

CON-E-CO®

An Oshkosh Corporation Company

Batch Plant and Central Mixer Operations Manual



SOLID PRODUCTS
SOLID PERFORMANCE

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The information found in this manual is supplied as a reference to the plant operator on the proper operation of CON-E-CO Batch Plant and Central Mixers. This information should be referenced when installing new equipment and when operating the equipment. Operating equipment not within the manner advised here by CON-E-CO may cause damage to the equipment and affect the warranty of new equipment.

Table of Contents

Section One-Batch Plant Components

Aggregate Batcher (Scale).....	1
-Discharge Gates.....	1
-Discharge-Feed Interlock.....	1
-Vibrators.....	2
Aggregate Batcher-Lo-Pro (Live Bottom)	
-Operation.....	2
-Variable Speed Conveyor.....	2
-Batcher V-Trough.....	3
-Conveyor Interlock.....	3
-Discharge-Feed Interlock.....	3
Mixer Charging Conveyor	
-Operation.....	3
-Start Warning Horn.....	4
-Conveyor Pull Cords.....	4
-Telescoping Discharge Shroud.....	4
-Retractable Drip Pan.....	4
Aggregate Feed Gates	
-Operation.....	5
Cement Batchers (Scale)	
-Discharge Gates.....	5
-Discharge-Feed Interlock.....	6
-Vibrators.....	6
-Aeration.....	6
-Batcher Filter Vents	
-BV Series.....	7
-PJC Series.....	7
Cement Batchers-Lo-Pro.....	8
Cement Feed Gate	
-Operation.....	8
-Emergency Slide Gates.....	9
Cement Feeder Screw (Screw Conveyor).....	9
Cement Air Conveyors.....	10
Cement Silo Aeration.....	10
Cement Silo Level Indicators.....	11
-Low Indicators.....	11
-High Indicators.....	11
Silo Overfill Protection (Pinch Valves).....	12
Cement Silo Filter Vents (Pulse Jet)	
-Operation.....	12
-Cleaning.....	13
Silo Pressure Relief Valves.....	13
Water Meter	
-Badger Turbo Meter.....	13
-Badger Mag Flow Meters.....	14
Water Batcher (Scale).....	14
-Discharge-Feed Interlock.....	14
Water Holding Tanks.....	14
Water Surge Tanks.....	15
Water Feed Valve.....	15
Water Pumps.....	15
Pneumatic Systems	
-Air Compressor.....	16
-Air Dryer.....	16
-Plant Compressed Air Lock Out.....	17
-Filter, Regulator and Lubricators.....	17
-Solenoid Valves.....	18
Electrical System.....	18

Section 2-Transit Mix (Dry Batch) Plant Discharge

.....	19
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Section 3-Aggregate Handling System

Pivot Distributors (Turnhead).....	20
Radial Stackers.....	20
Plant Charging Conveyor	
-Operation.....	20
-Start Warning Horn.....	20
-Conveyor Pull Cords.....	21
-Aggregate Keep Full System.....	21
-Emergency High Level Indicators.....	21
-Material on Belt Sensor (MOB).....	22
-Charging Conveyor Hopper Vib.....	22
-Charging Hopper Feed Gates.....	22

Section 4-Mixer & Central Dust Collector

-Cleaning.....	23
-Suction Blower.....	23
-Discharge of Reclaimed Material.....	24
-Reclaiming Direct Into Scale.....	24
-Reclaiming Using a Blower	
-Pressure Pod.....	24
-Vane Feeder.....	25
-Magnehelic Gauge.....	26
-Damper Valve.....	26
-Back In Shroud.....	27

Section 5-Tilt Central Mixer

Hydraulic Systems	
-Hydraulic Pump.....	27
-Hydraulic Control Valves.....	28
-Emergency Tilt System.....	29
-High Temperature & Low Oil Sensor.....	29
-Tank Heater.....	29
-Hydraulic Cylinders & Counter Balance Valves.....	30
Electrical Control-Tilting and Righting	
-Tilting and Righting.....	30
-Tilt Speed Potentiometer.....	31
-Tilt and Righting Limits.....	31
-Tilting and Righting Cushion Speeds.....	32
-Dust Shroud Interlock.....	32
Electrical Control-Drum Rotation	
-Single Speed.....	32
-Tilt Mixer VFD (Intelli-Drive).....	33
Auto Oiler Operation.....	34
Slump Meter.....	35
Dust Shroud.....	35

Section 6-HRM (Horizontal Reversing Mixer)

Operation.....	36
Remote Mixer Control Panel.....	36
Mixer Operation (From Batch Control).....	38
Mixer Charging Chute.....	40
Slump Meter.....	40
Emergency Drives.....	41

Table of Contents (cont.)

Section 7-Central Mix Plan Material Discharging and Sequencing.....41

Section 8-Maintenance Schedules
Plant Maintenance and Lubrication
Schedule.....44-45
Tilt Mixer Maintenance and Lubrication
Schedule.....46-47
HRM Maintenance and Lubrication
Schedule.....48-49

Plant/Mixer recommended Lubricates.....50

Section 9-Troubleshooting Information
Conveyor Belt Training and Adjustment.....51-55
Valve vs. Cylinder Leak Test.....56
Load Cell Troubleshooting.....57
Badger Turbo Meter Troubleshooting.....58-59

Section 10-Other Information
Silo Capacities.....60-62

Section One-Batch Plant Components

Aggregate Batcher (Scale)

Discharge Gates

Aggregate batcher discharge gate(s) are operated by a pneumatic cylinder. The cylinder receives air from a double acting solenoid valve that operates from an electrical signal from the batch control. To operate a double acting (inching) solenoid valve two signals are required an open and a closed, both signals need to be momentary. Flow controls are installed on the solenoid valve or cylinder that regulates the air flow to the cylinder. The flow controls are installed allowing the operator to regulate the speed at which the cylinders move to allow for precise control of the gates.

During normal operation of the plant the batch control will control the operation of the gates and the discharge rates. The batch control does need to be programmed properly to operate the gate efficiently. Below are some settings that may affect the operation of the gate. Note: These settings may be labeled differently depending on the manufacturer of the control.

Flow Rate (Minimum and Maximum)-Most batch controls try to obtain a flow rate when discharging; they will typically try to stay in a range and work off of a minimum and maximum setting. The settings for this need to be determined for each plant individually.

Initial Open-The initial open setting is used to get the gate opened at the start of discharge. Typically the initial open setting should get the gate $\frac{1}{4}$ - $\frac{1}{3}$ of the way open with the first pulse or to get a good flow rate started.

Open and Close Pulse-After the discharge gate has been opened with the initial open pulse, the open and close pulse takes over for the remainder of discharge. If the batch control determines the flow rate needs to be adjusted a pulse will be sent to the open or close the gate depending on if the discharge rate needs to increase or decrease. Each open or close pulse should move the cylinder $\frac{1}{8}$ of its overall travel.

Discharge-Feed Interlock

The air cylinders that actuate the discharge gates of the aggregate batcher are equipped with a reed switch (limit switch) attached to a tie rod. The piston of the air cylinder has a magnetic strip on it that the reed switch senses. The reed switch is used to let the batch control know if the discharge gate or gates is closed. If the batch control does not see a closed signal from the reed switch it will not allow material to be fed into the scale. Located on most batch control is an indicator light that

verifies when the gate or gates are closed.



Vibrators

Aggregate batchers are equipped with a pneumatic vibrator. The vibrator receives air to operate from a single acting pneumatic valve. The electrical signal to the valve for the vibrator should be momentary. The vibrator for the aggregate batcher should be setup in the batch control to come on to help clean out the batcher at the end of each batch. The vibrator should be set up to come on when there is less than 1500 pounds of material in the scale. The vibrator can also be set up in most batch controls to activate if the flow of material drops below a certain rate (lbs/sec) or stops. **Caution: The overuse or misuse of vibrator can cause damage to the batcher steel and vibrator mount.**

Aggregate Batcher-Lo-Pro (Live Bottom)

Operation

Plants equipped with a "Live Bottom" (Lo-Pro Style) batcher in place of gates use a conveyor belt to discharge the material instead of gates. During discharge of the batcher the batcher conveyor will discharge the material on to the mixer charging conveyor.

Variable Speed Conveyor

On most plants with this type of batcher, the batcher is controlled by a Variable Frequency Drive (VFD). The VFD is used to vary the speed of the belt so the discharge rate of the material can be adjusted, in the same manner as using discharge gates. The VFD is located in the plant main electrical service panel.

The speed of the conveyor is controlled by the batch control using the faster and slower function. The conveyor will operate in a range from 1/3 of full speed to full speed. Three outputs are required from the batch control to operate this batcher. The first is a maintain button that engages the conveyor to run and two individual momentary signals for the faster and slower function. When the speed of the conveyor is increased or decreased the VFD will maintain this speed until it receives another faster or slower signal. When the batch control adjusts the speed either faster or slower there should be a change of 3-5 hertz with each pulse. The actual speed the conveyor is running is displayed on the display of the drive in Hertz.

Batcher V-Trough



Internally in the aggregate batcher you will find an “inverted v-trough” that is used to keep the weight of the material off the belt and allow it to start under a load but still allow the material to flow around it. The “inverted v-trough” can also be used to control the rate of discharge out of the batcher. With the belt running at maximum speed if you are not getting a desired flow rate the trough can be raised to increase the discharge speed. When doing this be sure to check ampere draw prior and after adjustment to verify the motor is not being over loaded. When the trough is adjusted, make sure the front is higher than the rear, this will prevent binding of the material and damage to equipment

Conveyor Interlock

A “Lo-Pro” aggregate batcher conveyor is interlocked to the mixer charging conveyor, through the plant electrical system. This means the batcher conveyor will not start unless the mixer (incline) conveyor is running.

Discharge-Feed Interlock

When using a “LOPRO Style” aggregate batcher there are no air cylinders used to control the Discharge-Feed Interlock. Instead a set of contacts (N/C) are used on the “run” relay for the conveyor that will send a signal to the batch control that the conveyor is not running. This is an indication for the control that it is ok to weigh materials in the batcher if the conveyor is not running.

Mixer Charging (Incline) Conveyor Operation

The incline conveyor carries the aggregate from the aggregate batcher to the truck. It is interlocked with the aggregate batcher discharge gate or batcher conveyor so the incline conveyor has to be running before discharge of the aggregate batcher can begin.

Control for the conveyor should be provided by a momentary normal open start button and momentary normal closed stop button. When the start button is momentarily pressed a holding circuit through the motor starter or a holding relay latches in and keeps the motor starter pulled in, it will stay pulled in until the stop button is pressed and the holding circuit is broken.

It is recommended during periods of continuous batching that the conveyor is not started and stopped with each batch.

Start Warning Horn

Incline conveyor will be equipped with a start warning horn, the horn is installed to give personnel around the plant warning before the conveyor starts. The horn should be preset to sound for ten seconds prior to the conveyor starting, the timer for the horn can be found in the batch control or plant service panel, check electrical prints for location of timer.

Conveyor Pull Cords

Some conveyors can be purchased with pull cord switches, pull cords are installed to stop the conveyor when the pull cords are tripped. Prior to restarting the conveyor the reasoning for the pull cords being tripped needs to be addressed and the switches reset. The pull cord switches are properly operating if the switches are tripped and once reset the conveyor will not restart until the start button is pressed again, conveyor should not restart as soon as switches are reset.

Telescoping Discharge Shroud

If your plant is purchased with a telescoping discharge shroud (up/down shroud) two momentary signals will be needed to operate this component. The shroud is operated by an air cylinder that receives air from a solenoid valve. An up button and a down button will be needed; this signal will operate a double acting (inching) solenoid valve. Flow controls will be found on the solenoid valve or cylinder that will allow adjustment to the speed the shroud travels. This will allow the operator to place the shroud into the mixer truck at the desired depth for the most efficient charge of the mixer truck.

The cylinder for the up/down shroud will have a reed switch mounted on it to allow the indication of its position. This signal is usually used by the operator to identify when the shroud is in the up position to verify when the drip pan can be closed.

Retractable Drip Pan

A drip pan is used to catch material that drips or falls from the discharge shroud of the plant, the drip pan is usually under the discharge shroud whenever a truck is not. The drip pan is actuated by an air cylinder that receives air from a single acting solenoid valve. A maintain signal should be supplied by the control to active the drip pan. In the drip pans idle state it should be out from underneath the discharge shroud, so if the solenoid valve is activated the drip pan will move underneath the discharge shroud. This will prevent the drip pan from being damaged in case of power failures.

The cylinder for the drip pan will have a reed switch mounted on it to allow for the indication of its position. This signal is usually used by the operator to identify when the drip pan is in the retracted position so the operator knows it is safe to lower the up/down shroud.

