MODEL: 4’ X 12’ COOLER

CUSTOMER: XXX

SERIAL NO: JXXXXX

DATE: MAR X, 20XX

Supplied by:

BEVCO SALES INTERNATIONAL

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TABLE OF CONTENTS

CHAPTER 1

1.1. GENERAL INFORMATION

The Bevco cooler is designed to cool bottled or canned product after filling. This is accomplished by running the product through a machine which deluges it with cool water. The cooling of the water is assisted by the evaporative effect of a large volume of external air being forced through the machine when in operation.

The primary cooling source used is water, which is recirculated within each zone. No new water is added to the system unless the reservoir water exceeds a preset temperature. The cooler is divided into various zones; for cans, the infeed zone is the pre-cool area and recirculates the warmest water in the system. The cool zone is next, and has somewhat cooler water than the pre-cool area. The outfeed zone is the final cooling zone and contains the coolest water in the system.

The outfeed zone is also the control zone of the machine. New water is added to this zone as required, based on the water temperature in the zone. The zones all share a common reservoir tank, but it is baffled between zones. These baffles restrict water flow between zones, but do allow some from one zone to the next.

Because of the system of baffles, when fresh water is introduced into the final cooling zone, water will migrate over the baffle into the cooling zone and from the cooling zone into the precool zone. The precool zone contains the water outlet and will dump water from the reservoir to drain or to a water recovery system.

The temperature at which water is added to the system is preset at the desired temperature to achieve maximum efficiency. If the product is overcooling, the set temperature can be raised and the water usage of the system will decrease.

Each zone recirculates water at the rate of approximately 3 US gallons/minute/square ft. The pumps draw water from a pump box with double screens between the tank and the pump box. Each screen can be pulled out separately to allow for cleaning while in operation. The screens are a #12 x .023 stainless steel mesh with a maximum opening of .060”. The nozzles used are Spraying Systems #HH-50W, with a 17/64” orifice. Anything

which passes the screen will easily pass the nozzle. This eliminates nozzle plug-ups and keeps maintenance time to a minimum.

The secondary cooling source used in the Bevco cooler is the outside air circulated through the machine. A large quiet blower is mounted at the exit of the cooler and functions as a blow off for exiting product as well as introducing a large volume of air into the machine.

The blowers are ducted to the outside of the building, ideally straight up through the roof. The fans are adjustable and can be tuned to ensure the internal pressure of the plant is not affected. When properly set, no plant air will be drawn into the machine, nor will air be blown into the plant. When flow of air cools the water and the containers through evaporation and reduces the amount of additional cold water required. The amount of cooling provided will vary depending on outside air temperature and humidity and water temperature.

For clean-out purposes, there are main doors in each section of the tank. In addition, the top has lift-out doors to access nozzles, chain, etc. Each section also has removable Lexan windows through which cooler operation can be observed and product can be removed.

CHAPTER 2

2.1. SAFETY REQUIREMENTS

> *WARNING: Bevco coolers are automated, and once energized the equipment can start or stop at any time. All equipment must be LOCKED OUT electrically and mechanically before any maintenance or work of any kind is performed on the equipment.*

All maintenance and repair work must be performed by qualified personnel.
No equipment shall be operated with protective guards, covers or railings removed.
Care and attention shall be taken at all times in the vicinity of any operating equipment.
Worker's Compensation Board (Occupational Safety and Health of America) regulations shall be adhered to in all cases.>
Be aware, this equipment has many moving parts and pinch points, and extreme caution is advised when the cooler is in operation.
Safety warning stickers have been affixed to the equipment and must not be removed.

> *The foregoing and following safety suggestions should not be considered as limiting in safety precautions to be followed. Local conditions, environment and prudent judgment in safety should be paramount at all times.*

2.2. RECOMMENDED LOCK-OUT PROCEDURE

> *The following checklist is designed to be followed when it is necessary to deactivate a cooler in order to perform maintenance or inspection. The objective is to deactivate the equipment in such a manner that it cannot be mistakenly energized. The preferred method of deactivation is to "lock-out" as opposed to "tag-out".*

Notify the operator and supervisor of impending lockout and the reason for the action.
Shut down the equipment using the normal, recommended shutdown procedures.
Disconnect and lockout supply voltage at distribution panel.
Open equipment control panel door and test circuit on the supply side and the load side after opening the disconnect. NOTE, Check the voltage tester on a known energized source before testing the circuit.
If there are electrical interlocks, lock them out as necessary.

