



Industry Plant

# CHLORINE BY-PASS SYSTEM



## What is Chlorine By-pass?

The process of stabilizing the total cement manufacturing process by bypassing before partially (1-5%) adding chlorine substance that causes problems such as blockage of pre-heater during the cement manufacturing process is called chlorine bypass (CL BY-Pass).

## Problems to be solved at Chlorine By-pass

The heat efficiency of the cement kiln must not be deteriorated. Therefore, the ratio of added kiln flue gas must be minimized, the piled up dust minimized and removal efficiency of chlorine increased. The dust with high chlorine concentration must be handled effectively.

## Efficient Chlorine By-pass

For the location of by-pass probe, a place with the highest concentration of volatilized chlorine and small amount of dust scatter must be selected. The bypassed gas protects the front of the probe and to prevent internal coating, it is mixed with cooling air that enters in the tangent direction of the probe to enter as a coal allocation cyclone.

The chlorine substance of gas that has been bypassed is quickly cooled in the probe and is coagulated as a small KCl crystal before being enriched in the particle part of the by-pass dust. Therefore, the big particle part with a small chlorine concentration is separated and recovered and if the small particle part with a high chlorine concentration is emitted, the chlorine removal efficiency can be increased. This can also decrease the occurrence of the ultimate dust.

Since the separated big particles are sent back to the kiln in high temperatures, heat loss can be reduced by installing chlorine by-pass system.

## Waste Processing due to Cement Plant

- 01** Compared to incinerator exclusively used for waste, cement kiln is high performance and can safely incinerate waste. When incinerating city waste in the exclusive incinerator, since material that has sulfur or chlorine causes acid gas, decreases durability of the wall, slaked lime is inserted to satisfy the exhaust gas standard.
- 02** Since alkali oxide Cao exists in abundance in the cement kiln, the above concerns do not exist. When comparing the combustion state, since the city waste is not heterogeneous and incomplete, it is difficult to complete combustion state of exclusive incinerator. Meanwhile, since the cement kiln is managed by chemical plant for cement production, it has stable combustion state as stable operation is essential.
- 03** Compared to the waste exclusive incinerator, the cement kiln is massive equipment and the gas retention time is very long. Thus compared to waste exclusive incinerator, the combustion state of the cement kiln has a much higher temperature and is combusted for a long time. Therefore, regarding the occurrence of dioxin too, cement kiln has high stability compared to waste exclusive paths and stability has been confirmed in terms of real measurement too.



# Comparison between Waste Processing and Cement Manufacturing Process

Classification		Waste Processing	Cement Processing
Process Property	Mechanical Processing	Waste collection -> grinding -> mixing	Waste collection -> grinding -> mixing
	Heat Processing	Combustion/heat decomposition	Preheating -> plasticity (combustion/heat processing)
	Processing After Cooling	Cooling -> Ash -> laying/solidification	Cooling -> clinker -> fine grinding -> cement
Equipment Management Standard		<ul style="list-style-type: none"> <li>Combustion chamber exit temperature: 850 degrees</li> <li>Combustion chamber gas retention time: 2 sec or more</li> <li>Incineration remains ignition loss: 10% or less</li> </ul>	<ul style="list-style-type: none"> <li>Combustion chamber exit temperature: 1200 degrees</li> <li>Combustion chamber gas retention time: 3 sec or more</li> <li>Incineration remains ignition loss: 1</li> </ul>

## Machine by Process

### PROBE

By taking out some gas of the kiln from the probe, the gas is quenched by the cooling air to below the coagulation point and is also bypassed at the same time.



### CYCLONE

Coal that contains comparatively low concentration chlorine (in the flue gas added in the kiln) is recovered and reentered in the kiln. Other high temperature flue gas is sent to the heat exchanger or the boiler.



### Heat Exchange or Boiler

The flue gas that has passed cyclone has removed the comparatively bigger particle, but the smaller particles are left inside the flue gas. To remove this, bag filter must be used. If temperature is too high, the bag cannot tolerate it, thus temperature must be lowered through heat exchange. Here, boilers are installed to use the exchange heat.



### BAG FILTER

The flue gas that has passed the heat exchanger or the boiler passes the dust collector to pile up smaller particles. The piled up particles are re-used or disposed of.



### DUST TANK

It is a storage tank that temporarily saves the small particles piled up in the bag filter for reuse during or before disposal.

