



MekHAnX

MÜHENDİSLİK

MAK. SAN. ve TİC. LTD. ŞTİ.

**"In Industry:
Healthy Breathing,
Safe Living"**



Who
we are?

As MEKHANX ENGINEERING, we are talking about the importance of breathing comfortably. We are committed to providing air solutions that improve the quality of life for everyone. With our commitment to sustainability, health and environmental stewardship, we are at the forefront of revolutionizing the way we communicate with the air around us.

OUR MISSION

Our mission is simple: to create cleaner, healthier environments where people can thrive and work. We aim to increase the air volume of industrial areas and empower individuals and businesses with the latest air storage technologies.

WHAT MAKES US DIFFERENT?

Innovation: We continually push the boundaries of air storage technology, developing advanced systems that deliver unparalleled performance and efficiency.

Quality: Our products undergo stringent testing to ensure they deliver the highest standards of quality and development. We prioritize excellence in every aspect of our operations, from design to production.

Sustainability: Environmental responsibility is at the center of everything. We are committed to minimizing our carbon footprint and promoting sustainable practices, throughout our supply chain.

Customer Focus: We value our customers above all else. Whether it is the business owner, facility manager or employee, we are here to provide personalized solutions tailored to their specific needs.



OUR PRODUCTS

From dust filtration equipment to particle conveying systems, our comprehensive product range addresses a wide range of applications, including commercial, industrial and foodservice environments. Whatever your air filtration needs, we have the perfect solution to help you breathe easier.

OUR TEAM

Behind every great product is a great team, and ours is no exception. Our team of industry experts, engineers and passionate individuals is dedicated to driving innovation and delivering exceptional results. Together we are shaping the future of air filtration.

COMMUNICATION

Are you ready to experience the difference our air filtration solutions can make? Contact us today to learn more about our products and services. Join us on our mission to create a healthier, happier world, one breath of fresh air every time.

Project and Consultancy Service

- Preparation of Preliminary Design Reports
- Preparation and Follow-up of Tender Documents
- Management and Monitoring of Tender Processes
- Preparation of Project Management Plan
- Preparation and Monitoring of General and Detailed Work Schedules
- Establishment and Control of Interim Payment Procedures
- Monitoring of Provisional Acceptance and Final Acceptance Processes
- Commissioning Process and Provision of Handover with Performance Tests



De-Dusting Filtration Systems: Enhancing Air Quality

De-dusting filtration systems, also known as dust collectors or dust control systems, are vital components in various industries where airborne particulate matter poses a threat to human health, equipment efficiency, or environmental safety. These systems are designed to capture and remove particulates from air or gas streams, thereby improving air quality and ensuring compliance with regulatory standards.

How de-Dusting Filtration Systems Work:

De-dusting filtration systems utilize a combination of filtration techniques to effectively capture and remove dust particles from the air or gas stream. The basic components of these systems typically include:

- 1. Capture Mechanism:** Dust collectors employ different mechanisms to capture particulates, such as cyclonic action, inertial separation, gravitational settling, and electrostatic precipitation.
- 2. Filtration Media:** Various types of filtration media are used based on the specific application requirements. Common types include fabric filters (baghouses), cartridge filters, electrostatic precipitators, and high-efficiency particulate air filters.
- 3. Cleaning System:** To maintain filtration efficiency and prolong filter life, de-dusting systems often incorporate cleaning mechanisms. These may include mechanical shaking, pulse-jet cleaning, or reverse air cleaning, depending on the type of filter media used.
- 4. Disposal System:** Once captured, the dust particles are collected in hoppers or bins within the system and disposed of properly, either through manual removal or automated discharge.

Applications of De-Dusting Filtration Systems:

De-dusting filtration systems find application in a wide range of industries, including but not limited to:

- 1. Manufacturing:** Industries such as metalworking, woodworking, pharmaceuticals, and food processing utilize dust collectors to remove airborne particulates generated during production processes.
- 2. Mining and Quarrying:** Dust control systems are essential in mining and quarrying operations to mitigate the health risks associated with respirable dust, such as coal dust or silica dust.
- 3. Chemical Processing:** Chemical plants use dust collectors to prevent the release of hazardous particulates into the atmosphere during manufacturing processes.
- 4. Energy Production:** Power plants, especially those burning fossil fuels, employ de-dusting filtration systems to capture ash and other airborne contaminants emitted from combustion processes.