After performing voltage tests in 4 above, recheck the voltage tester on a known energized source.

Operate control switch, button etc. to make sure equipment is deactivated.

Discharge any electrical, pneumatic, or water sources that could hold potential energy.

If more than one person will be working on the deactivated equipment then each person shall attach their lock or lockout to that equipment.

When the equipment is ready to be activated the following procedure should be adhered to.

Inspect the work area to ensure that non-essential items have been removed and to ensure that the equipment is operationally intact.

Remove the lock-out/padlocks.

Ensure that all employees are clear of the equipment.

Begin energizing the circuitry starting at the furthest disconnect. When it comes time to energize the actual piece of equipment ensure that any switches etc. are in the “off” position.

Energize the equipment for testing. Follow recommended start-up procedure. If for any reason the equipment must be shut back down for further trouble shooting or repair then the entire lockout procedure must be followed.

CHAPTER 3

3.1. RECOMMENDED INSTALLATION

All required fittings and gasket materials are supplied. Wrenches, Alignment bars, Pipe wrenches etc. controlled by competent Mechanics/Millwrights are all that is required to properly assemble the cooler.

Personnel qualified as electricians and those knowledgeable with piping will be required for finalizing the installation.

Spot the first section module, set height, level and connect appropriate conveyor sections.
Spot the second module in line leaving a space between it and the first section.
Install 2-inch gasket (provided) around one side of the flange on all mating surfaces. This gasket is “tape-back” on one side for easy application.
Using alignment bars, pull the two modules together. Install bolts, washers and nuts and tighten in sequence starting at the bottom middle and working out to both edges, then upward to the top middle. NOTE; the interior bed, flange bolt holes and edges must be perfectly aligned before tightening.
Run a bead of silicone on all inside joints on the tank. Joints must be clean and dry before applying silicone.
Install the blowoff header at the outfeed end of the cooler.
Install the exhaust fan and blowoff blower. *CAUTION* These units are heavy and awkward, and at the same time the housings are fragile. The blowoff blower mounts on the corner of the outfeed end. The exhaust fan mounts on the center of the machine, with airflow up.
Attach the blower end to blowoff unit with the flex hose provided.
On the inside of the cooler, secure the loose wearstrip ends. Do not over tighten the screws. Wearstrip should be free to expand or contract without hindrance. If the wearstrips can’t expand then buckling will result.
Install the belt. NOTE the center sprockets on both the drive and idler end will have to be positioned correctly to match the belt openings. These two sprockets are keyed to the shaft(s) and can not move side to side. The remaining sprockets are not keyed and are free to move as the belt expands or contacts. Belt positioning is critical to insure proper

tracking. Note the locations on the sidewall of the first and last module for insertion of the belt hinge pin when joining the belt ends.

Install infeed/discharge conveyors. Pay attention to transfer match for level.

Position the pumps and re-connect to the cooler modules.

Install finger transfer dead plates at both the infeed and discharge end. When these finger transfer plates are properly bolted in place they are free to move within the confines of the slot that the mounting bolt goes through. Proper location is determined by the grooves in the conveyor belt.

Connect electrical supply lines for re-circulation pumps, belt drive, blower and control switches.

Mount two (2) switch gates, (supplied), at the outfeed of the cooler on the takeaway conveyor.

Supply correct power to the panel.

By using a motor rotation tester or by carefully “bumping” the motors, check the rotation of all motors. I.e. belt drive, blower drive, etc. Reverse rotation can cause damage. Do not run the motors yet.

Connect main water supply to the “make up” tank area.

Set the manual temperature control to your operating range. Reattach all plumbing to the unit.

Ensure cleanout doors are properly closed and sealed.

Turn on the water supply. Use the bypass valve for quick filling.

When tank level is up, turn the module pumps on and insure that all spray heads and pumps are functioning properly before proceeding.

Turn main belt drive on and observe for at least one revolution to insure that the belt tracks properly.

3.2. STARTUP

Before initial operation, the following are to be covered:

Confirm all service connections.
Lubricate all bearings – keystone Pennwalt Nevastane HT-2, for food and beverage, or its equivalent.
Check all drive units for oil level and top off if required – Shell Omala 680 or equivalent.
Confirm correct motor rotation.
Lubricate all drive chains with SAE 30 non-detergent oil.
Check alignment of equipment and ensure it is firmly anchored to the floor.
Check and tighten all bolted connections.
Ensure all safety guards and covers are in place.
Test run all pieces of equipment without load and inspect for proper operation prior to container flow.

