

# Vertical Seed Conditioner

Crown Iron Works Company

A CPM Company



# Vertical Seed Conditioner



## GENERAL FEATURES

The Crown Vertical Seed Conditioner (VSC) is a combination heater and dryer used on free flowing granular solids such as soybeans and rapeseed. The heater is a stacked design with multiple heating sections using low-pressure (1 Bar or 15 PSI) steam heated oval tubes. Crown's patented aspiration system dries the seeds by removing the free moisture brought to the surface during heating. A low-powered rotary style discharge creates a steady material flow to the plant with minimal electrical load requirements.

In soybean applications, seeds up to 14 percent moisture can be fed into the VSC, eliminating the use of grain dryers for processing. The typical retention time in the VSC ranges from 25 to 35 minutes depending on the required results for conditioning, drying and heating.

The VSC can be used for other applications including canola for pre-heating, final conditioning of soybean cracks prior to flaking in conventional dehulling systems, corn germ preparation, along with conditioning of many other oil seeds.

With five (5) models available, Crown can supply VSCs from a plant capacity as low as 25 MTPD (metric-tons-per-day) up to 3,500 MTPD. The flanged heating section design gives customers the option to easily expand their plant by adding heating sections.

The Crown VSC provides the greatest efficiency and lowest installation and operating costs of similar conditioning and drying methods currently available. The VSC is also a main component of Crown's industry leading dehulling systems.



## CROWN BEAN HEATER 'VSC' FLOWSHEET FOR SOYBEANS:

With traditional soybean preparation systems, beans are received and stored prior to processing. Traditional systems typically utilize a process dryer and a tempering operation which include a high degree of labor, maintenance, handling losses, along with other costs associated with the dryer. These systems also heat the beans twice which can deteriorate the oil quality.

Unlike the traditional system, all of the operations are performed in the preparation plant with a Crown vertical seed conditioner eliminating the need for the traditional dryer and its associated costs. The beans are heated once and kept hot, throughout the whole process.

Whole soybeans are delivered to the plant from the receiving silos and are metered and cleaned. After passing through the cleaners, the beans are delivered to the VSC. The beans are uniformly heated by contact with a series of steam-heated oval tubes extending the width of the VSC. This process can raise the temperature of the beans to approximately 70° C (158° F). While heating the beans, up to 3% moisture can be removed with the patented Crown aspiration system. Residence time in the VSC is approximately 25 to 35 minutes depending on the moisture level of the beans, allowing time for full bean conditioning. The fully conditioned beans are sent to the remainder of the preparation equipment.



## **ASPIRATION SECTIONS:**

Each VSC is equipped with a patented Crown aspiration system. This system is designed to remove free moisture created while the seeds are slowly heating. Air inlet and exhaust sections specifically designed to distribute fresh air through the entire bed of beans is installed between the heating sections.

As the seeds flow down the VSC, the seeds are in contact with the tubes heating and also bringing the moisture to the surface of the seeds. During aspiration, the direct air contact pulls the free moisture away. The aspiration system is designed as a complete negative air system. The fan is designed to pull air completely through a fresh air heater, the VSC, the ducting and cyclone prior to entering the fan. The air enters at various locations, typically towards the inlet hopper, the middle and near the bottom of the VSC. The air discharge, located near the center of the VSC, is controlled by butterfly dampers supplied by Crown.

With drying ability of up to three percent, a processor can receive beans at 14 percent moisture and reduce seed cost or eliminate additional drying prior to processing. In soybean production, the end result is to dry the seeds to approximately 11 percent at VSC discharge.

## **ROTOR DISCHARGE:**

The rotor discharge is a chain and sprocket driven unit protected by a shear pin hub. Multiple pocket type feeders are chained together to operate with one small, one and one half maximum, horsepower variable speed drive. This true volumetric feeder has been used by many plants to set the production rate for the remainder of the crushing process. The tight tolerance on the rotor plates completely halts the flow of material to ensure a positive shut-off when stopped. The rotors turn at two to three RPM, reducing the wear on the rotors, resulting in a very long lasting, maintenance free discharge.

## **CROWN LABORATORY VSC:**

At the Crown Laboratory located in Roseville, Minnesota, a Model 18 VSC is installed and available for clients and potential clients to test various products. Clients can call Crown to set up a test run prior to making any final purchasing decisions.

## Aspiration Section



## Rotor Discharge



## Lab VSC



## VSC PARTS

### INLET HOPPER:

The inlet hopper allows for a short-surge capacity before beans enter the VSC heating sections. A level of seeds is continually maintained above the top row of tubes to ensure excess tube wear does not occur. A flange is supplied for bolting an ultrasonic level device to the inlet hopper. The ultrasonic level device is used to control material flow and discharge speed from the VSC. Additional surge capacity can be added by supplying inlet extensions.

### HEATING SECTIONS:

VSC heating sections are square with a steam inlet header on one side, and a condensate header on the other. Multiple oval 304L stainless steel tubes are welded into a 304L stainless tube sheet. Bolt-on covers are supplied on both steam and condensate heating sections allowing full access for tube maintenance and replacement.