Aggregate Feed Gates

Operation

The aggregate feed gates are used to discharge material from the aggregate storage bins into the aggregate batcher. The gates are equipped with air cylinders that are operated by pneumatic valves. The valves that operate these gates are single acting valves which require a momentary button in the batch control. When the valve receives a signal from the batch control the gate will open, when the signal is removed the gate will close.



Each aggregate gate has an air cylinder that is equipped with a quick exhaust valve plumbed into the rod end port of the cylinder. The quick exhaust valve is installed to exhaust the air at the cylinder instead of it having to travel back to the valve to be exhausted. This allows the gate to close quickly and reduce the chance of over weighing.

Cement Batchers (Scale)

Discharge Gates

The cement batcher discharge gate is operated by a pneumatic cylinder that actuates the gate. The cylinder receives air from a double acting solenoid that receives an electrical signal from the batch control. To operate a double acting (inching) solenoid valve two signals are required an open and a closed, both signals need to be momentary. Flow controls are installed on the solenoid valve or cylinder that regulates the air flow to the cylinder. The flow controls are installed allowing the operator to regulate the speed at which the cylinder moves to allow for precise control of the gate.

During normal operation of the plant the batch control will control the operation of the gate and the discharge rate. The batch control does need to be programmed properly to operate the gate efficiently. Below are some settings that may affect the operation of the gate. Note: These settings may be labeled differently depending on the manufacture of control.

Flow Rate (Minimum and Maximum)-Most batch controls try to obtain a flow rate when discharging; they will typically try to stay in a range and work off of a minimum and maximum setting. The settings for this need to be determined for each plant individually.

Initial Open-The initial open setting is used to get the gate opened at the start of discharge. Typically the initial open setting should get the open 1/4 -1/3 of the way open with the first pulse.

Open and Close Pulse-After the discharge gate has been opened with the initial open pulse the open and close pulse take over for the remainder of discharge. If the batch control determines the flow rate needs to be adjusted a pulse will be sent to the open or close depending on if the discharge rate needs to increase or decrease. Each open or close pulse should move the cylinder 1/8 of its overall travel.

Discharge-Feed Interlock

The air cylinder that actuates the discharge gate of the cement batcher is equipped with a reed switch (limit switch) attached to the tie rod. The piston of the air cylinder has a magnetic strip that the reed switch senses. The reed switch is used to let the batch control know if the discharge gate is closed, the reed switch should be adjusted so when the gate is closed a signal is sent to the batch control. If the batch control does not see a closed signal from the reed switch it will not allow material to be fed into the scale. Located on most batch control is an indicator light that verifies when the gate is closed.

Vibrators

Cement batchers are equipped with a pneumatic vibrator. The vibrator receives air to operate from a single acting pneumatic valve. The electrical signal to the valve for the vibrator should be a momentary button. On the cement batcher the vibrator should be set up in the batch control to come on to help clean out the batcher at the end of each batch. The vibrator should be set up to come on when there is less than 150 pounds of material in the scale. The vibrator can also be set up in most batch controls to activate if the flow of material drops below a certain rate (lbs/sec) or stops. **Caution: The overuse or misuse of vibrator can cause damage to the batcher steel and vibrator mount.**

Note: During the initial use of the cement batcher the batcher will hold some material that will remain in the scale; this material fills in all the corners and crevices. It is important that this material is zeroed off the scale and left in the scale; failure to do this will result in increased batch time and damage to the scale through over vibration.

Aeration

Gravity cement batchers are equipped with aeration pads in the batcher. The aeration pads receive their air from a single acting solenoid valve, the electrical signal for this valve should be a maintain button. Aeration for the scale should be activated by the batch control at the start of the weigh up process and remain on until the scale is empty at the end of discharge. A regulator will be located along with the solenoid valve for aeration; approximately 8 PSI is required for the aeration.

It is important when dealing with high pressure air being used for aeration that the air is non-lubricated, dry and filtered. Using lubricated and moist air for aeration will decrease the life of the air pads and reduce discharge speed.

Cement Batcher Filter Vents BV Series (BV-14 & BV-22)

Most cement batchers are equipped with a batcher filter vent (BV-14 or BV-22) in some cases batchers are vented back to central dust collector and in this case a batcher vent is not used.

The contaminated air enters the filter vent through its bottom flanged opening at the top of the weigh batcher. In the weigh batcher, many of the heavy dust particles settle out of the air stream due to a reduction of air velocity.

From the weigh batcher, the dust laden air flows up through the inside of the filter bags where the dust particles are trapped by the filter bags thus allowing the clean air to pass through the bags into the clean air chamber. From there, the air flows through the exhaust opening and into the atmosphere.

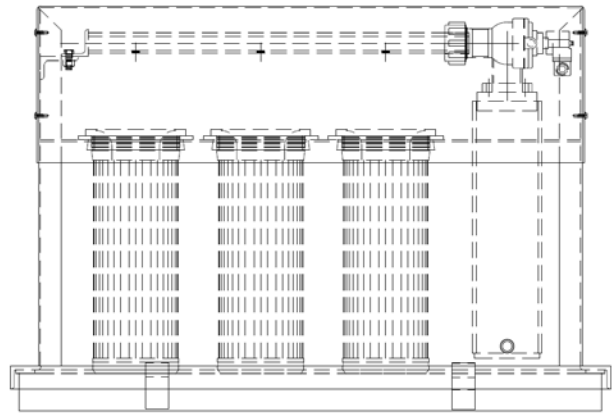
A vacuum is created inside the weigh batcher as the batcher is emptied. This vacuum reverses the air through the bags and pulls collected material from the bags back down inside the weigh batcher.



PJC Series (PJC-32)

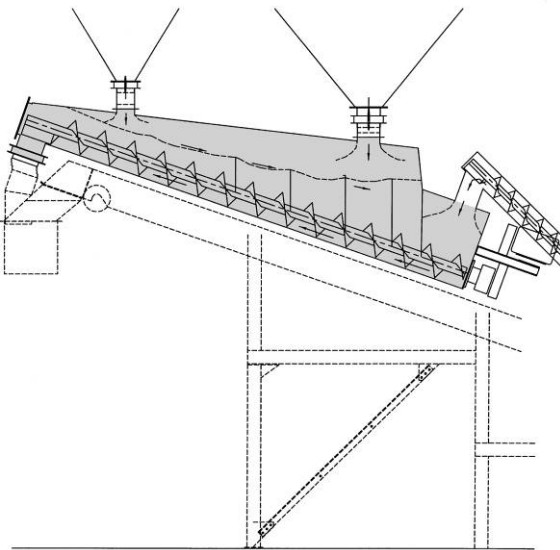
The PJC Series filter vent is a pulse jet filter vent that is used on a cement batcher. Contaminated air enters from the bottom of the cartridge chamber and flows from the outside toward the inside of the cartridges, leaving dust particles on the outside of the cartridges. Clean air exits through the top.

A pulse jet valve is mounted on a manifold on the filter vent and controls air to the blowpipes located above the row of cartridges. Holes in the blowpipes centered above each cartridge top opening direct air downward through a venturi into the cartridge.



The pulse jet valve is controlled by a timer that is located in the plant service panel. The timer receives a signal from the cement batcher closed limit (reed) switch that activates the timer each time the batcher is discharged. The timer controls the length of pulse to the pulse jet valve, usually 125 millisecond. The timer is reset every time the batcher discharge gate closes and will activate the pulse jet valve once time it is opened.

Cement Batchers-Lo Pro (Blending Cement Batcher)



Plants equipped with a “Blending Cement Batcher” (Lo-Pro Style) have a cement batcher that uses a screw conveyor to convey the material and discharge it. The screw conveyor in this type of batcher should be turned on before material is fed into the scale and remain on until the material is discharged out of the scale. A maintain signal is required from the batch control to operate the batcher screw.

Note: It is important that the batcher screw remain on whenever material is in the cement batcher, stopping the screw for extended periods of time could cause the material to plug the screw conveyor and not allow it to restart.

An interlock is installed with this type of batcher to prevent any material from being fed into the batcher unless the screw is running. The interlock is done through a relay or auxiliary contacts on the motor starter in the plant service plant.

The discharge of the “Lo-Pro Style” cement batcher is controlled the same way as done with a gravity style batcher. The discharge gate is controlled by the batch control to rate the flow of material out of the scale, a reed switch is also used on the air cylinder for the discharge feed interlock. The same vibrator settings are recommended with this type of batcher also.

Cement Feed Gates

Operation

Cement feed gates are used to discharge material from the cement silos into the cement batcher. The gates are equipped with air cylinders that are operated by pneumatic valves. The valves that operate these gates are single acting valves which require a momentary button in the batch control. When the valve receives a signal from the batch control the gate will open, when the signal is removed the gate will close.

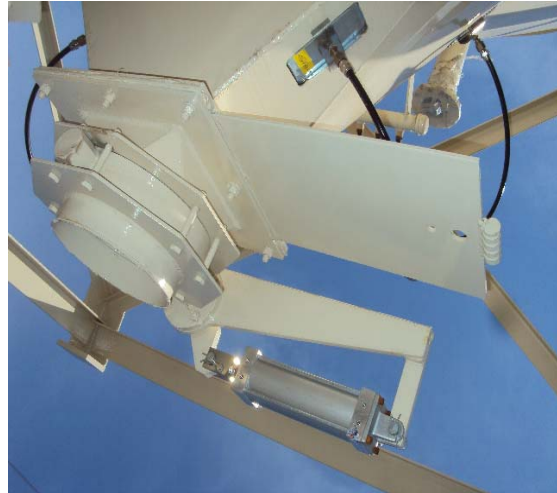
The air cylinders on the cement gates have a quick exhaust valve plumbed into the butt end port on the cylinder. The quick exhaust valves are

installed to exhaust the air at the cylinder instead of it having to travel to the valve to be exhausted. This allows for the gate to close quickly and reduce the chance of over weighing.

Emergency Slide Gates

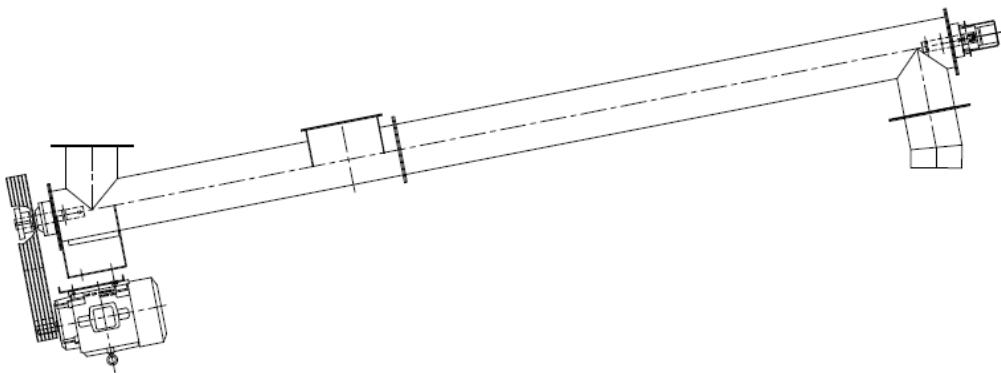
Butterfly valves that are used to discharge material from cement silos or bins will be equipped with emergency slide gates. This gate is located above the butterfly valve and can be used to shut off the follow of material if repairs need to be done to the valve or if blockage of the valve occurs and material flow can not be stopped.

The slide gate must be manually closed by driving in the exposed plate through the opening thus stopping the flow of material. Prior to doing this the bolts holding the plate in place must be removed.



Cement Feeder Screw (Screw Conveyors)

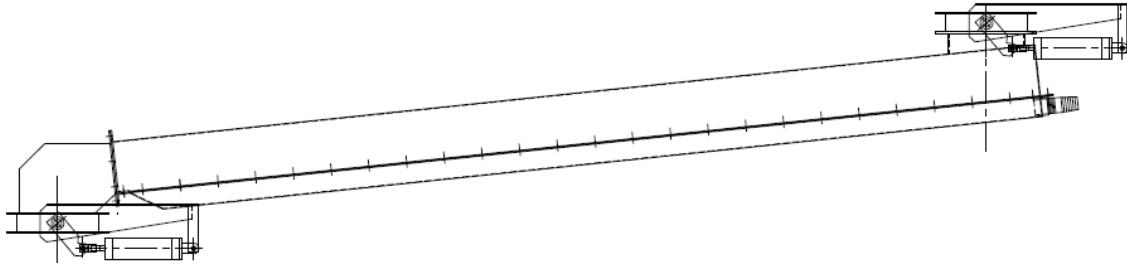
Screw conveyors may be used on some plants to convey material from a silo to a weigh batcher. A momentary signal will be needed to operate a screw that is feeding material to a batcher. Butterfly valve will be installed between the silo/bin feeding the conveyor, the valve and screw should work in conjunction with each other, the valve should open when the screw starts.