Benefits of De-Dusting Filtration Systems:

- **Improved Air Quality:** By capturing and removing dust particles from the air or gas stream, de-dusting systems contribute to better indoor and outdoor air quality, reducing the risk of respiratory illnesses and environmental pollution.
- **Enhanced Worker Safety:** Minimizing exposure to airborne particulates helps protect workers' health and safety, reducing the risk of respiratory ailments and occupational hazards.
- **Equipment Protection:** Dust control systems help maintain the efficiency and longevity of machinery and equipment by preventing the accumulation of dust on critical components.
- **Regulatory Compliance:** Compliance with environmental regulations regarding air quality standards is facilitated by the use of effective de-dusting filtration systems.





BagHouse Filters

Baghouse filters, also known as bag filters or fabric filters, are an essential component of air pollution control systems used in various industrial applications. These filters are designed to remove particulate matter (dust, smoke, fumes, etc.) from industrial exhaust gases, thereby improving air quality and ensuring compliance with environmental regulations.

How BagHouse Filters Work:

Baghouse filters operate on the principle of filtration through a porous fabric material. The basic components of a baghouse filter system include:

Filter Bags: The heart of the system, filter bags are typically made of woven or felted fabric materials such as polyester, polypropylene, acrylic, or fiberglass. These bags are suspended vertically in a housing or chamber, allowing airflow to pass through while capturing particulates on the surface of the bags.

Inlet Section: The polluted air containing particulates enters the baghouse through an inlet duct or chamber, where it is directed toward the filter bags.

Filtration Process: As the contaminated air flows through the filter bags, particulate matter is trapped on the surface of the bags, while clean air passes through and exits the system.

Cleaning Mechanism: Over time, the accumulation of dust and other particles on the surface of the filter bags can impede airflow and reduce filtration efficiency. To address this, baghouse filters are equipped with a cleaning mechanism, such as mechanical shaking, pulse-jet cleaning, or reverse air cleaning, to dislodge and remove the accumulated dust from the bags, restoring airflow and filtration capacity.

Outlet Section: The cleaned air exits the baghouse through an outlet duct or chamber, free from contaminants, and is released into the atmosphere or recirculated back into the facility.

Benefits of Bag Filters:

Efficient Particle Removal: Baghouse filters offer high-efficiency filtration, capturing a wide range of particulate sizes, including fine dust particles.

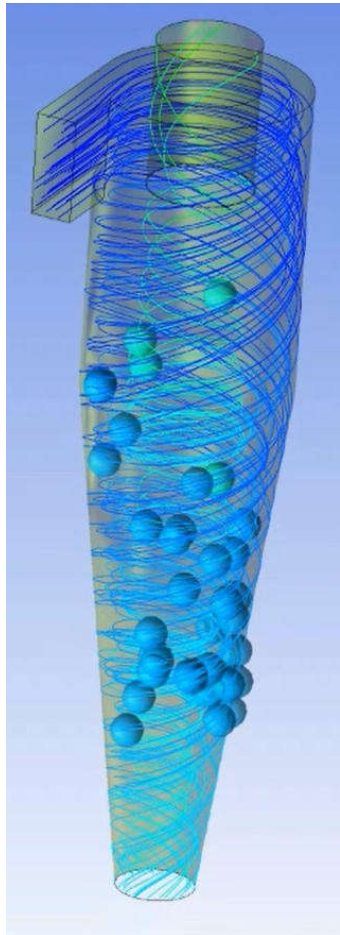
Versatility: They can handle high temperatures and corrosive environments, making them suitable for diverse industrial applications.

Compliance: Baghouse filters help industries meet regulatory requirements for air quality standards and emissions control.

Cost-effective: They have relatively low operating and maintenance costs compared to other air pollution control technologies.

Environmental Protection: By removing harmful pollutants from industrial exhaust gases, baghouse filters contribute to environmental conservation and public health protection.

In conclusion, baghouse filters play a vital role in maintaining clean air in industrial environments, ensuring worker safety, regulatory compliance, and environmental sustainability.



Cyclone - Multi Cyclones

Cyclone separators are mechanical devices used to remove solid particles from gas streams in industrial settings. They work by causing the gas stream to spin rapidly in a vortex motion, creating centrifugal force that separates the heavier particles from the gas.

The separated particles are collected at the bottom of the cyclone, while the cleaned gas exits through an outlet at the top. Cyclone separators are efficient, low-maintenance, and suitable for a wide range of industries including mining, woodworking, food processing, and chemical manufacturing.

