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CLEANING METHODS OF EMISSIONS FROM WASTE INCINERATORS

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The most commonly recognized methods for the disposal of municipal solid waste is incineration. The combustion process produces emissions. The process of flue gas cleaning is one of the most important and costly steps of incineration. In the international practice various treatment equipment is employed, which should meet the requirements of the international standards on reducing the volume of contaminating substances emission into the atmosphere. The cost of investments as well as the cost of operating and disposing waste should also be considered.

The cleaning technology contains several combinations of equipment and location. The choice of the most correct (effective) gas cleaning strategy largely depends on local conditions. Waste incinerators use several process steps to neutralize pollutants, namely, fly ash collection, acid gas neutralization, halogen and dioxin isolation, and nitrogen oxide neutralization.

Analysis of the global trends in the field of gas cleaning equipment development in modern installations for thermal waste treatment leads to the identification of two main research approaches. The first step in most incinerators is removing the fly ash, which can be done using cyclones, an electrostatic precipitator or a fabric filter. The principle of operation of the cyclone is based on the action of a centrifugal inertial separation of flying ash. The gas enters the cylindrical chamber. The simplicity of the design and ease of operation of electrostatic precipitators (electrostatic precipitators) allows them to be used to remove fly ash from waste incineration. A modern electrostatic precipitator

contains at least two or three sectors, guarantees a dust removal efficiency of more than 99% with particle sizes from 0.01 to 100 microns.

Fabric (bag filters) are also able to provide low emission values passing through fabric bags. Fly ash remains on the inside surface of the filter bags and is periodically removed by an air pulse in a discharge bunker underneath. A chimney is mounted on the pipe for the removal of combustion products. After the removal of fly ash, the residual dust concentration does not exceed 10 mg/ m3. The cleaning rate of gas suspensions in cyclones reaches 99% with 20 microns' particles or 87-95% with 10 microns' particles, or 56-85% with 5 microns particles.

The next level of cleaning is chemical cleaning. Chemical cleaning of gases after waste incineration can be performed in two main ways: wet cleaning and dry cleaning. The principle of wet cleaning is the absorption of gaseous components into a liquid. The absorption method of gas purification carried out in the absorber plants is the simplest and gives a high degree of purification, but requires bulky equipment and cleaning of the absorbing liquid. The efficiency of such an absorption process depends primarily on the available surface of the liquid, which controls the transfer of mass from the gas to the liquid phase. Wet scrubbing is a common waste incineration strategy in Central Europe, today it is in most cases performed by a two-stage installation with an acidic inlet scrubber followed by neutral or slightly alkaline cleaning.

Dry and semi-dry emission treatment methods are simple and cheap and are used in many incinerators around the world. In most cases, the adsorbent is either introduced directly into the gas channel, or sprayed into the boiler volume in a dry form (dry process) or in the form of a suspension (semi-dry process). Cleaning products are most often removed from the flue gas using a fabric filter. The efficiency of cleaning gas emissions from carcinogenic hydrocarbons, including dioxins, using platinum or palladium group catalysts has been proven. A catalytic emission treatment system ensures that the heat treatment process meets the environmental requirements.

Environmental monitoring data around the new waste incineration furnaces do not show any negative impact of these equipment on the environment.

For the process of neutralizing toxic chemicals that are formed after incineration of wastes, the study of modern equipment and technologies is critical.

It is necessary to develop new technical solutions using a multi-stage emission purification system, in particular, carrying out experiments on the selection of a catalyst. The research should be focused on obtaining the effective temperature and the height of the catalyst layer as a result of studying the flow rate and catalyst materials.