When dealing with a screw conveyor it is important that the operator does not jog the screw conveyor, jogging the screw may cause material to pack in the screw not allowing it to start or damage the machinery. Jogging is sending a quick start signal to the screw causing it to turn on briefly. It is recommended when needing small quantities of material out of a screw conveyor that the conveyor is allowed to run a minimum of 3-5 seconds.

Cement Air Conveyors

Air Conveyors may be used on some plants to convey material from a silo to a weigh batcher. An air conveyor is divided into two parts, the lower part is where air is introduced and the upper part is where the material travels is divided by a belting material that allows the air to permeate through. The air permeating through the belting will aerate the material conveying it down the air conveyor to the discharge point.



A butterfly valve will be located on discharge end of the air conveyor and will be actuated like a valve on the bottom of a silo. The butterfly valves will be used to control the feed of material into the scale. A ring compressor (low pressure blower) supplies the air required for the air conveyor, it is not recommended that you jog the blower to control the discharge of the material but jog the discharge valve. The blower should be turned on when the weigh up of this material begins and remain on until the final target weight is reached.

Cement Silo Aeration

Aeration of cementitious material in cement silos or bins is necessary to get the material to flow and flow at a consistent rate. This is accomplished through the use of a ring compressor (low pressure blower) which generates high volume of air at a low pressure. The blower sends the air to air pads which are mounted in the cone of the silo and introduce the air into the material.



The blower is an electric blower that is activated by a signal from the batch control, the signal from the batch control should be a maintain signal. The blower will need to be turned on when the material begins to be fed and remain on until

the material weigh up is complete. It is recommended that when batching loads continuously that the blower is turned on manually and left on for the duration of the batching.

In some cases one blower is used for multiple silos, when this is the case gate valves are installed in the lines feeding the air pads. Since some cementitious materials require less aeration than others to flow the gate valves can be used to regulate the flow of air to achieve ideal flow rates from each silo.

Occasionally in place of a ring compressor high pressure air will be used for aeration. In this case the aeration pads receive their air from a single acting solenoid valve, the electrical signal for this valve should be a maintain button. A regulator will be located along with the solenoid valve for aeration; approximately 8 PSI is required for the aeration.

It is important with high pressure air being used for aeration that the air is non-lubricated, dry and filtered. Using lubricated and moist air for aeration will decrease the life of the air pads and reduce discharge speed of the material.

Cement Silo Level Indicators

A cement silo is typically purchased with level indicators installed in them. Generally high and low indicators are used in the silos.

Low Indicator

The low indicator is positioned in the silo so that if the low light is on another load (approximately 25 tons) can be placed in the silo. Another way to describe the positioning of the low indicator is that if the silo is filled completely till the high level indicator comes on and then material is removed from the silo. When the low light comes back on approximately 25 tons can be placed in the silo.

If the plant is equipped with a light bar the green light will be the indicator light for the low indicator, the green light being on is an indication that the silo is low.

Note: One load of cementitious material is assumed to be 25 ton by CON-E-CO.

High Indicator

High indicators are positioned in the silo to give the operator the indication that it is full; once a high signal is attained all fill activities should stop. The failure to stop filling the silo once the high level has been reached could result in damage to the silo and/or silo filter vents.

If the plant is equipped with a light bar the red light will be the indicator light for the high indicator, the red light being on is an indication that the silo is full. The high (red) light will remain on as long as the silo is full. For light bars equipped with a high alarm, the alarm will sound once the high indicator is reached; a timer is used to active the high alarm. The timer can be set to a predetermined time that the high alarm will sound for, once the timer times out the horn will turn off. The timer for the horn is located in the plant service panel; there will be individual timers for each high indicator on each silo.

Silo Overfill Protection (Pinch Valves)

Pinch valves when installed on the fill lines of a silo will close off the fill line when the high indicator in the silo is reached by material. When the high indicator in the silo is reached by the material the high indicator is activated, the pinch valve is controlled by a timer in the plant service panel that delays the closing of the valve to give the operator time to stop the filling procedure. The timer used for the pinch valve is the same timer used for the high alarm, whatever time the timer is set to the alarm will sound for that amount of time and once the alarm stops the pinch valve will close. The pinch valve will remain closed until the material drops away from the high indicator and the high light turns off.

The pinch valve receives air from a single acting solenoid valve. The pinch valve is rated for a maximum pressure of 30 PSI; the solenoid valve for the pinch valve will be equipped with a regulator so the pressure can be adjusted.

Cement Silo Filter Vents **(PJ 200-600, PJC-300S & PJC-300-1200)**

Silos that are not vented back to a central dust collector will have a filter vent mounted on top of the silo. There are many different sizes of filter vents; they are sized by the volume of air they can handle. See dust collector specification to determine the CFM of the dust silo filter vent on your plant.



Operation

The cleaning operation of the filter vent is controlled by a pulse board that operates the pulse jet valves. A maintain signal is needed to energize the pulse board, this is a manual function. The operator should turn on the cleaning system when material is being loaded into the silo or bin and leave on five to ten minutes after loading operations have been completed.

For silo filter vents that are equipped with suction blowers a maintain signal separate from the pulse signal will be needed.



The blower needs to be manually activated by the operator during the time the silo or bin is being loaded; the blower does not need to be on to fill the silo but it will help decrease the truck unloading time.

Cleaning of Bag or Cartridges

Contaminated air enters from the bottom of the cartridge chamber and flows from the outside toward the inside of the cartridges (or bags), leaving dust particles on the outside of the cartridges (or bags). Clean air exits through the top.

Cleaning of the cartridges (or bags) is done one row at a time. Pulse jet valves are mounted on a manifold for the filter vent and control air to the blowpipes located above the rows of cartridges (or bags). Holes in the blowpipes centered above each cartridge (or bag) top opening direct air downward through a venturi into the cartridge (or bag).

From the factory the pulse boards are set to pulse every 30 seconds (off time) and the duration of each pulse is 125 milliseconds (on time).

Air pressure at the manifold (located inside the baghouse) should be maintained at 90 to 100 psi. Less than 90 psi will reduce cleaning efficiency: Greater than 100 psi will cause excessive bag or cartridge wear.

Water Meters

Badger Turbo Meter



Badger Turbo water meter (turbine type) is used to meter water. The meter will produce an output of one pulse for every gallon of water that passes through the meter. A turbo meter should be equipped with a strainer before the meter to prevent contaminate from entering the meter and damaging it.

Badger Mag Flow Meters

Badger Mag Flow water meter has no moving parts and uses electromagnetic induction to meter the water, this allows for dirty and reclaimed water to be metered. This meter will produce an output of one pulse for every gallon of water that passes through the meter.



Water Batcher (Scale)

Water batchers are equipped with a butterfly valve located in the bottom of the batcher to discharge the water. An air cylinder is used to actuate the butterfly valve and it receives air from a single acting pneumatic valve, which requires a momentary button to operate it.

Since rating of water during discharge is not common the valve will open completely during discharge. If it is required that the water discharge rate needs to be slowed a gate stop is provided on the air cylinder to reduce the amount the valve can open thus reducing the flow rate.

Discharge-Feed Interlock

The air cylinder that actuates the discharge gate of the water batcher is equipped with a reed switch (limit switch) attached to the tie rod. The piston of the air cylinder has a magnetic strip that the reed switch senses. The reed switch is used to let the batch control know if the discharge gate is closed, the reed switch should be adjusted so when the gate is closed a signal is sent to the batch control. If the batch control does not see a closed signal from the reed switch it will not allow water to be fed into the scale. Located on most batch control is an indicator light that verifies when the gate is closed.

Water Holding Tanks

Water holding tanks are used to pre-meter a batch of water in advance of the batch being discharged. Instead of discharging the batch water directly into the truck the water is metered into a holding tank in advance. When the load is ready to be discharged into the truck the water is discharged from the tank.

Water holding tanks are equipped with a butterfly valve located in the bottom of the tank to discharge the water. An air cylinder is used to actuate the butterfly valve and it receives air from a single acting pneumatic valve, which requires a momentary button to operate it.

Since rating of the water is not possible the valve will open completely during discharge. If it is required that the water discharge rate needs to be slowed a gate stop is provided on the air cylinder to reduce the amount the valve can open thus reducing the flow rate.

The holding tank will be equipped with an empty probe, the empty probe is needed so the batch control knows when the tank is empty and the valve needs to be closed. A capacitance probe is used as the empty probe, when water hits the probe it is grounded thus producing a signal that there is water against the probe.

When used on a transit mix plant the head water should be metered into the holding tank prior to the batch being discharged. This allows the water to be meter up ahead of time and be in the hold tank. After the head water is discharge the tail water will be metered into the tank in preparation of discharge at the end of the load.

Water Surge Tanks

A surge tank is located above a water batcher to allow for fast weigh up of water. Surge tanks are equipped with a butterfly valve located in the bottom of the tank to discharge the water. An air cylinder is used to actuate the butterfly valve and it receives air from a single acting pneumatic valve, which requires a momentary button to operate it.

A “keep full” system is usually used to keep the surge tank full of water. A full probe will be found in the tank that signals the water feed valve to open or close. A capacitance probe is used as the full probe, when water hits the probe it is grounded thus producing a signal that there is water against the probe. When the water is against the probe the feed valve should be shut, a timer is usually installed on the electrical circuit for the full probe to prevent the feed valve from jogging open and close as water sloshes in the tank. The timer requires that water has to be sensed on the probe for “x” number of second before it will close. This timer is usually located in the plant service pane; see electrical print for it exact location.

Water Feed Valve

For water feed valves that do not come directly out of a surge tank and are located is a water line a butterfly valve will be used which will be actuated by a rack and pinion actuator. Also these feed valves are used to feed holding tanks and surge tanks. The actuator will receive air from a single acting pneumatic valve; a momentary signal will be needed to activate the valve. When the valve is activated the valve will open and when the signal is removed the valve should close.

Flow controls are located between the solenoid valve and actuator to allow the operator to control the speed that the valve shuts at. In most cases the water feed line will be under pressure and closing the valve to fast will cause “water hammer” and damage piping. The flow control can be used to slow down the valve closing and reduce “water hammer”.

Water Pumps

When a water pump is used to feed water to a plant, the pump is usually setup to turn on when the water feed is activated. When this is the case no extra

controls are needed from the batch control to run the water pump, the pump will turn on when the water feed is activated.

Pneumatic Systems

Air Compressor

The standard air compressor used on a CON-E-CO batch plant is a piston compressor; the compressor will be setup to be on whenever plant power (X1) is turned on. When the plant power is turned on the compressor will be controlled by the pressure switch. The compressors are also equipped with a low oil switch that will shut down the compressor in the event that the oil level gets low.



It is recommended by CON-E-CO that all piston compressors are setup to run on "Constant Speed Control", this is where the motor runs continuously and when pressure is reached the pump unloads and the motor keeps running.

Tank drains are installed on all styles of compressors to automatically remove moisture from the tank. The auto drain is installed to be powered whenever plant power (X1) is turned on. The auto drain is equipped with a "off" and "on" timer, the drain will open for the amount of time the "on" time is set to with delay between for the "off" time setting.

Air Dryer

If a plant is equipped with an air dryer it is intended to remove moisture from the compressed air for either the plant compressed air and/or the central dust collector. The dryer will be installed to be on whenever plant power is turned on (X1).

Plant Compressed Air Lock Out

The compressed air system on the batch plant will be equipped with a lockout valve between the air compressor and pneumatic components. The lock valve can be used to dump the air past this point and be locked out to prevent energizing of pneumatic components. When the lock valve is depressed the air will dump at the valve, **THIS WILL NOT REMOVE AIR TRAPPED BETWEEN SOLENOID VALVES AND CYLINDERS.**



Filters, Regulators and Lubricators

High pressure air regulators are installed on all plants to regulate the air down to a working pressure. The air compressor will build pressure in excess of 150 PSI but the working pressure of the plant components is much lower than this. A regulator will be found just past the air compressor that is used to set the plant air pressure, usually set to 100 psi. Other regulators may be found on the plant and the following is the recommended setting for these regulators:

Cement Aeration (Batcher or Silo)	8 PSI
Pinch Valves	30 PSI
Dust Collectors or Silo Filter Vents	95 PSI

High pressure air lubricators will be found throughout the batch plant, they are typically found on each manifold. The lubricators are installed to provide oil for lubrication of the solenoid valves and cylinders. For a recommend list of oils see owners manual. Lubricators are set to dispense a drop of oil every 15 seconds when a vibrator is run, over oiling of solenoid valves and cylinders can do as much damage as not oiling the components.

High pressure air filters will also be found throughout the batch plant, they are mainly installed to remove contaminants and foreign material not moisture.