3.3. NORMAL OPERATION

To start up initial operation, or after draining and cleaning:

The cleanout doors on the side of each module should be closed and properly sealed.
Turn on the main water supply in sufficient time to have the water up to level and temperature prior to product being introduced. Level must be high enough to prevent pump cavitation.
Turn on the drive motor for the mattop belt.
Turn on the spray pump for each zone.
Set any temperature controller.
Adjust the mattop belt speed to ensure the containers cover the width of the belt. This is done with the potentiometer on the control panel. Maintain a record of the required speed setting for each product. Speed is indicated on the digital readout in the panel.
Check all pump boxes to ensure the pumps are not cavitating. (I.e. sucking air). If the water in the pump box appears to be lower than the tank level, check the filter screen and clean if required.

3.4. DAILY OPERATION

Check the temperature gauges on the spray header feed lines. This will give the exact temperature of the water going to the spray nozzles.
Check the pressure gauge on the spray header feed lines. This gives the pressure of the water going to the nozzles. It will vary from module to module and is not critical as long as the nozzles are maintaining a proper spray pattern. A decrease in the normal operating pressure may indicate a problem with the pump while an increase in pressure may result from plugged nozzles or an obstruction downstream from the gauge.
The filter screens in the pump boxes should be cleaned on a regular basis, at least daily. They should be checked hourly, especially if a new run is being done. An excessive amount of product spilled in the cooler could result in screens plugging quickly. A plugged screen will result in pump cavitation and early pump failure.
As double screens are supplied, the plugged screen may be removed while the pump is running. After cleaning it can be replaced with no pump interruption.

3.5. OPERATIONAL INTERLOCKS

If either of the two rail switches at the cooler outfeed is activated, the main drive motor will stop after a predetermined time.
If the main water level is below the operating level the float switch will not be activated and none of the drive or pump motors will operate.
If the water level in a pump box drops below operating level the pump will stop and will have to be manually started. NOTE if a filter screen is getting dirty it can restrict the flow sufficient to trip the pump out. As soon as the pump has stopped the water level may come back up to operating level and give the false impression that nothing is wrong.

3.6. MAINTENANCE

> *A minimum of maintenance has been designed into your BEVCO cooler. All maintenance requirements have been kept as simple as possible and are not meant to take the place of any additional preventative maintenance procedures you require for your operation.*

The time frames suggested are rough guidelines only, and you may want to perform the procedure more or less frequently than indicated.

Daily:

Visually inspect water level, operation of nozzles and filter screens on an hourly basis. Nozzles should be spraying a full cone, coarse spray. Filters should be clean and allow unobstructed water passage.
Visually inspect finger dead plates and mattop belt for broken or damaged areas that could cause container instability.

Weekly:

Drain and clean the tank. Refill with clean water, treat if necessary

Clean any accumulation of dirt, dust, grease, or other debris from the top and sides of the cooler

Check the tension of the “V” belt on the exhaust drive. The sheave on this motor is adjustable so that blower speed can be changed.

While the pumps are running, open the ball valves inside the cooler on the end of each spray header to flush out the header. Leave open for 30 seconds, then close.

Monthly:

Check the chain on the main drive. Chain take-up is accomplished by moving the motor on its base mount. No adjustment should be required until the drive chain exhibits excessive stretch.

Grease main shaft bearings if necessary.

Clean spray nozzles if needed.

Clean idler shaft bearings if needed.

Quarterly:

Thoroughly clean the inside of the cooler. This may involve chemical treatment as well as washing and rinsing.

Check and lubricate the main drive chain.

Yearly:

Service the pump motors as per manufacturers specifications.
Service the blower as per manufacturer's specifications.
Check the oil level in gear reducers. Correct any deficiencies.

3.7. EXTENDED SHUTDOWN PROCEDURES

If the operation is to be shut down for an extended period of time, care must be taken to ensure problems are avoided on restart.

Drain the tank and clean thoroughly. Use a disinfectant to ensure no growth occurs in the tank. Refer to the section on cleaning for more information.

Grease all bearings and ensure all moisture is driven out.
Check the oil levels in the gearboxes and top up where necessary.
Lubricate the main drive chain.
Lock-out the electrical system.
Clean all external surfaces of the cooler.

3.8. RESTART PROCEDURES

After any lengthy shutdown, refer to the start-up procedures (Section 3.3) prior to running the equipment.

