CB Series Blend-Veyor™ White Paper

Cyclonaire Corporation

If you are working with powdered supplementary cementitious materials (SCMs) for blended cement products, then the Cyclonaire CB Series Blend-Veyors™ are for you. With the CB Series, you can blend and convey two or more materials in one unit for greater efficiency and less capital project investment. These units feature vacuum-loaded, semi-dense phase blending and conveyance with a capacity up to 80 TPH. Blend-Veyors use a single 15 PSI positive displacement blower and a venturi for vacuum loading and pressure conveying at low line velocities and high material-to-air ratios, reducing material degradation and abrasive line wear. A cement terminal can batch blend limestone and ordinary portland cement to produce the newly approved PLC blended cement during a few hours of a shift. After clearing the convey line the terminal operators can switch to a different recipe using fly ash, slag or even pozzolan in international markets. So long as the ingredients are powdered and have similar aerated densities the CB Series Blend-Veyor can blend from up to eight different sources. Another great application is the use of the CB Series to blend variations of a single product to obtain a homogeneous powder.



Figure 1. Typical CB-150 with six (6) inlets at our factory floor ready for shipping

How It Works

Using motive air from a positive displacement blower, the Blend-Veyor vacuum loads each material independently, blends them (as required) and pressure discharges the blended mix to the destination on a cyclical basis. During a batch cycle, Cyclonaire's proprietary venturi-based vacuum configuration utilizes full- and dribble-feed loading to achieve the target weight for each ingredient. After the materials are batch fed, blending occurs using Cyclonaire's aeration technology in the cone. The conveyor then switches to discharge mode, in which blower air is directed into the conveyor vessel to discharge the blend to the destination using semi-dense phase. When the conveyor is empty, the Blend-Veyor returns to loading mode.

The air supply system can also be used to aerate the material sources to ensure optimal discharge and conveyance rates into the Blend-Veyor. Semi-dense conveying minimizes particle degradation, reducing line wear and increasing system efficiency.

Installation Benefits

Since the CB Series product line has vacuum-loading capabilities, this solution does not require costly excavation for a pit. The CB Series can be fabricated on a permanent frame (shown in Fig. 3) or portable skid (shown in Fig. 4). CB Series units can be easily transported and retrofitted into existing operations.

Blower packages can also be built on a custom frame equipped with forklift slots to allow the units to be moved to or from a trailer. Cyclonaire recommends the use of a low-boy trailer to allow safe transportation due to the height of the unit and road bridge height restrictions. Our blower packages come with a soft start motor control and starter enclosure mounted on the frame.

Cyclonaire supplies the system controls preprogrammed with client recipes capable of blending cement, slag, fly ash and other cementitous materials. The system's accuracy is calibrated to be at 1% or 5 lbs., whichever is greater. Control panels are also supplied with electrical hookups to allow for the necessary power to be easily supplied.

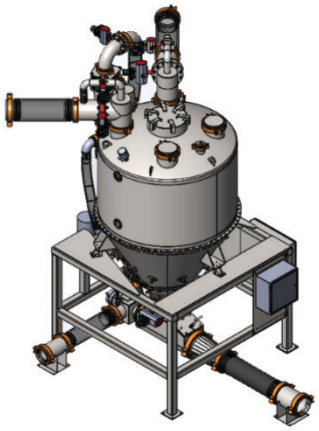


Figure 2. CB rendering of two inlet, two recipe blending configuration



Figure 3. Structural frame for foundation installation with simple anchoring



Figure 4. A project recently finished was designed to blend cement and fly ash at a convey rate up to 38 STPH over a total convey distance of 150 ft. Components of this solution were skid mounted and intended to be temporary installations capable of easy future relocation.