Solenoid Valves

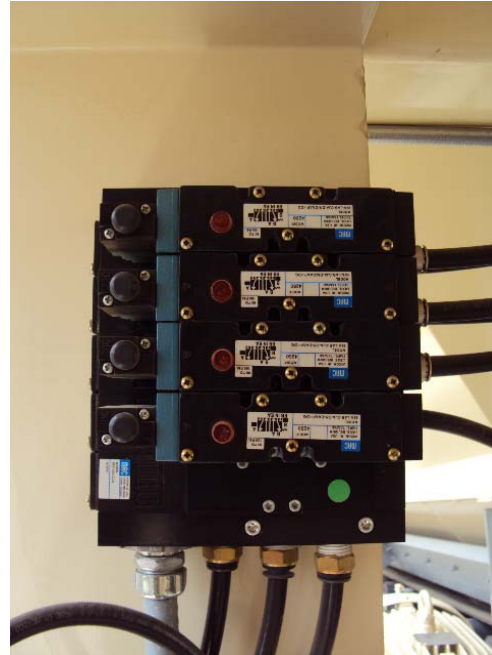
Generally two different types of solenoid valves are installed on the batch plant, single acting solenoid valves and double acting (inching) solenoid valves.

Single acting valves: valve will have one coil when power is applied to the valve the component will open when power is removed it will close. Single acting valves are typically found on the following components: aggregate, cement and water feeds, water batcher discharge, drip pans and vibrators.

Double acting (inching) valves: valve will have two coils, when power is applied to one coil the component will move in one direction as long as power is

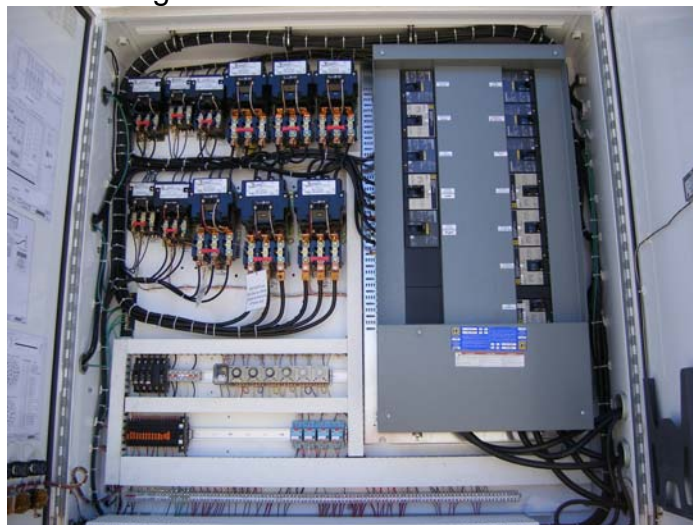
applied. When power is removed the component will stop, the component will not move again until power is applied to that coil or power is applied to the other coil to move it in the opposite direction. Double acting (inching) valves are typically found on the following components: aggregate and cement discharge and telescoping shrouds.

All solenoid valves are equipped with manual overrides; the manual override allows the solenoid valve to be operated directly at the valve without energizing the coil. The manual override will either be a push button or a twist knob. On a single acting valve there will be one manual override button and on a double acting valve there will be two, one for each coil. Manual override buttons or knobs can be used to assist in the troubleshooting and help determine an air versus electrical problem and used in emergency situations when electricity is not available but compressed air is.



Electrical System

Electrical power enters the batch plant through a Main Disconnect that is used to supply power to the Service Panels. The Main Disconnect should be used to lock out the electrical power prior to performing any maintenance or servicing any electrical components on the plant. The main disconnect provides three phase power to individual breakers in the plant service panel that power motors. Each motor will have a breaker and a motor starter that switches the three phase power to energize the motor.



Single phase power (using two legs of three phases is called single phase) is also fed through a transformer; the transformer is used to produce the control voltage (usually 120 V AC). The control voltage will leave the transformer and be fed through a breaker before energizing the L1 terminals. The L1 terminals provide power to the batch control or manual station. The batch control or manual station will switch the L1 through a key switch to power the switched power (X1) of the plant. Switch power provides power to electrical components on the plant that need a constant power supply such as: limit switches and bin signals. Switch power is also used to power the push button or switches in the batch control for each function on the plant.

Section 2-Transit Mix (Dry Batch) Plant Discharge



How materials are discharged out of the plant and into a mixer truck on a dry batch plant has a lot to do with how the concrete comes out of the mixer truck to the end user. The sequence in which materials are discharged may vary from producer to producer. A lot of factors go into determining how materials should be discharged to achieve a quality product; slump trying to be achieved, materials being used, admixes being used and etc.

As a general starting guide line a basic discharge sequence is to discharge some of the batch water (65-90%) into the mixer truck prior to any other materials, this would be called "Head Water". Once the "Head Water" is in the truck 10-20% of aggregate should be placed into the mixer truck prior to the cement starting. Once 10-20% of the aggregate is in the mixer truck cement can be discharged into the mixer truck, while the aggregate is being discharged. It is important when discharging cement that the flow rate stays constant and that the flow of cement is not too slow or there are not blasts of cement powder being discharged. The cement should finish discharging with approximately 5-15% of aggregate left to go in the mixer truck. Once aggregate has finished discharging the remaining batch water "Tail Water" 10-35% of total water should be discharged into the truck.

Section 3-Aggregate Material Handling Systems

Pivot Distributors (Turnheads)

Pivot distributors or turnheads are usually controlled by an electrical circuit that when a momentary signal is sent to energize the electrical circuit the turnhead moves until it reaches the next bin or position and stops. The electrical signal required to activate a turnhead is a momentary signal regardless whether it comes from a remote control or manual push button. Turnheads are equipped with a start warning horn that notifies personnel in the area that the turnhead will be moving. The signal to activate the turnhead must be maintained through the horn sounding and can be released once the turnhead starts moving.

Located on the turnhead work platform a manual pendant switch can be found that has an "Auto-Off-Manual" switch. To operate the turnhead from a remote panel or remote control the switch must be in the "Auto" position. Turning the switch to the "Manual" position the turnhead can be activated as long as held in this position. Putting the switch in the "Off" position will disable the turnhead from being used from a remote panel or remote control.

Each bin the turnhead is feeding will have its own proxy switch. The proxy switch can be found under the turnhead chute, they are used to sense the position of the turnhead.

Radial Stacker

For radial stacking conveyors a transversing drive is used to move the conveyor from bin to bin, a reversing starter is used to allow the conveyor to travel in both directions. A momentary signal is required for each the left and right travel directions regardless of whether the signal comes from remote control or manual push button.

Plant Charging Conveyor

Operation

Plant charging conveyors carry the aggregate from the charging hopper or other conveyors to the storage bin.

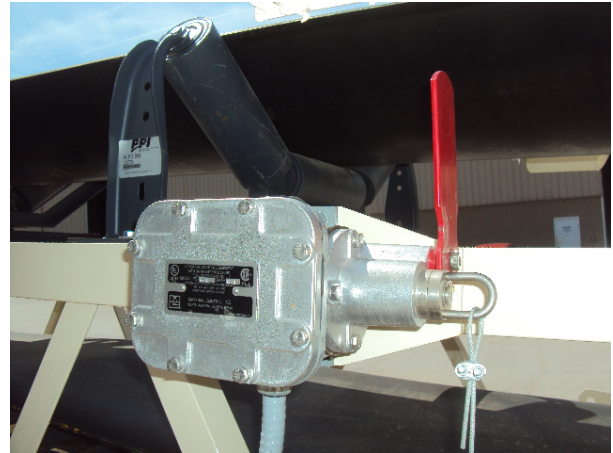
Control for the conveyor should be provided by a momentary N/O start button and momentary N/C stop button. When the start button is momentarily pressed a holding circuit through the motor starter or a holding relay latches in and keeps the motor starter pulled in, it will stay pulled in until the stop button is pressed and the holding circuit is broken.

Start Warning Horn

The plant charging conveyor will be equipped with a start warning horn, the horn is installed to give personnel around the plant warning before the conveyor starts. The horn should be preset to sound for ten seconds prior to the conveyor starting; the timer for the horn can be found in the conveyor service panel, check electrical prints for location of timer.

Conveyor Pull Cords

Some conveyors may be purchased with pull cords switches, pull cords are installed to stop the conveyor when the pull cords are tripped. Prior to restarting the conveyor the reasoning for the pull cords being tripped needs to be addressed and the switches reset. The pull cord switches are properly operating if the switch is tripped and when reset the conveyor will not restart until the start button is pressed again, conveyor should not start as soon as switches are reset.



Aggregate Keep Full Systems



For aggregate handling systems that are equipped with keep full system, bin signals are used in the aggregate bin to start and stop the conveyor when material is needed. Typically with keep full systems there is a dedicated charging conveyor for each storage compartment. When material drops away from the bin signals that conveyor will start filling the bin until the high indicator is reached, in this case the conveyor will start and stop with material on it.

Emergency High Level Indicators

Emergency high level indicators are used in aggregate storage bins to stop the charging conveyor prior to it overfilling. In a case were a high level indicator fails or is not realized emergency highs will automatically stop the conveyor and prevent the storage bin from being overfilled.

Material on Belt (MOB) Sensor

MOBs are generally used as a switch to active a vibrator on a charging conveyor when material stops flowing out of a hopper. The MOB sensors used are Ultrasonic Sensors that detect a change or lack of material on the conveyor belt. When a MOB sensor is used to trigger a vibrator it will be set up so that if material stops flowing the sensor will active the vibrator. The vibrator will be set up on a timer so that the vibrator will only run for a certain amount of time after the material stops flowing. If the material does begin flowing before the timer times out the MOB sensor will turn off the vibrator.

MOB sensors are also used in conjugation with automated material handling systems to give the system an indication whether material is flowing or not.

Charging Conveyor Hopper Vibrators

Charging conveyor hoppers may be equipped with a pneumatic or electric vibrator, regardless of the type the control of these vibrators is the same. When using a pneumatic vibrator a normally closed solenoid valve will be used to turn the air on and off to the vibrator.

If the conveyor has an MOB sensor the vibrator will be controlled by the MOB sensor and a timer (See MOB section). There may also be a separate momentary button provided on the service panel or remote control, as long as the button is depressed the vibrator will run but the timer like with the MOB will turn the vibrator off at a preset time.

If the conveyor is not equipped with an MOB sensor there will be momentary button on either the service panel or remote control if not both that will active the vibrator. In this case there will also be a timer circuit but a single push of the button will latch in the circuit in and the vibrator will stay running for the preset time.

If is recommend by CON-E-CO that the timer for the vibrator is set so that it does not allow the vibrator to run for more than ten seconds at one time.

Caution: The overuse or misuse of vibrator can cause damage to the hopper steel and vibrator mount.

Charging Hopper Feed Gates



Hopper feed gates are used to discharge aggregate out of a variety of types of material storage systems. Depending on the setup of the equipment and the manner at which it is being controlled a momentary or maintain single is used. The gates are equipped with air cylinders that are operated by pneumatic valves. This solenoid valve is single acting. When the

valve receives a signal from the control the gate will open, when the signal is removed the gate will close.

The gates are typically equipped with gates stops that can be used to limit the opening of the gate to regulate the amount of material discharged.

The air cylinders that actuate the discharge gates of the aggregate batcher are equipped with a reed switch (limit switch) attached to a tie rod. The piston of the air cylinder has a magnetic strip on it that the reed switch senses. The reed switch is used to let the control know if the discharge gate or gates is closed.

Section 3-Mixer & Central Dust Collectors

High Capacity Dust Collectors come in two different basic arrangements. They are either mixer loading point dust collector where they just collect dust at the loading point. Or they are central dust collectors were they collect dust at the mixer loading point and from silos and bins.

Cleaning

Contaminated air enters from the bottom of the filter media chamber and flows from the outside toward the inside of the filter media leaving dust particles on the outside of the filter media. Clean air exits through the top.

Cleaning of the filter media is done one row at a time. Pulse jet valves are mounted on a manifold in the dust collector and control air to the blowpipes located above the rows of filter media. Holes in the blowpipes centered over each filter media top opening direct air downward through a venturi into the filter media.

The cleaning operation of the dust collector is controlled by a pulse board that operates the pulse jet valves. The pulse board is energized when plant power (X1) is turned on, so cleaning takes place continually when plant power is turned on. At the end of production for the day when the blower for the dust collector is turned off it is recommended that the plant power (X1) is allowed to remain on to allow the bags to be cleaned without the blower running. Letting the bags be cleaned for ten or fifteen minutes without the blower running allows for more efficient cleaning of the bags.

From the factory the pulse boards are set to pulse every 30 seconds (off time) and the duration of each pulse is 125 milliseconds (on time).

Air pressure at the manifold (located inside the baghouse) should be maintained at 90 to 100 psi. Less than 90 psi will reduce cleaning efficiency: Greater than 100 psi will cause excessive bag or cartridge wear.