They offer high efficiency, compact size, robust construction, and energy efficiency, making them a popular choice for particulate removal in industrial applications.



Scrubbers for Wet Filtration

Scrubbers, specifically designed for wet filtration, are air pollution control devices utilized to remove particulate matter and harmful gases from industrial exhaust streams by directing them through a liquid solution. These scrubbers play a crucial role in improving air quality, mitigating health risks, and ensuring compliance with environmental regulations in various industrial sectors.

How Scrubbers for Wet Filtration Work:

Scrubbers for wet filtration operate on the principle of gas-liquid contact, where the contaminated gas stream is brought into contact with a liquid solution, typically water or chemical reagents, to capture and neutralize pollutants. The key components of a wet scrubber system include:

Gas-Liquid Contact Zone: The contaminated gas stream enters the scrubber and comes into contact with the liquid solution, usually in the form of a spray, mist, or packed bed, depending on the specific design of the scrubber.

Particle and Gas Absorption: As the gas stream passes through the liquid contact zone, particulate matter and gases are absorbed or dissolved into the liquid phase through physical or chemical reactions. This process effectively removes pollutants from the gas stream and transfers them into the liquid solution.

Separation and Collection: The cleaned gas stream exits the scrubber, while the laden liquid solution containing captured pollutants is collected in a sump or reservoir at the bottom of the scrubber. Depending on the application, the liquid may undergo further treatment or disposal processes to remove or neutralize the pollutants before being discharged or recycled.

Types of Wet Scrubbers:

Venturi Scrubbers: Utilize a converging-diverging nozzle to create a high-velocity gas stream that entrains liquid droplets, facilitating gas-liquid contact and particle capture.

Packed Bed Scrubbers: Contain a bed of packing material (e.g., plastic or ceramic) to increase the surface area for gas-liquid contact and enhance pollutant removal efficiency.

Spray Tower Scrubbers: Direct the contaminated gas stream through a tower where it comes into contact with liquid sprayed from nozzles or trays, effectively capturing pollutants through absorption or impingement.

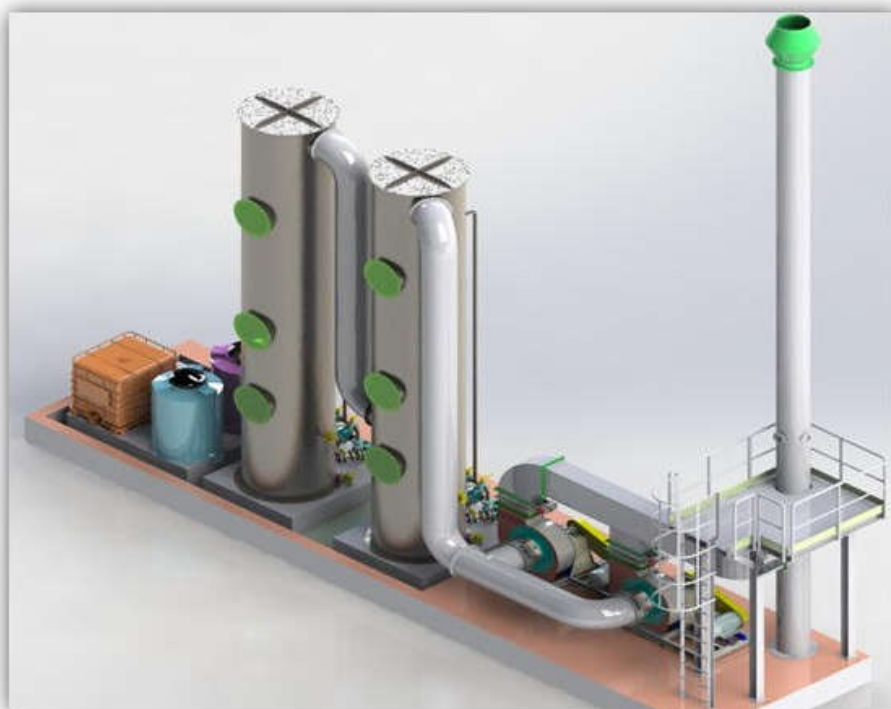
Applications of Scrubbers for Wet Filtration:

Chemical Processing: Removal of acidic or alkaline gases, such as sulfur dioxide (SO_2) and hydrogen chloride (HCl), from chemical manufacturing processes.