CHAPTER 4

4.1. CONTROL SYSTEMS

The BEVCO cooler in your plant has been controlled through the PLC. The main drive is controlled through an inverter, and speed can be set on your main control panel. The actual speed of the belt is recorded on readout also located on your main panel. A record of the required speed for each product should be maintained for future start-up.

Each motor, including pumps and fans, has a separate start/stop button on the main panel. Individual motors can be shut down when not required. A red or green pilot lamp on the main panel indicates the condition of each motor.

The inlet of fresh water is controlled through a solenoid valve. There is also a by-pass to facilitate filling the tank on initial start-up.

Float switches are located in the tank to indicate a low water condition. The uppermost float operates the solenoid valve to allow fresh water into the cooler when the level drops.

The second float switch indicates a low water condition and shuts down all pumps. This is to protect the pumps from drawing air if the level is too low.

Additional float switches are located in each pump box. These will shut down the individual pump if the filter is plugged and water level is too low.

A single large blower is included at the discharge end of the cooler to blow water off containers as they exit. In addition, a second blower moves air through the interior of the cooler to facilitate evaporative cooling.

4.2. CLEANING PROCEDURES

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The BEVCO cooler has been designed and built with ease of cleaning in mind. The exterior of the cooler has been kept as simple as possible and easy access to the interior is included. A suitable mild cleaning solution is recommended.
Cleaning Schedule:

Daily:
Remove all filter screens and clean thoroughly with a high-pressure hose. Because the filters will trap the majority of spilled product, they may be subject to bacterial fungus growth and therefore should be monitored closely

Weekly:
Drain the cooler.

Remove clean-out doors on each section. Check for a buildup of sludge and debris in the tank. Also check for any growth in the tank.
If the infeed section shows excessive dirt or contamination, check the remaining sections as well. The tank modules should be cleaned with a high pressure hose and a squeegee with a handle long enough to remove all excess water.
Wipe down the exterior of the cooler with a damp cloth. The top should be cleaned with a long handle mop to prevent the buildup of dirt and grime. IT IS RECOMMENDED THAT YOU DO NOT WALK ON THE TOP OF THE COOLER.

Monthly:
Drain the cooler completely.
Clean out the interior of all tanks with a high-pressure hose and long handled squeegee.
The inside of the tank should be sprayed with a sanitizing agent as recommended by your local chemical supplier.
Thoroughly rinse all surfaces after sanitizing as the chemicals may be corrosive.
Monitor the condition of the rinse water to see if more frequent changing of the water is required to inhibit biological growth in the tank.

Wash down the top, interior of the cooler using a high-pressure hose and gaining access though the inspection windows.