Suction Blower

The suction blower for the dust collector requires a maintain signal to activate, this should be strictly a manual function. It is recommended that the blower is not automated through the control; the blower should not start and stop with each batch. Frequent starting and stopping of the blower can cause damage to the blower wheel and its components.

Discharge of Reclaimed Material

The frequency in which the reclaim hopper needs to be emptied is determined on a case by case basis. The larger the volume of concrete produced by the plant the more often it needs to be emptied. It may be necessary to turn off the suction blower when reclaiming to completely empty the hopper.

As a rule of thumb 1 – 1 ¼ lbs of reclaim material is generated per one yard of concrete produced with a central dust collector. With a mixer loading point dust collector 1 – 1 ¼ lbs of reclaim material is generated per ten yards of concrete produced.

Reclaiming Direct Into Scale (Batcher)

With dust collectors' setup to reclaim directly into a scale there will be a butterfly valve that discharges the material or a butterfly valve that discharges into a screw conveyor and takes the material to the scales. Either way the cylinder operating the butterfly valve will be controlled by a single acting valve. If there is a screw conveyor the valve and conveyor will be controlled together, a momentary signal is required for either of these situations. A pneumatic vibrator on the hopper will be plumbed into the solenoid valve for the cylinder so the vibrator activates whenever the cylinder receives air to open.

Upon initial use of a dust collector that reclaims directly into a cement batcher the hopper should be emptied daily to determine the amount of material being generated. It is recommended that you should reclaim no more than 200-300 lbs at a time. If you are reclaiming more than the 200-300 lbs at a time, the frequency needs to be increased.

When reclaiming directly into a cement batcher it is ultimately up to the operator to determine what is done with this material. It is not recommended that the reclaim is tied into a silo or bin feed to open and discharge material with every batch. Doing this will activate the vibrator frequently and possibly cause damage to the vibrator mount and hopper.

Reclaiming To Silo Using a Blower

Positive Displacement Blower with Pressure Pod

When reclaimed material is being blown back into a silo or bin with a positive displacement blower and a pressure pod there will be an electric circuit that will operate the system. On the service panel door you will find an "Off-Auto-On" switch, this switch is used to operate the reclaim equipment.



The reclaim system will operate in the following sequence, all times listed are standard factory settings. The valve on the bottom of the hopper will open and vibrator will run for 45 seconds, in some cases a screw conveyor may be in the bottom of the hopper feeding the valve it should run at the same time the valve is open. Once this is completed the valve will close and the blower will activate and run for 120 seconds blowing the material from the pod into the silo.

With the switch in the “Auto” position the system will cycle automatically, it will cycle through this sequence every ten minutes after the completion of the previous cycle. If the switch is moved to the “On” position momentarily it will automatically go through one reclaim cycle, the switch will return to the “Auto” position and once this cycle is completed the automatic sequence will continue. In the electrical service panel there are timers that control all these times.

With a reclaim system that blows the material into a silo the weight of material being reclaimed will not be able to be determined. In this case after a day of normal production, remove inspection hatch on hopper of collector and see if hopper is empty. If not, adjustments will need to be made to reclaim more frequently. Consult factory on recommendations of appropriate changes to timer settings that need to be made.

Turbine Blower with Rotary Vane Feeder

When reclaimed material is being blown back into a silo or bin with a turbine blower and a rotary vane feeder there will be an electric circuit that will operate the system. On the service panel door you will find an “Off-Auto-On” switch, this switch is used to operate the reclaim equipment.

The reclaim system will operate in the following sequence, all times listed are standard factory settings. The reclaim blower, rotary vane feeder and vibrator will all turn on at the same time when activated either manual or in “Auto”. The vibrator will cycle on and off through a reclaim cycle, being on for approximately 15 seconds and off for 20 seconds. The rotary vane feeder will run for 330 seconds feeding material to the blower and turn off. The blower will operate for 360 seconds blowing material into the silo or bin and turn off.

With the switch in the “Auto” position the system will cycle automatically, it will cycle through this sequence every 10 minutes. If the switch is moved to the “On” position momentarily it will automatically cycle through one reclaim cycle,

the switch will return to the “Auto” position and once this cycle is completed it will go back to cycling ever 10 minutes.

With a reclaim system blowing the material into a silo weight of material being reclaimed will not be able to be determined. In this case after a cycle of the reclaim system, remove inspection hatch on hopper of collector and see if hopper is empty. If not, adjustments will need to be made to reclaim for a longer period. Consult factory on recommendations of appropriate changes to timer settings that need to be made.

Magnehelic Gauge



Magnehelic pressure gauges are part of a dependable system to make sure your filtering equipment is working properly, but the gauge readings do not reflect absolute pressures. CON-E-CO recommends the user of the filtering equipment monitor the gauges and record readings. Initially, the gauge readings will rise until the bags get a protective coating of material, then

the readings will level off at a pressure reading. This reading may vary from system to system, depending on the system and the gauge. After the gauge reading has stabilized, the reading should be recorded and compared with future readings of the equipment.

CON-E-CO recommends that the gauge be read and recorded daily, and if a significantly higher reading is recorded, maintenance personnel should check the bags to see if they are being cleaned properly or if there is an obstruction in an air duct. If a significantly lower reading is recorded, maintenance personnel should check to see if there is a tear in the bags, an air leak in an air duct or if there is an air leak around a door or hatch in the system.

Damper Valves

Damper valves are installed in the dust collection lines between the central dust collector and the mixer pickup point. The main purpose of the damper valve is to be used with a central dust collector to close off the suction line and allow filling of the silo or bin when the blower is turned off. Without the damper valves when the blower is not running dust would escape out the mixer pickup point and not through the bags.

The damper valves are butterfly valves that are operated by actuators; the actuators receive air from a single acting pneumatic solenoid. Typically the valve is controlled by a maintain signal. The damper valves should remain open whenever the dust collector blower is running and should close when the blower is turned off.

In some cases the operator may wish to use the damper valve to reduce the amount of moisture entering the dust collector during cold weather operations

from steam. When this is the case the damper valves need to be set up to be overridden and open only when dust collection is needed.

Back In Shroud

For dust collection shrouds that are equipped with side and end curtains that enable the customer to drive thru and/or back in from either direction. Side curtains hinge out to allow room for the mixer truck to drive thru the shroud. The side curtains are operated by air cylinder that are controlled by single acting pneumatic valves that require a maintain signal, both curtain will be controlled by the same solenoid valve.

End curtains rise out of the way to allow room for the truck to drive through or back in from either end. The end curtains are operated by air cylinders that are controlled by a single acting pneumatic valve that requires a maintain signal.

Section 5-Tilt Central Mixer



Hydraulic System

Hydraulic Pump

The hydraulic pump used on the CON-E-CO tilt mixer is a pressure compensated load sense pump. This means the pump will only come on line and produce pressure when it sees a demand for it and it only produces the pressure necessary to do the work up to its maximum pressure. When no work is being demanded by the system the pump will run at an idle state. Idle pressure for the pump is approximately 250 PSI and maximum pressure will be set to 3000 PSI.



The pump is run by a three phase electric motor; the motor is activated by a motor starter that receives a signal to engage from the control. A normal open start signal and a normal closed stop signal are required to operate the hydraulic pump. The hydraulic pump should be turned on prior to operation of the equipment and allowed to run continuously during operation, automation of the hydraulic pump is not required. If operating in a cold weather environment just running the hydraulic pump does little to circulate the oil and warm fluid prior to operation. In this situation the mixer needs to be tilted and righted to warm up the oil prior to operation. Most hydraulic units are equipped with a tank heater to assist in keeping the temperature at an operating level. (See section Tank Heater)

Hydraulic Control Valves

The tilting and righting of the mixer is controlled by two separate control valves. The directional valve controls the direction the fluid flows, determining whether it is to tilt or right. This valve is controlled by a 120 volt AC coil; it is equipped with manual override on the valve that allows the operator to tilt and right the mixer at the valve.

The proportional control valve meters the fluid going into the system, it allows for speed control of the mixer when tilting and when in the cushions. The proportional control valve is equipped with a 12 volt DC coil; this valve controls the speed of both the tilt and right. It is also equipped with a manual override, the manual override must be screwed in when wanting to manually tilt or right the mixer. The farther the manual override is screwed in the faster the mixer will travel, when tilting or righting manually the operator must use the manual overrides on both the proportional valve and directional control valve in conjunction with each other. See electrical control for more detail explanation of hydraulic control.

Emergency Tilt System

The hydraulic system is equipped with an emergency tilt system that allows the operator to tilt and right the mixer in case of three phase power lose. This system is not meant for continuous operation.



The emergency tilt pump is equipped with jumper cables that will need to be hooked to a 12 volt DC power source, usually a vehicle. When doing this it is important to remember that the vehicle needs to be running or the battery will be drained quickly. Once the emergency tilt pump motor is running the two ball valves on the supply lines leaving the hydraulic unit need to be closed, once they are closed the manual handle on the emergency tilt valve can be used to tilt or right the mixer. Typically it will take approximately ten minutes to raise the drum when loaded with concrete, since the drum will not be turning in this situation the drum may need to be rinsed out with water while tilting to get material to discharge.

High Temperature and Low Oil Sensor

Installed in the reservoir of the hydraulic unit is a high temperature sensor. This sensor will emit a 120 volt AC signal once the oil has reached a certain temperature to signal the operator, 158 Degrees F +/- 5 Degrees. The reservoir is also equipped with the low oil sensor that will signal the operator when the oil level drops below a certain level; it is also a 120 volt AC signal. Separate indicator lights are required on the control to signal the operator of a low oil or high oil temperature situation.

Tank Heater

A tank heater is installed in the reservoir for cold weather operations. Fluctuations in oil temperature can cause the equipment to operate erratically, especially when equipment is idle over night or for long periods during the day. The tank heater provides for oil to be maintained at a closer to operating temperature when starting up equipment.

Three phase power is required to operate the tank heater and it is switched on and off by a breaker in the mixer service panel. The mixer service panel must be energized with three phase power prior to operation (over night)

for the tank heater to be working. The thermostat of the tank heater should be set to around 100 degree, turning the breaker for the tank heater on and off is not necessary it should be left on continuously.

Hydraulic Cylinder & Counter Balance Valves

The mixer is tilted and righted by two hydraulic cylinders that raise the tilt frame of the mixer. Located on the butt end port of each cylinder is a counter balance valve, the counter balance valve is basically a safety valve. The counter balance valve does not let fluid leave the butt end of the cylinder unless pressure is seen on the rod end of the cylinder. So in the case of a fluid leak or hydraulic line failure the counter balance valve traps fluid in the bottom of the cylinder keeping it from righting because of the weight of the mixer.

There is one needle valve located on the hydraulic line running across the front of the mixer and in front of one of the cylinders. This needle valve is used to control how fast the counter balance valves close. If the mixer is drifting down when fully tilted the needle valve will need to be opened so the counter balance valve closes quicker. If the mixer is jerky when it is being righted the needle valve will need to be closed so the counter balance valve closes slower.

Note: When tilting the mixer the counter balance valve has no affect on this operation, fluid is bypassing it.

Electrical Control-Tilting and Righting

Tilting and Righting

The mixer requires a signal for both the tilt and right to operate the drum. A holding circuit should be supplied by the control so when the "Tilt" button is pressed momentary the tilt circuit is energized until the "Hold" button is pressed or the control receives a fully tilted signal. This is the same with the operation of the righting signal, once the "Right" button is momentarily pressed the mixer rights until the "Hold" button is pressed or until the control receives a right signal.

When tilting the "Hold" button should not be used to stop the discharge of material until the tilt speed potentiometer is turned down. If the mixer does need to be stopped and righted before the tilt limit is reached the speed potentiometer should be turned down to stop the drum and once the drum has stopped moving the "Hold" button should be pressed to unlatch the tilt circuit. The "Hold" button should never be used to stop the drum when righting under normal operation.

Speed of the mixer when tilting is controlled by the tilt speed potentiometer (See Tilt Speed Potentiometer), when righting the speed at which the mixer returns at is not variable.

Tilt Speed Potentiometer

The CON-E-CO tilt mixer comes equipped with a tilt speed potentiometer; this allows the operator to control the tilting speed so the discharge of the material can be regulated. The potentiometer used is a $\frac{3}{4}$ turn potentiometer, turning the potentiometer all the way counter clockwise will bring the mixer to a complete stop. If the potentiometer is turned clockwise completely the mixer will tilt at its fastest speed.



The tilt speed potentiometer has control of the mixer from when it leaves the righted proximity switch until it reaches the tilt cushion proximity speed. Once the tilt cushion proximity switch is reached the control of the speed is switched to the tilt cushion speed potentiometer. For more information on the tilt cushion speed see Tilt and Right Cushion Speed.

Tilting and Righting Limits

At the end of stroke when tilting or righting a proximity sensor will be found that limits the travel of the mixer and allow the control to know the positioning of the mixer. When fully tilted or righted and the proximity sensor is activated and a 120 volt signal will be outputted to the control to unlatch the circuit for tilt or right.



The tilt and right limits are also used to interlock the tilt and right circuit in the mixer service panel. Once the corresponding proximity switch is reached the electrical circuitry disables the tilt and right signal going to the hydraulic valve so the mixer can not continue to be driven once the limit is reached.

Tilting and Righting Cushion Speed

A few inches before the tilted or right limits a cushion proximity switch can be found that slows the mixer down to prevent it from traveling too fast when stopping. The cushion speeds are controlled by separate potentiometers in the mixer service panel. The cushion speed potentiometer controls the speed when the mixer is in between the cushion proximity and fully tilted (or righted) proximity.



The potentiometers can be adjusted to change the speed the mixer travels at when in the cushion; the higher the number of the counter on the potentiometer the faster the mixer will travel. When adjusting the cushion speed it needs to be done with the hydraulic oil at operating temperature.

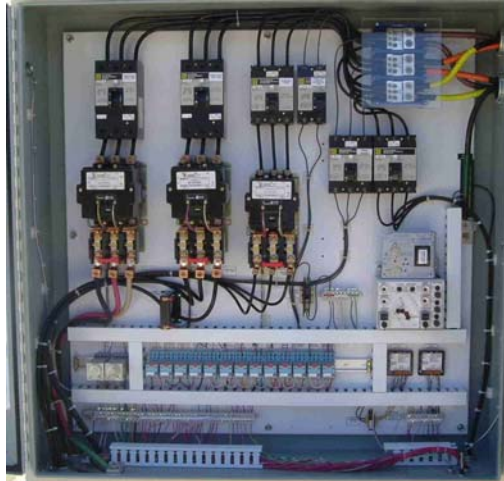
Dust Shroud Interlock

If the mixer is equipped with a dust shroud for dust collection on the discharge of the mixer the dust shroud is actuated by a pneumatic cylinder. The cylinder has installed on it a reed switch (limit switch) that detects when the dust tube is fully retracted, if the dust tube is not fully retracted the tilt and right signals to the hydraulic valve are interlocked to stop the mixer from performing either of these functions. This interlock is done thru electrical circuitry in the mixer service panel.

Electrical Control-Drum Rotation

Single Speed

It is recommended that once the mixer is started it is left running continuously throughout production unless extended down time is expected. Starting and stopping of the mixer frequently will activate the auto oiler with each startup thus wasting oil.



To control the starting and stopping of the drum rotation a normally closed stop signal is needed and a normal open start signal is needed both momentary signals. When a start signal is sent to the mixer a holding circuit energizes and latches in until the stop is pressed.

This circuit is equipped with a start warning horn that signals plant personnel the mixer is about to start; the horn will sound for ten seconds prior to the starting of the mixer. The timer for this is located in the mixer service panel; it is recommended that the timer is set for no less than ten seconds.

Once the horn has stopped sounding the mixer will start, when using the hard starter contactors one motor is delayed approximately $\frac{1}{4}$ of a second so both motors do not start at the same time. This is accomplished by the use of a timer in the mixer service panel; it is recommended that this timer is set for $\frac{1}{4}$ of a second.

If using the tilt mixer variable frequency drive to rotate the drum the same circuitry is used except both motors start at the same time and the delay timer is bypassed.

Tilt Mixer Variable Frequency Drive (Intelli-Drive)

The Intelli-Drive monitors the activity of the batch plant and reduces the rotational speed of the mixer drum at times when the mixer is inactive between batches or when a load has been in the drum longer than the normal mix time. When tilting the mixer barrel the speed can be reduced to eliminate the amount of splatter created when discharging and effectively increase the speed of discharge into a ready-mix truck.

The PLC monitors the aggregate batcher discharge open, cement batcher discharge open and water batcher discharge open. Anytime activity is seen on one of these functions, it will speed the mixer drum up to full speed, anticipating the drum being loaded with materials. After the drum has been charged with material and it does not tilt for a predetermined amount of time (example: 90 seconds) after the open signals stop, it will slow to $\frac{1}{3}$ full speed.

When tilting, the drum will slow to a programmable speed to get the desired discharge. Upon righting the drum, the mixer will go back to full speed,

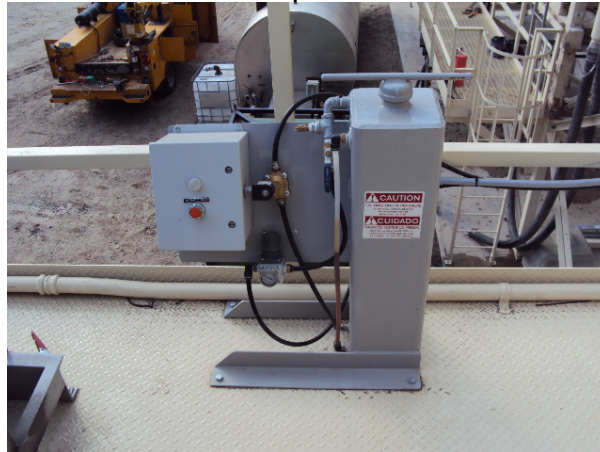
anticipating that it will be charged once completely righted. If not charged once it has righted for a predetermined amount of time (example: 180 seconds) the mixer will slow to 1/3 full speed until activity is seen on any of the scale discharge opens.

An input is available into the PLC to override the PLC and run the mixer at full speed from the batch control, a maintain signal is required for this. This can be used when washing out the mixer or when needed to mix longer than the PLC is programmed to mix at full speed

See mixer owner's manual for detailed description on speed and time setting and instruction on how to adjust.

Auto Oiler Operation

To lubricate the ring gear, pinion gears, support rollers and support roller track the auto oiler is set up on a timer circuit to oil automatically. The timer for the auto oiler is located in the electrical panel on the auto oiler.



The timer is energized when the mixer drum is rotating, once both drives have engaged the timer circuit will activate. For the first thirteen seconds of operation the mixer will be oiled and as long as the mixer stays running it will be oiled every hour there after. The timer is factory set to oil every hour for thirteen seconds, it is not recommend that the frequency (Off time) is increased or duration (On Time) is decreased.

On the electrical panel for the auto oiler a push button is found that will activate the auto oiler, only when the mixer is rotating. With a momentary push of the button the timer will activate and oil for thirteen seconds. When the circuit has been manually operated the timer will automatically reset and wait another hour before oiling again.

High pressure is used to pressurize the oiler tank to send the oil to the mixer. A pressure regulator can be found on the unit that is used to regulate the pressure. Standard pressure for this regulator should be set at 45 PSI, but adjustments may need to be made depending on how the oil flows. During cold weather operation the pressure may need to be increased to get a good flow of oil.

Slump Meter

The Slump Meter can be used by the operator to gauge the slump of the concrete prior to discharging it. The meter will energize when the mixer barrel is rotating, power is received by the slump meter when the motor starters for the mixer are engaged.

Calibration of the slump meter is accomplished by the use of two potentiometers on the amplifier cards on the back of the dial inside the slump meter box. One potentiometer is used to calibrate the low range and the other is used to calibrate the high range. See mixer manual for calibration procedure and electrical prints for the location of the potentiometers.

It is recommended that when the slump meter is calibrated it is reading two percent with the barrel rotating empty.

When calibrating the high range the slump meter should read approximately ninety-five percent when the lowest slump largest volume batch is in the drum. This should provide the operator with the biggest span of the meter and allow the operator to be more accurate when trying to produce the right slump concrete.



Dust Shroud

The dust shroud on the discharge end of the mixer is used to collect dust off the mixer when the mixer is being charged. It is actuated by a pneumatic cylinder that receives air from a single acting solenoid valve, a maintain signal is required to energize the solenoid.



When the scales start to discharge material into the drum the shroud should be activated. The shroud should stay against the mixer throughout the

charging of the mixer and for approximately ten or fifteen seconds after charging has ended or when there is no more dust from the charging of materials. Leaving the shroud against the mixer during mixing will cause excessive build up to occur on shroud.

The dust shroud should not be up against the drum when no material is in the drum, sucking air through the drum will dry out the drum and increase buildup of concrete in it.

The cylinder that actuates the dust shroud is equipped with a reed switch for interlock purposes. See Dust Shroud Interlock section.

Section 6-HRM (Horizontal Reversing Mixer)



Operation

The Horizontal Reversing Mixer (HRM) is equipped with four 50 horsepower motors, each driving a set of tires. The motors are controlled by a Variable Frequency Drive (VFD) that controls the barrel speed and rotation direction. The HRM will run in two directions; Discharge direction to empty material from the barrel into the truck or Mix direction for when the barrel is being charged with material or when material is being mixed.

Through the use of the VFD and a potentiometer the speed at which the barrel rotates at can be controlled. When running in the Mix direction the operator will typically have the speed at maximum since material is being charged into the barrel or mixing. When discharging, the barrel speed can be controlled to rate the discharge into the mixer truck.

Remote Mixer Control Panel

A remote manual control panel is provided with the HRM to allow the plant operator to control the mixer near the mixer location. The panel is provided for an added convenience to the operator to be able to operate the mixer when doing maintenance or cleaning the equipment.



“Power On” Light

This indicator light gives the operator an indication on whether the plant control power is turned on. This light will be on if control power is turned on; the key switch at the batch control turns plant power on and off. An identical indicator light is also located on the mixer service panel door.

“Emergency Stop” Button

An emergency button is located on the remote panel and mixer service panel door. By depressing either emergency stop button the control power to the mixer will be deactivated, this however will not turn control power off to plant. Both emergency stop buttons must be pulled out for mixer control power to be on.

“Manual-Off-Auto” Switch

The “Manual-Off-Auto” switch is used to switch control of the mixer from the remote manual control panel at the mixer to control at the batch control. When the switch is in the “Manual” position the mixer can only be controlled at the remote panel at the mixer. When in the “Auto” position the mixer can only be controlled at the batch control. When in the “Off” position control of the mixer is disabled at both locations.

“Start” Button

The “Start” button on the manual control panel will start the drum when momentarily pressed. The “Manual-Off-Auto” switch must be in the “Manual” position to enable this button.

“Stop” Button

The “Stop” button on the manual control panel will stop the drum when momentarily pressed. The “Manual-Off-Auto” switch must be in the “Manual” position to enable this button.

“Drive Run” Light

The “Drive Run” light gives the operator an indication that the run circuit for the mixer rotation is energized regardless whether it is rotating in the mix or discharge direction. The “Drive Run” light will be on regardless whether the mixer is being controlled at the manual control panel or the batch control.

“Mix-Discharge”

The “Mix-Discharge” switch can be used to change the rotation of the drum at the remote panel. The “Manual-Off-Auto” switch must be in the “Manual” position to enable this switch.

“Speed Control”

A 3/4 turn potentiometer is located on the manual control panel to allow the operator to control the speed of the drum in either the mix or discharge direction. The “Manual-Off-Auto” switch must be in the “Manual” position to enable the potentiometer.

“Drive Fault” Light

The “Drive Fault” indicator light will light any time a fault occurs on the variable frequency drive (VFD) controlling the mixer. If a “Drive Fault” light occurs the drive will need to be reset prior to continuing operation. This can be done two ways: the “Manual-Off-Auto” switch can be switched to the off position and back to the previous location. If this does not reset the fault the three phase power to the mixer control panel can be turned off and after a minute turned back on to reset the fault. Prior to resetting the drive check the display of the VFD and write down the fault displayed. An identical indicator light is also located on the mixer service panel door.

Hour Meter

The hour meter located on the remote panel is an accumulated run time for the mixer.

Mixer Operation-(From Batch Control)

Mixer Rotation Start-Stop

For the operator to be able to control the mixer at the batch control the “Manual-Off-Auto” switch on the remote panel at the mixer must be in the “Auto” position. There is an output from the mixer service panel when the “Auto” position is selected that should be used to supply power to the start and stop button on the batch control.

The start button needs to be a normal open momentary button and the stop button needs to be a normal closed momentary button. When the start button is momentarily pressed it will latch in a holding circuit in the mixer service panel that will stay engaged until the stop button is momentarily pressed.

Start Warning Horning

The mixer is equipped with a start warning horn for the barrel rotation, the warning horn will sound once the start button is pressed and sounds for ten seconds prior to the mixer starting. The timer for the start warning horn is located in the mixer service panel. The warning horn will sound when starting the mixer from the remote panel or at the batch control.

Mixer Barrel Directional Rotation

For the operator to be able to control the mixer direction at the batch control the “Manual-Off-Auto” switch on the remote panel at the mixer must be in the “Auto” position. The operator is able to control the direction of the mixer either mixing or discharging.