Metal Smelting and Refining: Control of metal fumes, dust, and volatile organic compounds (VOCs) generated during smelting and refining operations.

Power Generation: Reduction of sulfur oxides (SO_x) and nitrogen oxides (NO_x) emissions from coal-fired power plants and other combustion processes.

Waste Incineration: Capture of particulate matter, heavy metals, and acidic gases from waste incinerators to prevent environmental contamination.

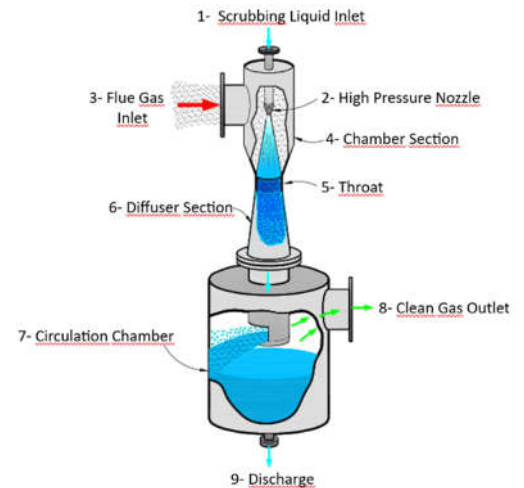


Ejector Scrubber

Ejector scrubbers, also known as venturi scrubbers, are air pollution control devices used to remove particulate matter and gases from industrial exhaust streams without using any fan.

They work by creating a high-velocity gas stream that entrains liquid droplets, facilitating gas-liquid contact and pollutant capture. Ejector scrubbers have small volumetric flows and are commonly used in industries such as steel manufacturing, chemical processing, waste incineration, and power generation.

They offer high removal efficiency, compact design, robust construction, low maintenance, and versatility in handling various pollutants. Overall, ejector scrubbers play a crucial role in improving air quality, protecting public health, and ensuring regulatory compliance in industrial processes.

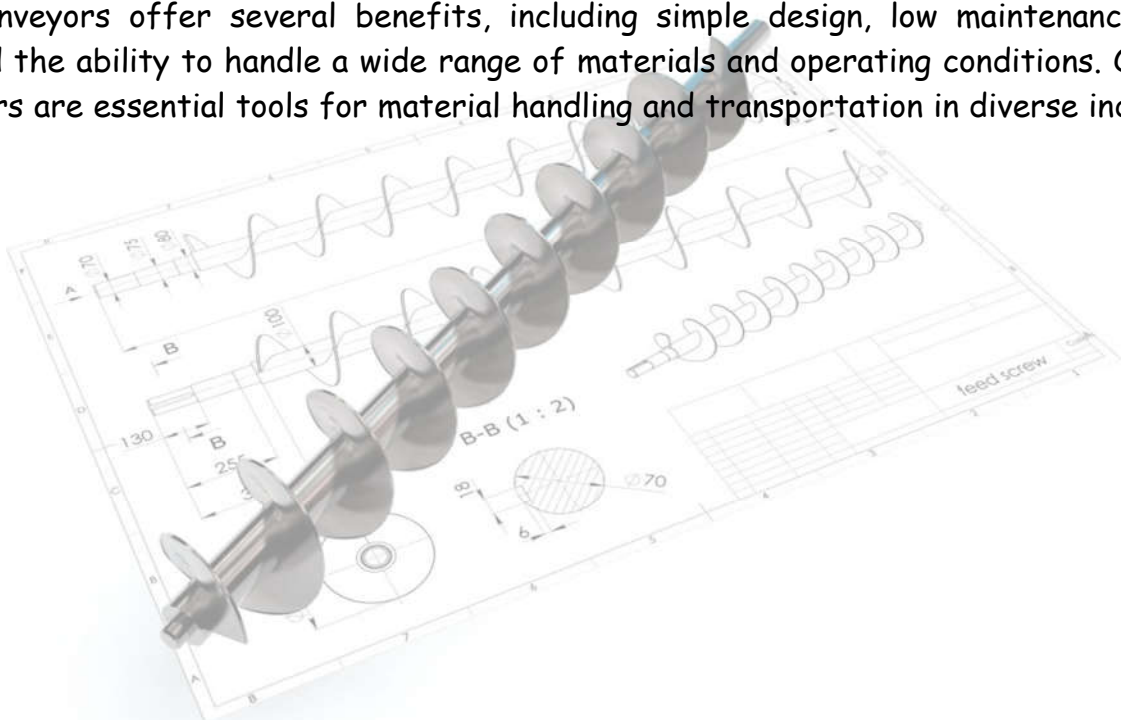


Screw Conveyors

Screw conveyors are versatile mechanical devices used to move materials horizontally, vertically, or on an inclined plane within various industrial processes. They consist of a rotating helical screw blade enclosed in a cylindrical casing or trough.