CHAPTER 5

5.1. SUPPLEMENTAL INFORMATION

SCOPE OF WORK

Job Specific

5.1. PHOTOS

PHOTOS OF UNIT

OVERALL VIEW OF COOLER

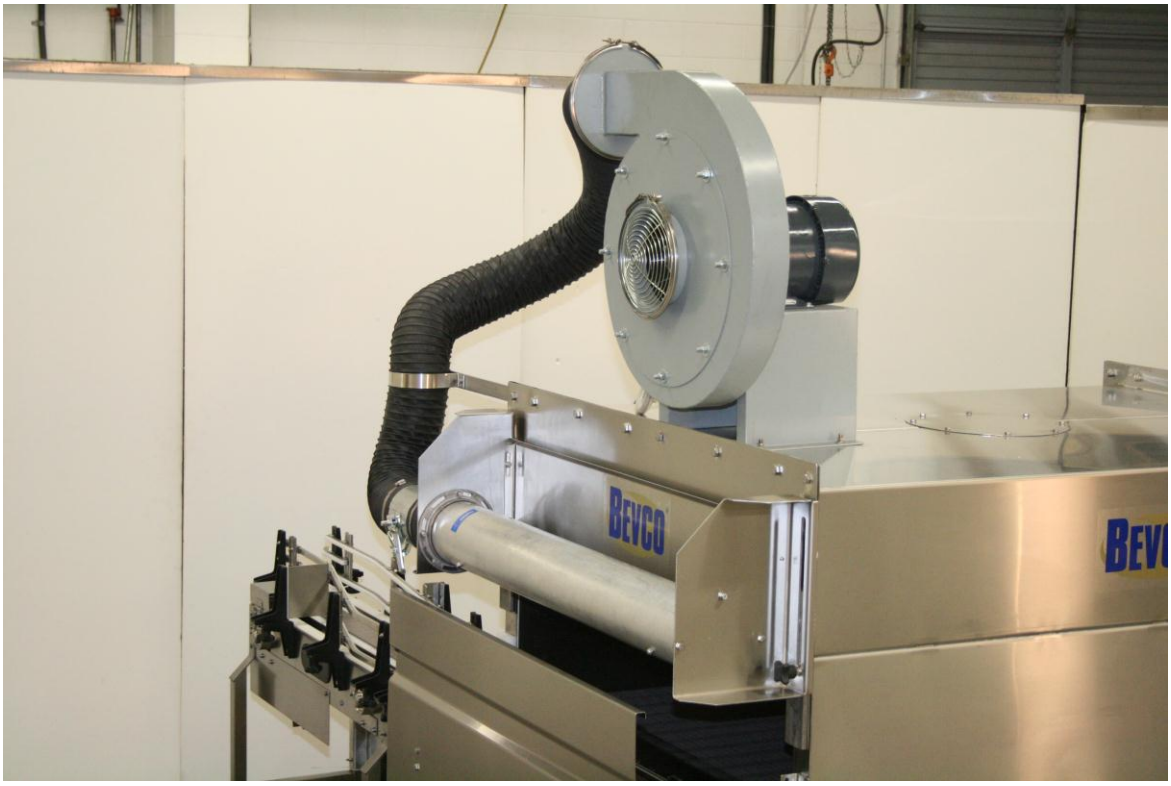
OVERALL VIEW OF COOLER

INFEED END OF COOLER

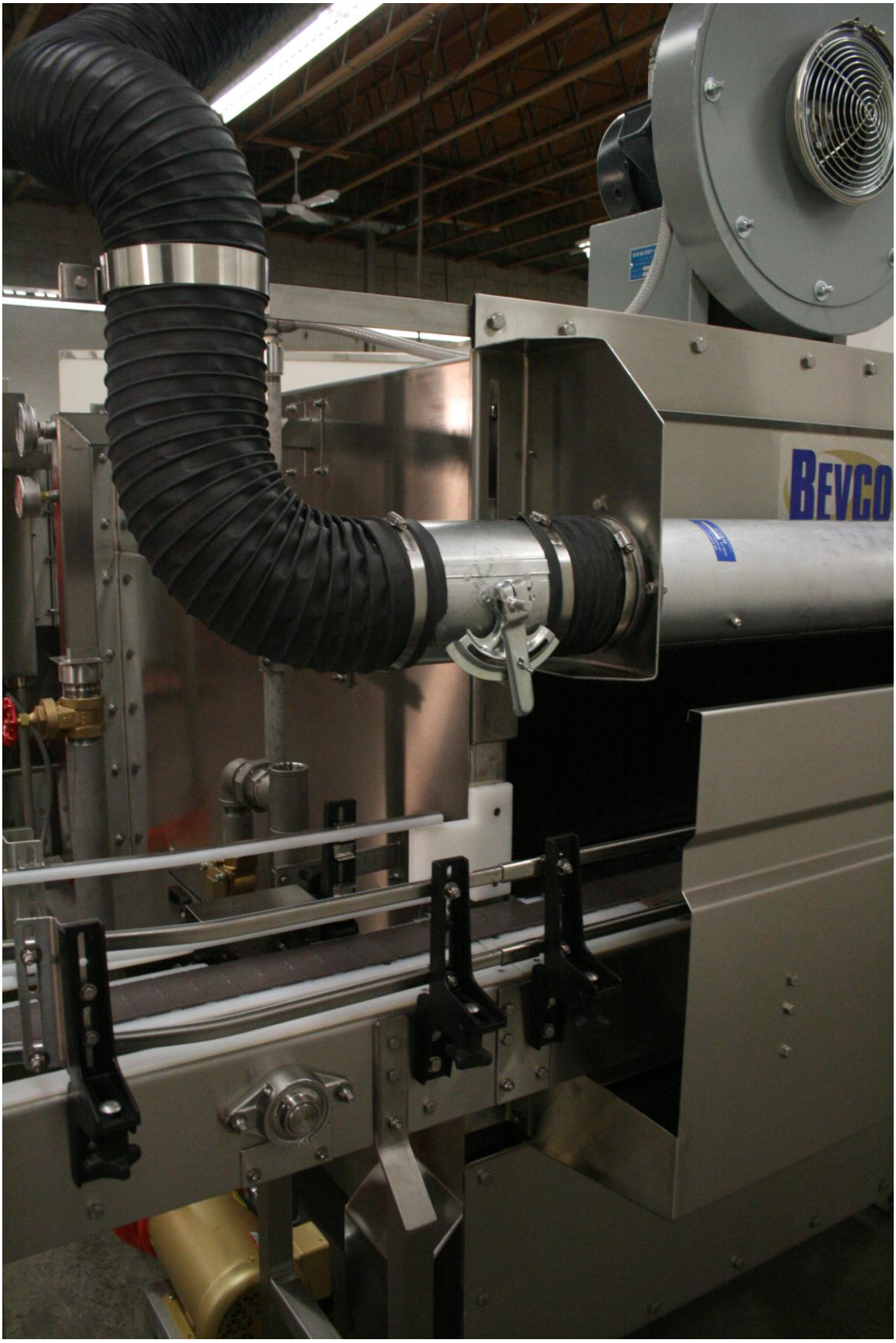