Removable doors with lexan sight glasses are supplied on two sides to view the seed movement and allow internal access. During installation, sections are stacked and rotated to allow for proper mixing of the seeds, avoiding short-circuiting. The oval tubes are designed and spaced for maximum bean contact as they are traveling through the VSC. This design results in consistent heating and conditioning in all seeds.

### Inlet Hopper



### Heating Section



## TYPICAL VSC INSTALLATIONS:

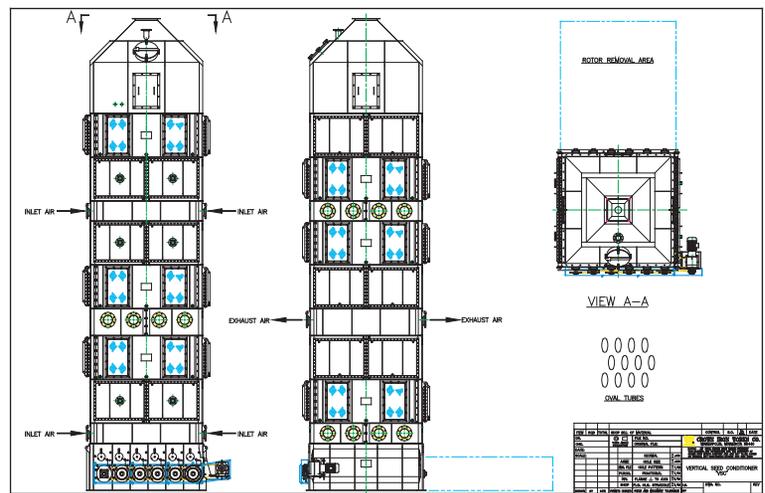
The typical VSC is mounted on a steel platform level with a discharge hopper below. A take away conveyor, typically an L-path conveyor, elevates the conditioned beans to the next phase of the process. A VSC can be installed inside the preparation building, or just outside the walls of the preparation building. It is essential to insulate the VSC to maintain temperatures and reduce the risk of moisture build-up inside the unit.

The largest single VSC Crown offers will condition 3,500 MTPD of soybeans. If more production is required, multiple units will be offered. Smaller capacity units can be easily expanded by installing additional heating sections and increased drying. When market conditions warrant, the VSC can easily be expanded into a full Crown Hot Dehulling system.

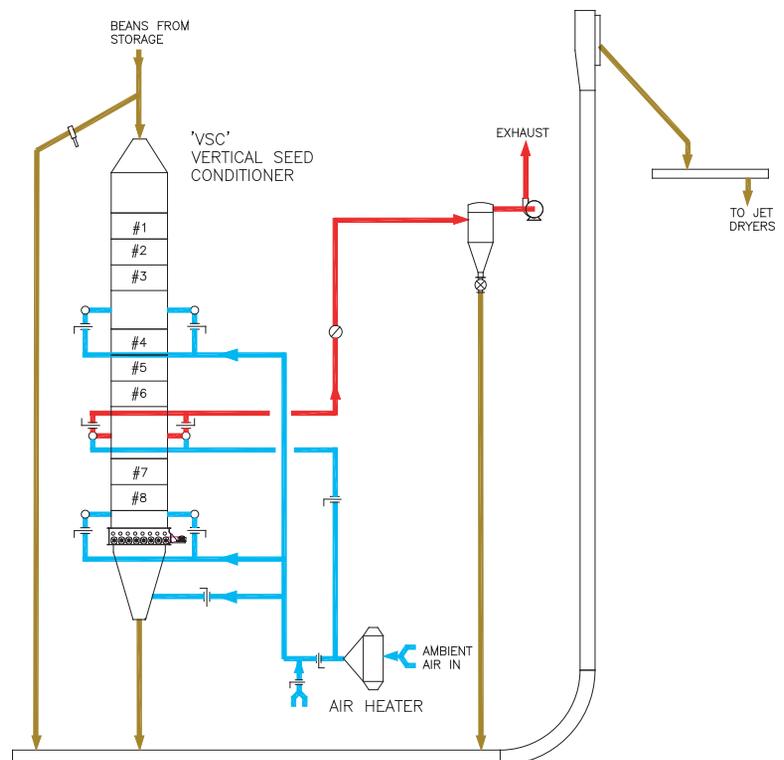
## CROWN VSC HIGHLIGHTS:

- Five (5) models available (25 – 3,500 MTPD)
- Stack up to 12 heating sections in one unit
- Easily expandable by adding sections
- FIFO, a true first in first out system
- Oval tubes increase heating surface area
- Low pressure steam (1 BAR or 15 PSI)
- Up to 3 % drying with the Crown patented air system
- Low power volumetric rotor discharge (1 1/2 hp [1.2 kw] maximum )
- Heating sections use oval 304L SS tubes and tube sheets
- Access to all tubes with removable covers
- Wear protection armor on top row of tubes
- Side inspection covers to watch product flow during operation
- No need for expensive and high maintenance grain dryers
- Optional heat sources include hot water or flash steam
- Proven technology as a canola pre-heater, soybean crack conditioner, and corn germ conditioner
- Many other seeds can be tested in the Crown laboratory.

## Assembly Drawing



## Flowsheet





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