Screw conveyors operate by rotating the screw blade, which pushes or pulls materials along the conveyor path, effectively transporting bulk solids, powders, granules, or sludges from one point to another. They are commonly used in industries such as agriculture, food processing, mining, wastewater treatment, and construction.

Screw conveyors offer several benefits, including simple design, low maintenance, high efficiency, and the ability to handle a wide range of materials and operating conditions. Overall, screw conveyors are essential tools for material handling and transportation in diverse industrial applications.



Air Lock (Rotary Valve)

Airlock rotary valves are mechanical devices used in pneumatic conveying systems to control the flow of bulk materials while maintaining an airtight seal and preventing air leakage.

They consist of a rotor with vanes or blades that rotate within a housing, creating chambers between the rotor blades. As the rotor turns, these chambers alternately fill with material from an inlet and discharge the material through an outlet. The rotation of the rotor ensures a continuous flow of material while preventing air from leaking back into the system.

Airlock rotary valves are commonly used in industries such as food processing, agriculture, pharmaceuticals, and chemical manufacturing to meter and transfer bulk solids, powders, granules, and pellets.

They offer benefits such as reliable operation, minimal maintenance, high efficiency, and the ability to handle a wide range of materials and operating conditions. Overall, airlock rotary valves play a crucial role in pneumatic conveying systems by facilitating efficient material transfer while maintaining air pressure differentials and preventing contamination.



Dilute Phase Pneumatic Conveying Systems

Dilute phase pneumatic conveying systems are a type of pneumatic conveying system used to transfer bulk materials such as powders, granules, and pellets in a suspended or entrained state through a pipeline using a high-velocity air stream. These systems are characterized by low material-to-air ratios, typically ranging from 2:1 to 10:1, where the bulk material is suspended in the air and transported through the pipeline.

Key Components of Dilute Phase Pneumatic Conveying Systems:

Material Feeding Device: The bulk material is typically fed into the pneumatic conveying system using a feeder, such as a rotary valve, screw conveyor, or gravity feeder, which meters the material into the conveying line at a controlled rate.

Conveying Pipeline: The conveying pipeline is a closed-loop system consisting of straight sections, bends, elbows, and other fittings. The pipeline is designed to transport the material from the feed point to the destination, often spanning long distances horizontally or vertically.

Air Supply: A supply of compressed air or gas is used to generate the high-velocity air stream required for conveying the material through the pipeline. The air is injected into the pipeline at a controlled pressure and velocity, creating a pneumatic force that suspends and carries the material.

Material Separation and Collection: At the destination point, the material is separated from the conveying air using a separator, such as a cyclone separator or filter receiver. The separated material is then discharged into a storage vessel, process equipment, or packaging system, while the conveying air is either recirculated back into the system or discharged into the atmosphere.

Operation of Dilute Phase Pneumatic Conveying Systems:

In dilute phase pneumatic conveying systems, the bulk material is entrained in a high-velocity air stream and transported through the pipeline in a suspended or fluidized state. The air velocity is typically maintained above the minimum conveying velocity required to keep the material in suspension, but below the saltation velocity at which the material would settle out of the air stream.

Applications of Dilute Phase Pneumatic Conveying Systems:

Food Processing: Conveying flour, sugar, spices, grains, and other food ingredients.

Pharmaceutical Manufacturing: Transporting powders, granules, and active pharmaceutical ingredients (APIs).

Chemical Processing: Conveying catalysts, pigments, resins, and specialty chemicals.

Plastics Processing: Transporting plastic pellets, powders, and additives in polymer production.

Agriculture: Conveying grains, seeds, fertilizers, and animal feed ingredients.

Mining & Minerals: Transporting ores, minerals, cement, and aggregates in mineral processing plants.

Dense Phase Pneumatic Conveying Systems

Dense phase pneumatic conveying systems are a type of pneumatic conveying system used to transfer bulk materials such as powders, granules, and pellets in a dense or concentrated state through a pipeline using a low-velocity, high-pressure air stream. Unlike dilute phase pneumatic conveying, where the material is transported in a suspended or entrained state, dense phase conveying systems move the material in a dense, slug-like flow, with a higher material-to-air ratio.

