Flue Gas Purification

The wet scrubbing in packed bed wet scrubbers is very efficient and cost effective method of capturing SO$_2$ and CO$_2$ from the flue gases to limit the harmful emissions in the atmosphere from the conventional thermal power systems.

Main activities:

• Development of a gypsum flue gas desulfurization technology for small and middle capacity boilers with absorbers of packed bed column type and packing of horizontal expanded metal sheets ensuring high efficiency of SO$_2$ removal.

• Study of a new packing of vertical polystyrene plates with crossing inclined capillary grooves for a redistribution layer intended for operation over a basic layer of a packing with vertical walls for increasing the efficiency of the absorption with extremely low liquid flow rate, typical for packed bed absorbers for FGD

• Investigations on the influence of the liquid viscosity and surface tension on the wettability of different packing materials and on liquid phase leakage in the free volume of packed columns with vertical-wall packings intended for extremely low liquid superficial velocity, typical for packed bed absorbers for FGD

• Investigation and comparison of performance characteristics of modern highly efficient packings for usage in scrubbers - Raschig Super-Ring (RSR), and Impulse Metal Tower Packing (IMTP)

Available tools

• Experimental installations with packed columns and equipment for packing investigations
  • Infrared gas analyzer

Working references

Projects in the field:

• Contracted by the National Science Fund of Bulgaria: New technology for energy efficient purification of flue gases from small and middle capacity boilers with obtaining of valuable products (2008-2013).

Publications in the field:


Waste Heat Utilization

The most efficient option for cooling of wet waste gases is by systems with contact economizers. Typically such a system represents a packed column, in which flue gases are cooled directly by contacting in countercurrent with circulation water entering the column. The utilized heat from the flue gases, including the heat of condensation of the water vapor, is used for industrial or district heating purposes.

**Main activities:**

- Design of a contact economizer system for flue gas cooling, connected upstream of the absorption system in a gypsum FGD technology for small and middle capacity boilers for the purpose of heating and humidifying air used in the main production.

- Development of a contact economizer system, as a part of a gas turbine installation, for flue gas heat utilization for steam production and district heating.

- Generalizing experimental data obtained by different authors from investigations of arranged packings with vertical walls typically used in contact economizers like Raschig rings, Honeycomb packings, blocks with rectangular openings etc., by deriving equations for prediction of the mass transfer coefficients and packing dynamic hold-up.

**Available tools**

- Experimental installations with packed columns and equipment for packing investigations

**Working references**

**Projects in the field:**

- Contracted by the National Science Fund of Bulgaria: *New technology for energy efficient purification of flue gases from small and middle capacity boilers with obtaining of valuable products* (2008-2013).

- Contracted by the National Science Fund of Bulgaria: *Investigation of energy efficiency of a system with a gas-steam turbine and a contact economizer with fuel conversion in the burning chamber* (2005-2008).
Publications in the field:


