

Reduces the SO<sub>x</sub> level in emissions highly efficiently at low cost.

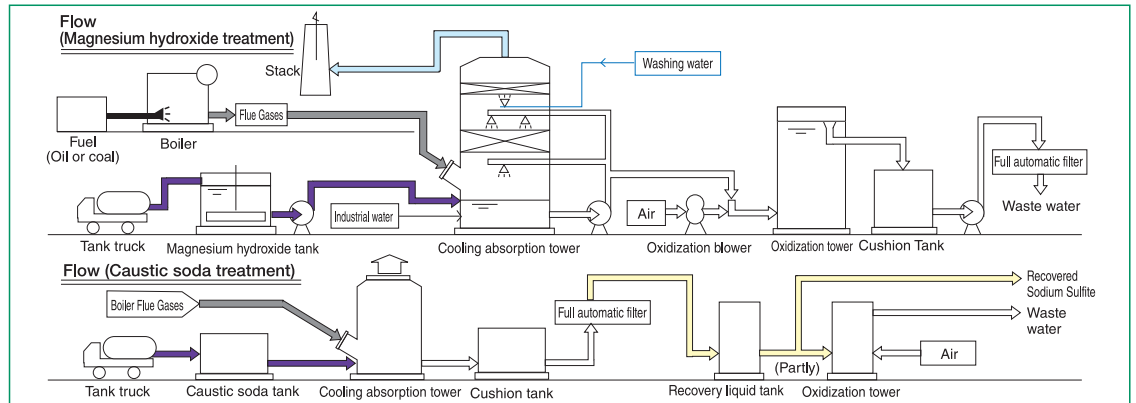
# Flue Gas SO<sub>x</sub> Removal (Desulfurization) Equipment

## Features

- Makes it possible to eliminate harmful SO<sub>x</sub> highly efficiently.
- Equipment of simple construction with simple operating processes ensuring ease of operation control.
- Highly economical processes with low installation cost compared with other types of SO<sub>x</sub> removal equipment.



Appearance of Desulfurization Equipment



Desulfurization Flow Sheet

## Overview

(Technical principles, actions, etc.)

### Process

#### ① Cooling Absorption Process

Flue gas from the boiler will be cooled to a temperature close to the adiabatic saturation point in the cooling unit in the absorption tower. Next, the SO<sub>x</sub> will be in countercurrent flow contact with the absorbent solution (absorption liquid) in the absorption block where the SO<sub>x</sub> will be absorbed with ease. The SO<sub>x</sub> in the flue gas is absorbed in the following reaction process.

※Magnesium hydroxide treatment  
 $\text{SO}_2 + \text{Mg}(\text{OH})_2 \rightarrow \text{MgSO}_3 + \text{H}_2\text{O}$   
 $\text{MgSO}_3 + 1/2\text{O}_2 \rightarrow \text{MgSO}_4$   
 $\text{SO}_3 + \text{Mg}(\text{OH})_2 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$

※Caustic soda treatment  
 $\text{SO}_2 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_3 + \text{H}_2\text{O}$   
 (Partly)  $\text{Na}_2\text{SO}_3 + 1/2\text{O}_2 \rightarrow \text{Na}_2\text{SO}_4$   
 $\text{SO}_3 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$

#### ② Oxidization Process

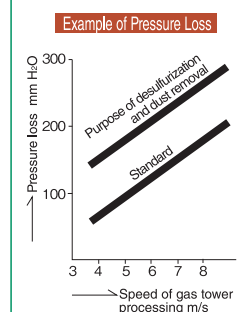
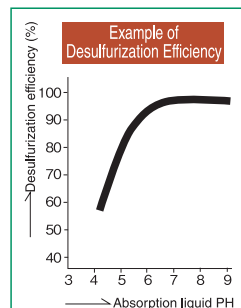
When draining the absorbing liquid, the level of chemical oxygen demand (COD) will be reduced by air oxidation at normal pressure if needed.

#### ③ Absorbent Pouring Process

The fresh adsorbent is added to the adsorption tower, in order to keep pH level of the adsorbent solution at a desired level.

#### ④ SS Removal Process

When draining and collecting the absorption liquid, the full automatic filter will be applied to SS removal if needed so that the liquid will change into a normal state.



## Introductory Track Record

- Approximately 60 units have been already delivered to users including Nippon Paper Industries, Nippon Steel Corporation, Daio Paper Corporation, and Mitsubishi Paper Mills in Japan.

Year of delivery	User	Place of delivery	Method	Processing quantity of gas (Nm <sup>3</sup> /h)
1996	China Manmade Fibres Corp.	Taiwan	Magnesium hydroxide treatment	207,730
1997	Cheng Loong Corp. HouLi	Taiwan	Magnesium hydroxide treatment	96,000
1997	Cheng Loong Corp. DaYuan	Taiwan	Magnesium hydroxide treatment	96,840
1999	China Petrochemical Development Corp. Kaohsiung	Taiwan	Caustic soda treatment	400,000
2005	Korea Electric Power Corp.	Korea	Caustic soda treatment	288,700

## Effects

### ◎ Magnesium Hydroxide Treatment

- Most of the SO<sub>x</sub> in flue gas will change into MgSO<sub>4</sub> in a dissolution state in the absorption tower, thus not causing slurry trouble.
- Magnesium sulfate (MgSO<sub>4</sub>), which is the main ingredient of the desulfurization drainage, is a very safe substance. This substance exists in seawater, and can be discharged harmlessly.
- The equipment of simple construction uses simple operating processes, thus ensuring ease of operation control.
- Magnesium hydroxide is a weak alkali adsorbent material and not hazardous.
- The equipment uses highly economical processes with low installation cost compared with other types of SO<sub>x</sub> removal equipment.

### ◎ Caustic Soda Treatment

- The use of caustic soda as an adsorbent material makes it possible to collect high-concentration sodium sulfite and salt cakes.
- The equipment is of simple construction that will not be clogged with the crystallization of the processing material.
- The equipment of simple construction uses simple operating processes, thus ensuring ease of operation control.
- The equipment uses highly economical processes to collect sodium sulfite with low installation cost compared with other types of SO<sub>x</sub> removal equipment.

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