S=0,0012$ ;  $S_2=0,0022$ ;  $SO=0,0098$ ;  $SO_2=0,0182$ ;  $SH=0,0018$ ;  $CO=0,1307$ ;  $CO_2=0,043$ ;  $N_2=0,698$ .

The thermal calculation of the waste-heat boiler is made.

Further task of investigation is determination of the size and characteristics of the waste-heat boiler and consideration of multi-stage system of purification.