Typically a normally open momentary button is required for both directions. When a rotational direction of the mixer is selected a holding circuit will need to be provided by the batch control to maintain that direction until the direction is changed. When the opposite direction is selected the holding circuit should unlatch and allow the mixer to change direction and maintain the new direction.

Mixer Revolution Speed Potentiometer

To control the revolution speed of the mixer a speed potentiometer is provided that will allow the operator to control the revolution speed of the drum in either the mix and discharge direction. For the operator to be able to control the revolution speed at the batch control the “Manual-Off-Auto” switch on the remote panel at the mixer must be in the “Auto” position.



When charging the mixer and mixing the material the revolution speed potentiometer will need to be turned to the maximum (clockwise), this allows for maximum RPM's of the barrel. Prior to switching to discharge direction the operator will want to turn the potentiometer down (counter-clockwise) and then switch to the discharge direction; this will prevent getting a surge of material when first starting to discharge. Through the duration of discharge the operator can use the potentiometer to control the rate of discharge into the truck. Once the mixer is empty the operator should turn the revolution speed to maximum to clean out the drum and in anticipation of switching the mix direction and charging the barrel again with material.

Drive Running

An input is available to the batch control at the mixer service panel that gives the control an indication that the mixer is running.

Ok to Charge Mixer

This input is available to the batch control to give the control an indication if the mixer is ready to be charged. The mixer must be running and running in the mix direction before the mixer is charged with material, the plant discharge should be interlocked with this input. The operator must manually make sure the mixer is running a maximum speed and empty prior to charging. When trying to produce the right slump concrete.

Mixer Charging Chute

The HRM is equipped with a charging chute at the rear of the barrel that is removable and allows access into the barrel for maintenance and clean up. The charging chute is actuated by two pneumatic cylinders and they receive air from a manual operated pneumatic valve mounted on the charging chute structure. The manual handle on the valve can be used to move the chute in or out.

A reed switch is located on one of the cylinders that gives that batch control an indication of the location of the charging chute. The piston of the air cylinder has a magnetic strip on it that the reed switch senses. The charging chute must be against the mixer when discharging material into the mixer. The reed switch will give the control an indication that the chute is in, this input should be interlocked with the material discharge in the batch control to prevent discharging when chute is not in the proper location.

Slump Meter

The Slump Meter can be used by the operator to gauge the slump of the concrete prior to discharging it. The meter will energize when the mixer barrel is rotating, with the HRM the slump meter reading should only be taken when the mixer is running at full speed.



Calibration of the slump meter is accomplished by the use of two potentiometers on the amplifier cards on the back of the dial inside the slump meter box. One potentiometer is used to calibrate the low range and the other is used to calibrate the high range. See mixer manual for calibration procedure and the electrical prints for the location of potentiometer.

It is recommended that when the slump meter is calibrated it is reading two percent with the drum rotating empty.

When calibrating the high range the slump meter should read approximately ninety-five percent when the lowest slump largest volume batch is in the drum. This should provide the operator with the biggest span of the meter and allow the operator to be more accurate when trying to produce the right slump concrete.

Emergency Drives

HRM is equipped with emergency drives that enable the operator to discharge the mixer in case of long term power failure. A 240 volt AC power source will be needed (portable welder or generator) to power both drive motors. The emergency drives gears will need to be engaged prior to powering the motors.



Section 7-Central Mix Plant Material Discharge and Sequencing

When operating a central mix plant the sequence of how the materials are introduced into the central mixer greatly affects the quality of product out of it and the time it takes to achieve a good mix.

When sequencing materials into a central mix drum CON-E-CO found the best results are achieved when introducing the water into the drum first, followed by the aggregate entering one to two seconds later and the cement entering one to two seconds after the aggregate. This is all based on when the materials enter the drum not when they leave the scale (batchers or meters).

With a batch control there is no indication on when the individual materials enter or finish discharging into the drum so the operator will physically have to look at when the materials are entering and their length of discharge. You can not solely rely on the batch control when sequencing material discharge for a central mix plant.

After the materials start entering the drum they should continue discharging together. The cement should be the first material to finish with the

aggregate ending one to two seconds later and the water should end one to two seconds after the aggregate.

To achieve proper starting times it is usually a good idea to use time delays to start the material discharge. The use of percentage delays is not recommended when setting up a discharge sequence because regardless of the batch size the material takes the same amount of time to travel to the mixer from each batcher. With percentage delays the start timing will vary depending on the size of batch.

Since in most cases the aggregate batcher is located furthest away from the mixer compared to the other materials the aggregate will start discharging first and the time delays will be based on when the aggregate starts. For instance if the aggregate takes eight seconds to reach the drum you would have approximately a six to seven second delay on the water from when the aggregate starts, thus allowing water to enter the drum one to two seconds before the aggregate. With this example on cement you would delay the cement nine to ten seconds to allow the aggregate to enter the drum for one to two seconds before the cement begins.

Aggregate Discharge

When controlling the speed of the material discharging or how it ends each material has to be looked at individually. With most central mix plants the speed of the material discharging is much faster than a dry batch plant. Due to this fact it may be difficult for the batch control to regulate the flow effectively enough to provide a good discharge sequence. By the time the control makes an adjustment to the discharge gate a large volume of material may have discharged and gotten ahead of all the other material.

Discharging of the aggregate batcher usually is the limiting factor (slowest material) when dealing with discharge. Discharge of the aggregate batcher will typically open the discharge gates fully or run the batcher conveyor at fully speed throughout discharge; this is dependent on the type of plant.

Cement Discharge

To regulate the flow out of the cement scale a physical gate stop will be used to allow the discharge valve to only open partially and regulate discharge. When doing this the batch control should be set up to hold an open signal on the valve throughout discharge, flow regulation should be turned off in the batch control. The gate stop will have to be manually adjusted to speed up or slow down the cement discharge so the cement ends properly in the discharge sequence, one-two seconds before the aggregate. The use of a gate stop provides an even discharge rate through the discharge sequence, when allowing the batch control to regulate the rate you may get an ever changing discharge rate.

Water Discharge

To regulate the flow out of the water scale a physical gate stop will be also used to allow the discharge valve to only open partially and regulate discharge. When doing this the batch control should be set up to hold an open signal on the valve throughout discharge, flow regulation should be turned off in batch control. The gate stop will have to be manually adjusted to speed up or slow down the

water discharge so the water ends properly in the discharge sequence, one to two seconds after the aggregate.

An improper discharge sequence can cause many different issues mainly: build up in drum or long mix time to achieve uniform material. If you are experiencing problems with these issues observe how the materials are entering the drum, these problems usually can be resolved with an adjustment to the discharge sequence.



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Plant Maintenance and Lubrication Schedule

--USE LOCKOUT-TAGOUT PROCEDURES

--SEE NEXT PAGE FOR INGERSOLL-RAND COMPRESSOR MAINTENANCE SCHEDULE

DAILY ROUTINE

1. Drain all air tanks, manifolds and water traps.
2. Check oil level in all pneumatic oilers on plant, fill as needed.
3. Inspect all air cylinders, gates and valves.
4. Inspect tension on all V-drive belts.
5. Inspect conveyor belts for alignment and excessive wear.
6. Inspect all guards to assure they are in place.
7. Lubricate all screw conveyor reducer adaptors. (ONE PUMP ONLY)

WEEKLY ROUTINE

1. Lubricate all bearings (ONE PUMP ONLY). Included are head and tail pulleys on all conveyors, snubber roller on loading conveyor, head and tail bearings on cement feeder screws, wheel bearing supports on turn head, etc.
2. Lubricate all aggregate gate pivot points.
3. Blow clean or replace all air filters on aeration blowers.
4. Inspect and tighten all bolts and bearing set screws.
5. Inspect and/or adjust all belt wipers.
6. Lubricate packing at the ends of the cement feeder screws with oil.
7. Inspect all decals. For location information, please see Local Decal Location.
8. Remove build up from plant structure, charging hoods and hoppers.

MONTHLY ROUTINE

1. Inspect oil level in all gear reducers.
2. Adjust/or Replace skirtboards and conveyor seals as needed.
3. Adjust and tighten conveyor belts as needed.
4. Check operation of silo filter vents and dust collector cleaning systems.
5. Check operation of storage bins level indicators, light bars and pinch valve systems

SEMI-ANNUALLY

1. Change oil in all conveyor gear reducers.
2. Remove bags in silo filter vent and dust collector and blow clean or replace.
3. Tighten or replace all V-belts as needed.
4. Inspect scale accuracy.
5. Inspect water meter accuracy.
6. Inspect hanger bearings in feeder screws and replace as needed.
7. Inspect and/or replace bin aeration pads.

* Refer to Manufacturer's Reference Manual for further maintenance detail.



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Maintenance and Lubrication Schedule For Ingersoll-Rand Piston Air Compressors

DAILY ROUTINE

1. Check for unusual noise/vibration
2. Drain receiver condensation manually
3. Check oil level
4. Verify correct operation of compressor

MONTHLY

1. If using Petroleum based lubricate: change oil
2. Blow clean or replace air inlet filter
3. Inspect and clean compressor intercooler tubes
4. Check operation of compressor and receiver relief valves
5. Inspection and check tension of v-belts
6. Clean motor
7. Check and tighten all screws/bolts
8. Inspect for air leaks
9. Check pump up time of compressor and record

QUARTERLY/NO MORE THAN 500 HRS

1. If using Petroleum based lubricate: inspect valves.
2. Check operation of low oil level switch.

YEARLY/NO MORE THAN 2000 HRS

1. If using All-Season T30 Select Oil: change oil.
2. Lubricate inlet unloaded piston o-ring with 200 F lubricant
3. Lubricate motor bearings



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TILT MIXER Maintenance and Lubrication Schedule

****NEVER OPERATE A CONCRETE MIXER WITHOUT ALL GUARDS IN PLACE!!!** - Utilize an infrared (laser) temperature gun to obtain operating temperatures from a safe distance. Stop and lock-out / tag-out the drum power before performing any equipment inspections or adjustments. **** ALWAYS USE LOCKOUT-TAGOUT PROCEDURES ****

CONTINUOUS--DURING OPERATION

1. The pinion gears, ring gear, support roller track and support rollers must not be allowed to run dry and require frequent attention. Adjust the timer on the automatic oilier as required to maintain “wet” appearance at all times.
2. Monitor for unusual or irregular sounds and vibrations while mixer is in operation

DAILY ROUTINE

1. Check oil distribution on ring gear, pinion gear support roller track and support rollers.
2. Check oil level in Auto Oilier and fill as necessary.
3. Check hydraulic fluid level in sight glass of reservoir.
4. Inspect mixer barrel for build up and remove as necessary.

WEEKLY ROUTINE--No More than 2000 yards

1. Grease support roller bearings.
2. Grease tilt cylinder pins.
3. Grease mixer pivot pins.

MONTHLY ROUTINE--No more than 8000 yards

1. Perform and file the “MONTHLY INSPECTION”.
2. Check oil level in the gear reducer.

QUARTERLY--No more than 12,000 yards

1. Replace hydraulic unit filters.

ANNUAL ROUTINE--No more than 100,000 yards, or at end of season

1. Drain and replace gear reducer oil.
2. Drain and replace hydraulic fluid. Replacing the hydraulic fluid filters, tank strainer and clean inside of tank.

REQUIRED LUBRICANTS AND FLUIDS

- Ring gear oil - 80w90 or 85w140 Gear Lube, or equivalent (Petroleum or Synthetic Based)
- Bearings and pins - high quality extreme pressure bearing grease
- Gear reducer oil - API-GL-5, No. 80 or 90 - capacity approx. 70 oz. (See page--Gear Reducer Lube Points)
- Hydraulic fluid - Premium Grade, viscosity index of 90 or higher, Phillips 53130 HG Fluid or equivalent (Capacity 120-140 gallons)

TILT MIXER MONTHLY INSPECTION

**** ALWAYS USE LOCKOUT-TAGOUT PROCEDURES ****

Pinion Gears, Ring Gear, Support Roller Track and Support Rollers

- Check for complete distribution of oil of ring gear teeth, pinion gears, support roller track, thrust roller track and support rollers.
- Inspect all rollers, roller tracks, pinion gears and ring gears for wear and/or damage

Thrust Rollers

- Check condition of face of roller.
- Check for evidence of grease seal leakage.
- Check mounting bolts.

Drive Assemblies

- Check the mounting bolts for tightness.
- Inspect for wiring damage, soundness of connection and loose electrical fitting for the electric drive motors.
- Inspect Para-Flex coupling element for wear and/or damage. Inspect bushing connections to the shaft and check bolt tightness on flanges.

