



GAS CLEANING SYSTEM





Application

The aim of the flue gas cleaning system is to reduce temperature of the gas and capture solid contaminants from the gas produced in the lime kiln. The temperature of gas at the exit from the system does not exceed 40°C, which protects for devices installed downstream of the technological process. The system also enables removal of excess gas, which is not used for technological purposes. The emission of solid pollutants is within the limits set by environmental protection institutions.

Design and principle of operation

The installation purifies the exhaust gases in dry-wet method. The gas extracted from the underpressure or positive pressure lime kiln is first directed to the dust collector. Then the gas is transported to a gas scrubber, and finally reaches a droplet separator.

Dust collector – uses one of the simplest methods of dust extraction by gravitational separation of dust particles from the gas stream. It is a cyclone type filter with a tangential horizontal inlet and a centrally positioned vertical outlet. Dust separated from the gas stream, is extracted through the bottom flange of the cyclone. The filter is made of stainless steel.

Gas scrubber – is a key element of the gas purification system. The process of cooling and purifying gas from solid residues is carried out using wet method. The device is a cylindrical vertical tank. The gas supplied using flange installed in the side wall of the cylindrical body first passes through the water bath. After being cleaned from solid particles it is directed towards the outlet located in the top of the scrubber. In the top section the gas goes through the bed filled with Białecki rings, whose purpose is to partially catch moisture from the gas.

Droplet separator – is the last element of the gas purification system. Similar to the cyclones, the inlet connection is located in the upper part tangentially to the body. The gas entering the catcher moves downward in a whirling motion. Condensation occurs on the side wall. Condensed water accumulates in the lower part from where it is drained with a flange for further use. The gas goes to the internal chamber connected with the outlet nozzle located in the upper part. The construction of the catcher prevents secondary entrainment of droplets by gas by using a partition installed over the bottom where water is being collected.

Barometric closure – is an element that closes the water circuit in the gas purification system. Both the water drained from the scrubber and from the droplet separator goes to the barometric closure. Additionally, the tank is connected to the water supply. Fresh water is fed to tank and then distributed to the cleaning system. Excess water is extracted through the drain. Depending on the Customer's preferences, the construction can be made of carbon or stainless steel.

Gas pumps are responsible for flow of most of the gas. They are part of the internal installation of gas transport for technological needs of the factory. However to enable the system to work properly and purify all of the gas also during the start-up of the lime kiln and during technological breaks, when the excess gas is emitted to the atmosphere, a system is equipped with gas exhaust fans and throttles. The control of the flow rate of the emitted gas is carried out with the use of inverters. Fans also enable pressure control in the process chamber of the lime kiln.

The water recirculation within the gas purification system is performed by water pumps. Both the gas scrubber and the barometric closure are equipped with level sensors for measuring filling ratio. Pressure and temperature are monitored continuously between the devices.

Characteristics of gas cleaning system

DUST CATCHER		
MEDIUM		combustion gases from the lime kiln
CYCLONE CAPACITY	m ³	6,7
CAPACITY OF THE DUST CONTAINER	m ³	0,22
MAXIMUM TEMPERATURE	°C	100
POWER	kW	1,1

GAS SCRUBBER		
MEDIUM		combustion gases from the lime kiln
WATER DEMAND	m ³ /h	18
THE NUMBER OF BIAŁECKI RINGS	m ³	2,0
FLUE GAS FLOW	m ³ /min	up to 300

DROPLET SEPARATOR		
MEDIUM		clean gas from scrubber
GAS EFFICIENCY	m ³ /h	15 000
WORKING CAPACITY	m ³	15,5
MAXIMUM TEMPERATURE	°C	100