INFEED END OF COOLER

OUTFEED END OF COOLER

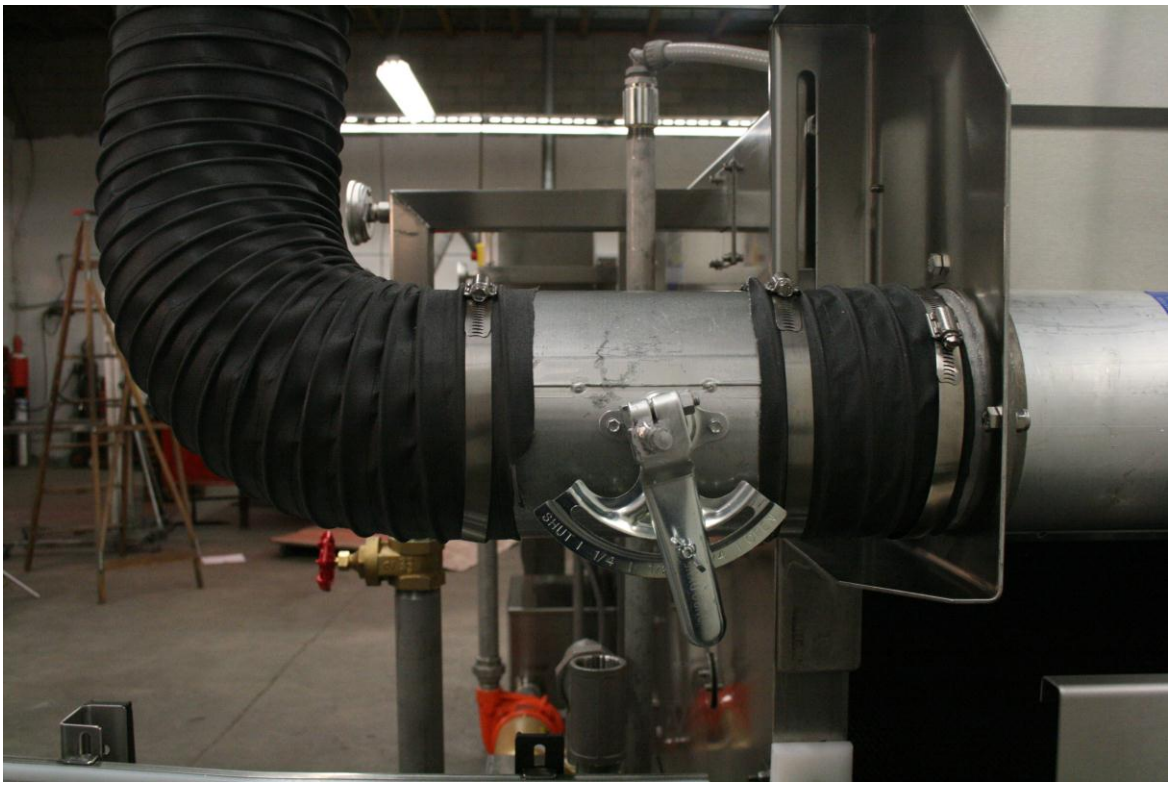
ELECTRICAL PANEL



BLOWER AND AIR KNIFE



OUTFEED END, AIR KNIFE AND AIR DAMPER



AIR DAMPER

CLEAN OUT DOOR AND FLOAT BOX

CLEAN OUT DOOR ON DRIVE END

PUMP SIDE PROFILE