Operation of Dense Phase Pneumatic Conveying Systems:

In dense phase pneumatic conveying systems, the bulk material is transported through the pipeline in a dense, plug-like flow, with the material forming a continuous slug that moves through the pipeline at a relatively low velocity. The material is propelled through the pipeline using short bursts of high-pressure air, which push the material forward in discrete increments.

Advantages of Dense Phase Pneumatic Conveying Systems:

- **Gentle Handling:** Dense phase conveying systems are gentle on the material, minimizing degradation and preserving product quality.
- **Less Wear and Maintenance:** The low-velocity operation reduces wear and abrasion on the conveying pipeline and components, resulting in lower maintenance requirements.
- **Minimal Dust Emissions:** Enclosed pipelines help to minimize dust emissions and maintain a clean working environment.
- **Less Energy Consumption:** Dense phase conveying systems typically operate at lower air velocities and pressures, resulting in reduced energy consumption compared to dilute phase conveying systems.
- **Ability to Handle Difficult Materials:** Dense phase conveying systems can handle a wide range of materials, including fragile, abrasive, cohesive, and friable materials that may be difficult to convey using other methods.

Desulfurization Systems- DeSOx

Desulfurization systems for air filtration are designed to remove sulfur-containing compounds from industrial exhaust gases, helping to reduce air pollution and comply with environmental regulations. Sulfur compounds, such as sulfur dioxide (SO₂) and hydrogen sulfide (H₂S), are common pollutants emitted from industrial processes such as power generation, chemical manufacturing, and refining operations. These compounds can contribute to acid rain, smog formation, and adverse health effects.

Types of Desulfurization Systems:

Wet Scrubbers: Wet scrubbers are commonly used for desulfurization in industries such as power generation and chemical manufacturing. They utilize a liquid solution, usually water or an alkaline reagent, to absorb sulfur compounds from the gas stream. Wet scrubbers can be configured as packed bed scrubbers, spray towers, or venturi scrubbers, depending on the specific application requirements.

Dry Scrubbers: Dry scrubbers are an alternative to wet scrubbers for desulfurization, particularly in applications where water availability is limited or where dry waste disposal is preferred. Dry scrubbers use a dry sorbent, such as lime or sodium bicarbonate, to absorb sulfur compounds from the gas stream. The sorbent is typically injected into the gas stream using pneumatic conveying or mechanical feeding systems.

Desulfurization systems offer several key advantages:

Air Quality Improvement: They reduce emissions of sulfur compounds, enhancing air quality and lessening the environmental impact of industrial activities.

Regulatory Compliance: Desulfurization systems aid industries in meeting environmental regulations and emissions standards for sulfur compounds.

Health & Safety: By minimizing sulfur emissions, these systems safeguard public health and safety by decreasing exposure to harmful pollutants.

Resource Recovery: Some processes can recover valuable byproducts like elemental sulfur or gypsum, contributing to additional revenue or use in other industrial processes.

Sustainable Operations: Desulfurization systems help in reducing the environmental footprint of industrial operations and promoting responsible resource management.

Denitrification System- DeNOx (SNCR)

Selective Non-Catalytic Reduction (SNCR) is a method used to reduce nitrogen oxide (NO_x) emissions from industrial combustion processes, particularly in boilers, furnaces, and power plants. SNCR involves injecting a reagent, typically ammonia (NH₃) or urea, into the combustion chamber or flue gas ducts at elevated temperatures to react with nitrogen oxides and reduce them to nitrogen (N₂) and water vapor (H₂O), which are less harmful to the environment.

Key Components of SNCR Systems:

Injection System: SNCR systems typically include an injection system consisting of one or more injection lances or nozzles located in the combustion chamber or flue gas ducts. The reagent, such as aqueous ammonia or urea solution, is injected into the combustion zone or flue gas stream at controlled rates.

Reaction Zone: The reagent is injected into the combustion zone or flue gas stream, where it reacts with nitrogen oxides (NO_x) at elevated temperatures (typically between 816°C to 1149°C). The reaction forms nitrogen (N₂), water vapor (H₂O), and small amounts of nitrogen-containing compounds, such as nitrogen dioxide (NO₂) or nitrous oxide (N₂O).

