



**WESTECH**  
Horizontal Belt Filter

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# Gypsum Dewatering

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With extensive background in filtration technology, WesTech has successfully applied this experience to develop horizontal belt filters which excel in industry-specific applications. WesTech offers filter sizes from lab-scale to 150 square meters. The minerals and power industries demand robust design and rigorous performance requirements. WesTech's **Horizontal Belt Filters** meet or exceed demanding production rates, low cake moisture and cake washing requirements, while minimizing process upsets. WesTech employs the right balance of conservative design and experience to provide a cost effective and high performance filter.

## Gypsum Dewatering

Wet flue-gas desulfurization (FGD) systems generally operate in a pH of 5.0 or above and require feed of reagent to remove sulphur. Limestone slurry is the most commonly used reagent. The quantity of slurry depends mostly on the sulfur levels in the coal. It is common for modern FGD systems to achieve 99% removal of  $\text{SO}_2$ . Scrubbers not only capture the  $\text{SO}_2$ , but also capture up to 98% of mercury and 99% of fine particles associated with lung problems such as asthma.

This reaction produces gypsum ( $\text{CaSO}_4$ ) as a byproduct. The gypsum is removed either by thickeners or hydrocyclones and then dewatered. In general, gypsum is either disposed of in a landfill or sold for the manufacture of wallboard.

Disposal grade gypsum typically has a specified moisture of 15%. WesTech scraper discharge filters offer a simple, yet effective, means of dewatering disposal grade FGD gypsum.

Wallboard grade gypsum is specified as having less than 10% moisture. To achieve this low level of moisture, a horizontal belt filter is used. A major influence on obtaining this performance is the aspect ratio of the gypsum solids.

For a square cross-sectional area and crystals of equal volume, an 8:1 aspect ratio has 35% more surface area than a 2:1 aspect ratio. So, if crystals with 2:1 aspect ratio give 10% surface moisture, 8:1 aspect ratio will give 13.5% moisture under the same filtration conditions. This is approximately what has been observed in the field.

The system must start with limestone of high purity, generally greater than 95%  $\text{CaCO}_3$ , which will then contribute less than 3% inert fines in the gypsum.

The oxidation step is run with long residence time (for gypsum growth), high solids concentration (for low aspect ratio) and low pump shear (for low mechanical nucleation rate). Keeping fly ash out of the gypsum and using makeup water with low silt content will also produce a lower moisture filter cake.

## Horizontal Belt Filter Design for Gypsum Dewatering

The filter must be sized accurately for the gypsum specifications. Filtration rates vary from 150 to 400 lb./hr./ft<sup>2</sup> depending on particle size distribution and desired moisture content of cake.

High feed solids concentration are required, typically 50 to 55 wt. % solids to avoid segregation of fine and coarse particles. High vacuum air flow rates of 15 to 25 cfm/ft<sup>2</sup> are used to provide pressure drop to strip off surface moisture for 10% moisture or less.

Chloride removal is accomplished by two to three wash displacements to achieve the over 90% wash efficiency for required wallboard quality. Good feed distribution is essential. Even a slight flow bias gives cake thickness variation side to side with corresponding wash and dry differences.

Gypsum cake leaves a heel on the cloth. The cloth wash slurry contains about 1–2% of gypsum. This stream can be returned to the system as cake wash water. This allows the recovery of the water and the gypsum solids and reduces the total suspended solids (TSS) of the wastewater from the process.