Operational Benefits

The most obvious operational benefit is the capacity to produce different recipes on demand and not be limited by the time required to blend the ingredients in a blending silo and wait for the silo to be empty to perform a different blend recipe. Finding equipment that could provide all-in-one loading, weighing, blending and conveying for custom cement products eliminates the need for multiple components such as weigh feeders, ribbon mixers and screw conveyors. Because the CB Series doesn't require

adding any costly pits or other structures to allow gravity loading, the blending conveyor's design allows the mix producer to convey from its existing silos without modifying the silos' current discharge equipment. Thus, both blended and nonblended products can be loaded out.

From a labor perspective, the operator has significant reliability, control and flexibility. The system normally is supplied with three preprogrammed recipes of customer-preferred percentages. More recipes can be added with additional communication control cards. Depending on what recipe is pulled up on the computer, the required weight amount of each material is vacuum conveyed from a silo. The entire system can be operated from the loadout control room without any local supervision. For each custom cement blend, an operator uses a computerized control panel to enter each material's proportion in the batch and the total batch size to be blended, then starts the blending conveyor. The system operates automatically until it reaches the batch blending setpoint. To save the operator time, cement blends can be preprogrammed, saved and identified by a customer-selected product name.

Logging and reporting of individual batches and total blended amounts is available via the conveyor's control panel for monitoring quality requirements or ensuring adherence to state reporting regulations.

Like all Cyclonaire pressure conveyors, the Blend-Veyor charges the conveying line with the product (blended mix) using few moving parts that are easily maintained. As a result, maintenance and downtime costs that commonly occur with other line charging methods (rotary valves, screw feeders) are nearly eliminated. Additionally, conveying using semi-dense mode (typical for cementitious materials and other fluidizable powders) allows for optimized conveying capacity while minimizing particle degradation and damage to system components.

Below is a depiction of the process flow diagram of a common system with three source ingredients and a single destination. This type of solution is normally supplied with three preset recipes for the percentages of the ingredients per the customer-desired values, but additional recipes can be programmed with the right modifications to the control system.

Cyclonaire's CB Series Blend-Veyor is an efficient, practical solution to the challenge of meeting the diverse demands of different blended cements in a market that requires the blending of multiple recipes on demand.

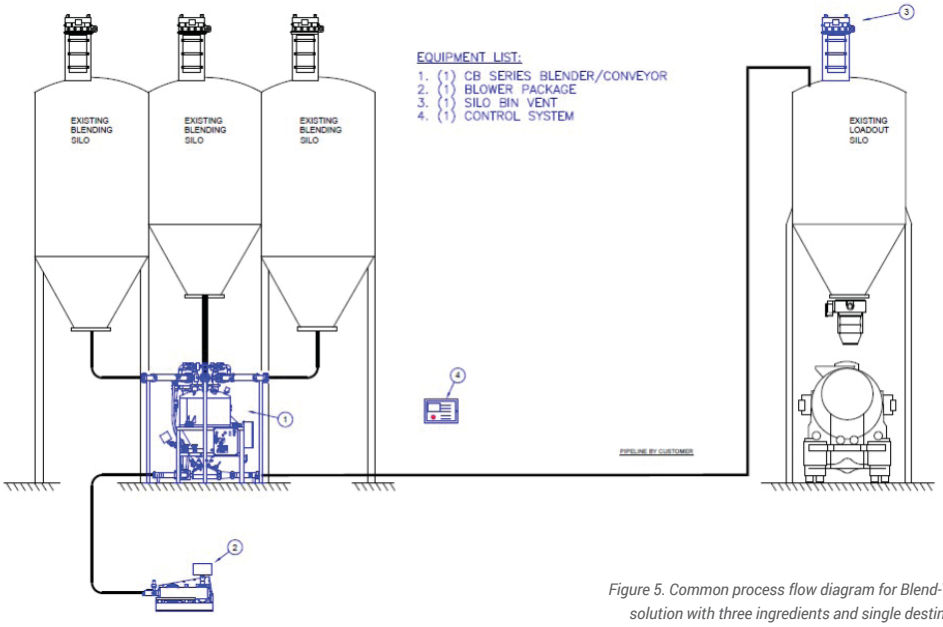


Figure 5. Common process flow diagram for Blend-Veyor solution with three ingredients and single destination