Temperature Control: SNCR systems require specific temperature ranges for effective NO_x reduction. The temperature range varies depending on the type of reagent used and the specific reaction kinetics. Control systems may be employed to monitor and adjust the temperature within the reaction zone to optimize NO_x reduction efficiency.

The primary reactions involved in the SNCR include:

For aqueous ammonia (NH₃) injection: $4 \text{ NH}_3 + 4 \text{ NO} + \text{O}_2 \rightarrow 4 \text{ N}_2 + 6 \text{ H}_2\text{O}$

For urea injection: $\text{CO}(\text{NH}_2)_2 + 2 \text{ NO} \rightarrow 2 \text{ N}_2 + \text{CO}_2 + 2 \text{ H}_2\text{O}$

Advantages of SNCR:

Cost Effectiveness: SNCR systems are generally less expensive to install and operate compared to Selective Catalytic Reduction (SCR) systems, particularly for applications with lower NO_x reduction requirements.

Flexibility: SNCR systems can be retrofitted to existing combustion equipment and can accommodate varying load conditions and fuel compositions.

No catalyst required: Unlike SCR systems, SNCR does not require a catalyst, reducing initial capital costs and eliminating the need for catalyst replacement and maintenance.

Big-Bag Unloading Machine

Big bag unloading machines, also known as bulk bag dischargers or FIBC (Flexible Intermediate Bulk Container) unloaders, are essential equipment for handling and emptying large bags of bulk materials in various industrial applications. These machines provide a safe, efficient, and dust-free method of discharging materials from bulk bags into downstream processes.

Key Features and Components:

1. **Frame and Support Structure:** A robust and stable frame supports the bulk bag during the unloading process. It often includes a hoist or forklift-compatible structure to lift and position the bulk bag.
2. **Bag Lifting Mechanism:** An integral hoist, crane, or forklift system is used to lift and suspend the bulk bag over the discharge point. Some systems use an electric hoist for easy and precise positioning.
3. **Discharge Spout and Spout Clamp:** The discharge spout at the bottom of the bulk bag is connected to the machine's hopper or receiving vessel. A spout clamp or sealing system ensures a tight connection, preventing material spillage and dust emissions.
4. **Flow Control Valve:** A valve or gate controls the flow of material from the bulk bag, allowing for precise and controlled discharge rates. Common types include slide gate valves, iris valves, and butterfly valves.
5. **Dust Collection System:** Integrated dust collection systems or enclosures help maintain a clean working environment by capturing airborne dust during the unloading process.
6. **Bag Massagers or Agitators:** Some machines are equipped with bag massagers, paddles, or vibration systems to ensure complete discharge of material, especially for materials that tend to bridge or clump.



Benefits of Big Bag Unloading Machines:

- **Efficiency:** Streamline the unloading process, reducing manual labor and increasing productivity.
- **Safety:** Minimize the risk of injuries associated with manual handling of heavy bags.
- **Dust Control:** Integrated dust collection systems help maintain a clean and safe working environment.
- **Versatility:** Suitable for handling a wide range of materials, including powders, granules, pellets, and flakes.
- **Ease of Use:** User-friendly design with intuitive controls for efficient operation.

Applications:

Big bag unloading machines are widely used in various industries, including:

Chemical Industry: For handling raw materials, additives, and chemicals.

Food and Beverage: For unloading ingredients such as flour, sugar, and grains.

Pharmaceuticals: For transferring powders and active ingredients.

Plastics: For managing resins, pellets, and additives.

Agriculture: For dispensing seeds, fertilizers, and animal feed.

Construction: For handling cement, sand, and other building materials.

References and Projects

- * 51.000 m³/h Capacity Fly Ash Silo BagHouse Filter System
- * 2.000 m³/h Capacity HCL Storage Tank Scrubber System
- * 30.000 m³/h Capacity Crusher Dust Collection Bag Filter System
- * 53.000 m³/h Capacity Aluminum Melting Furnace Dust Collection BagHouse Filter System
- * 4.000 m³/h Capacity Phenol-Formaldehyde Exhaust Scrubber System
- * 10 ton /h Capacity Polymer Material Dense Phase Transport System
- * 8.000 m³/h Capacity Chemical Plant Reactor Outlet Double Tower Scrubber System
- * 250 kg /h Capacity Biomass Power Plant SO₂ Removal Dry Lime Dosing System
- * 10.000 m³/h Capacity Pharmaceutical Industry Fluid Bed Dryer Scrubber System

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