Mixer Barrel

- Check paddles and mounting hardware for loose or missing hardware
- Check urethane paddle and drum liners for loose attachments, excessive wear and separating seams.
- Inspect mixer barrel for structural cracks or damage.
- Inspect mixer nose cone mounting bolts.

Hydraulic System

- Check the entire hydraulic system for evidence of leaks while the power unit is not running.
- Listen to hydraulic power unit for unusual sounds-pump cavitation in particular.
- Clean hydraulic unit heat exchanger.
- Check operation of control valves manual overrides.
- Check operation of emergency tilt system.
- Check operation of tank heater.
- Inspect hydraulic cylinders for leaks, wear and damage.

Electrical System

- Check tightness of all electrical connections.
- Inspect electrical conduit and wiring for damage and/or wear.

Safety Decals

- Use the Mixer Decal location in owners manual and check to make each decal is in place and readable.

Remarks/Comments: _____



An Oshkosh Corporation Company

HRM (Horizontal Reversing Mixer) Maintenance and Lubrication Schedule

****NEVER OPERATE A CONCRETE MIXER WITHOUT ALL GUARDS IN PLACE!!!-** Utilize an infrared (laser) temperature gun to obtain operating temperatures from a safe distance. Stop and lock-out / tag-out the drum power before performing any in-depth equipment inspections or adjustments. **** ALWAYS USE LOCKOUT-TAGOUT PROCEDURES ****

CONTINUOUS--DURING OPERATION

1. Monitor the high friction drive tires occasionally during operation. A small amount of tire wear is normal during break-in. This will look like very small, finely “rolled” particles of rubber. Look for any signs excessive wear, chunking, or heat build-up in the tires. These could be early signs of a more serious problem.
2. Keep the friction drive surfaces clean and free of all foreign matter. Contaminants could create slippage and cause damage to the tires.
3. Monitor pillow block bearing operation. Higher than normal operating temperatures are an early sign of problems.
4. Listen for unusual or irregular sounds or vibrations while mixer is in operation.

DAILY ROUTINE--(see “REQUIRED LUBRICANTS, FLUIDS AND REPLACEMENT PARTS”)

1. Retract inlet chute, lock out, and wash out interior of drum at the end of the day or during extended down-time.
2. Clean out inlet and discharge chutes thoroughly.
3. Check pneumatic lubricator bowls and fill if necessary.
4. Clean and inspect drive tires.

WEEKLY ROUTINE—up to 2000 yards - in addition to “Daily Routine”

1. Check oil level in the gear reducers.
2. Clean and inspect thrust rollers. (sealed unit – no lube necessary)
3. Clean and grease mixer drive pillow block bearings (8) places.
4. Remove any concrete build-up inside of the drum, inlet, and discharge chutes while being careful not to cut, puncture or otherwise damage the urethane liners. Repair or replace any damaged liners immediately.

Section 8

MONTHLY ROUTINE—up to 8000 yards – in addition to “Weekly Routine”

1. Perform, initial, and file the “MONTHLY INSPECTION” document.
2. Check drive V-belt tension adjust if needed.
3. Inspect drive tires, shafts and machinery.

Inspect all safety decals and replace if necessary. Refer to safety section of this manual for decal locations.

QUARTERLY ROUTINE—(Or As Needed)

1. Rotate urethane discharge boot liner if it shows signs of wear.
2. Check drum mixing paddles and bolts. Replace any broken or missing bolts.

ANNUAL ROUTINE--No more than 100,000 yards, or at end of season

1. Drain and replace gear reducer oil.
2. Inspect drive V-belts & replace if needed.
3. Thoroughly inspect and replace “wear parts” inside of mixer drum as necessary.
4. Test run emergency drive system to make sure all parts move freely and to help circulate gearbox lubricant.

REQUIRED LUBRICANTS AND FLUIDS

- Bearings and pins - high quality extreme pressure (EP) bearing grease
- Gear reducer oil - API-GL-5, No. 80 or 90
- Pneumatic lubricator – 10 weight hydraulic oil, air tool oil, or Sierra® brand anti-freeze (*in cold climate*).EP



Plant/Tilt Mixer Recommended Lubricants

Air Compressor

All Seasons T30 – Non-Detergent Ingersoll-Rand Oil

Gear Reducers

Phillips 66 – 80/90 Weight Gear Oil

Lubricators

Phillips 66 10 Weight Non-Detergent Hydraulic Oil

Reclaim Blowers

Phillips 66 40 Weight Non-detergents

Mixer Ring Gear-Auto Oiler

Phillips 66 80/90 Weight Gear Oil

Mixer Auburn Reducers

Phillips 66 80/90 Weight Gear Oil

Mixer Hydraulics

Power Train Sunco TH Fluid

Grease

Mobile Grease XHP 221



An Oshkosh Corporation Company

Conveyor Belt Training and Adjustment

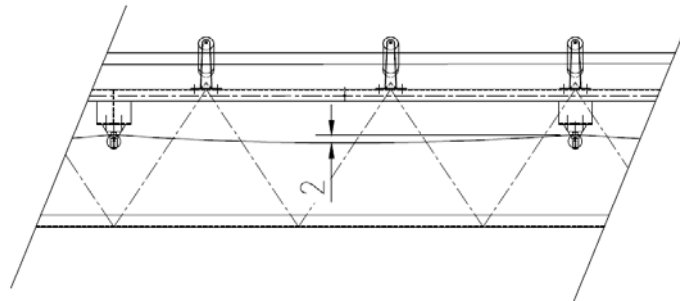
Conveyor Belt Tracking Adjustments

1. When adjusting the tracking of a conveyor belt it is recommend that you first properly tension the belt.
2. Once the belt has been properly tensioned you will want to run the conveyor empty and make adjusts to the conveyor to achieve good tracking while the conveyor is running empty.
3. Once the tracking of the empty conveyor is acceptable you will want to run material on the conveyor and adjust the tracking of the belt loaded.

Some conveyors spend most of their time running loaded, so keep this in mind when training a conveyor empty. It may not be necessary to worry too much about the tracking of a belt empty if it does not run empty.

Belt Tensioning

Proper belt tensioning is accomplished by looking at the sag in the conveyor belt between return idlers. If you were to run a string line across the tops of the return idlers and pull tight you should adjust the belt until it has 1-2 inches of sag between idlers.



Also another good rule of thumb for conveyor belt tensioning is the belt must be tight enough to prevent slippage between the drive pulley and belt. Tighten belt up until it is just tight enough that it does not slip on head pulley.

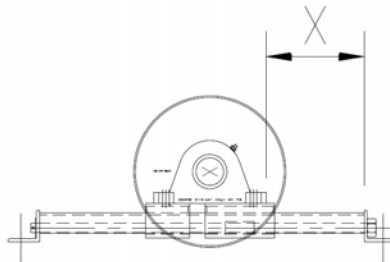
The belt should be allowed to conform to the crown on pulleys and the degree trough of idlers. Over tensioning of a conveyor belt will make it difficult to train and damage the belt.

Conveyors with Screw Take-Up

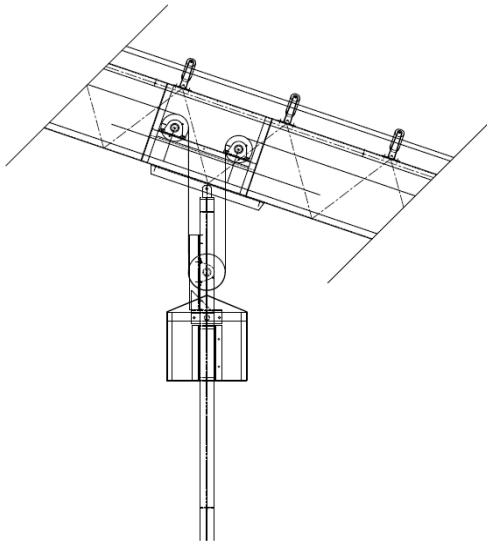
*****Screw Take-Ups are only to be used to adjust tension; they should not be used to train a belt.*****

*****If tail pulley is used to train the belt you will be stretching the belt unevenly, this will make the belt difficult or even impossible to train properly.*****

For conveyors that have screw take-ups on the tail pulley they will be used to adjust the tension. The take-ups are to be used to adjust the tension only and not for training of the conveyor. The tail pulley must be kept square to the conveyor, to accomplish this check the dimension from the bearing to a fixed point on the take-up. This dimension must remain equal from side to side.



Conveyors with Gravity Take-Up



With longer length conveyors a gravity take-up will be used to tension the belt. Large aggregate should be placed in the take up box for weight to tension the belt. Typically a recommended weight is given on erection drawings for belt tensioning but to achieve proper tension a visual inspection must be done. Material should be added or removed from the take-up box to achieve proper belt sag, it is recommended never to use concrete in a take-up box because this material is difficult to remove in order to adjust tension.

Conveyor Belt Training-Conveyor Belt Empty

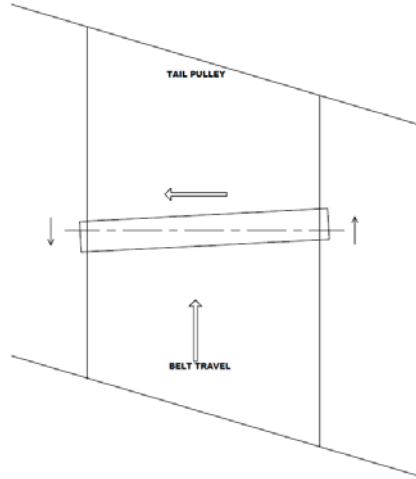
To train a conveyor that tracks off when empty you will be using only the return idlers (idlers on underside of conveyor) to adjust the tracking. The return idlers dictate how the belt runs when the conveyor is empty, the brackets the

Section 9

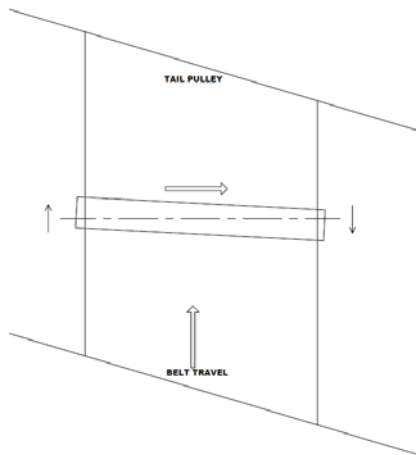
Idlers are bolted to a frame that is slotted and this allows each side of the idler to be adjusted. Loosen the bolts used to mount idlers so they are loose enough so that the brackets can be hit with a hammer to make adjustment, but not move accidentally.

The conveyor belt will track to the side of the idler it contacts first. When training the belt empty you will want to orientate yourself in a manner so the belt is traveling away from you to the tail pulley. You will want to determine on which idler the belt is traveling off of, start at the first idler it is traveling off at. Make small adjustments to the idlers at a time, it may be necessary to make adjustments to multiple idlers. If the belt is traveling off on three idlers you may want to make adjustments to all three idlers but make adjustment to each idler individually and observe results, do not try and make all the correction with one idler.

-If the belt is going off to the right side of the conveyor you will want to adjust the idlers so the right hand bracket of the idler goes away from you and the left hand bracket towards you.



-If the belt is going off to the left side of the conveyor you will want to adjust the idlers so the left hand bracket of the idler goes away from you and the right hand bracket towards you.

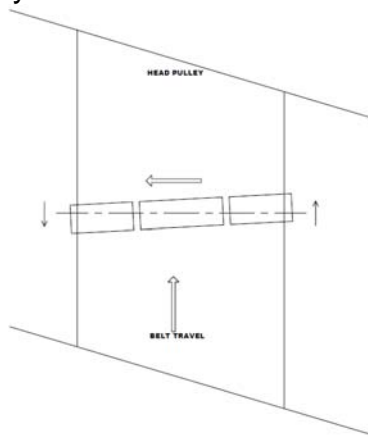


Conveyor Belt Training-Loaded Belt

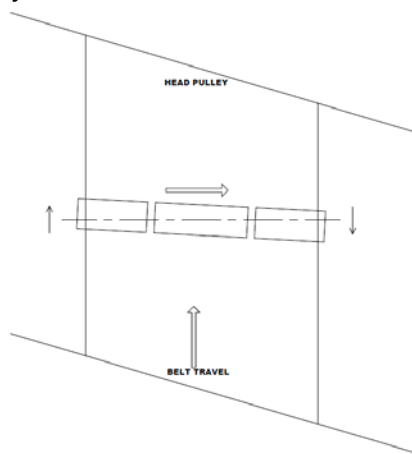
To train a conveyor belt that tracks off when loaded with material you will be using the troughing idlers (idlers on top side of conveyor) to adjust tracking. The top side idlers dictate how the belt tracks when the conveyor is loaded, the idlers are slotted and this allows each side of the idler to be adjusted. Loosen bolts used to mount idlers so they are loose enough so that the idler can be hit with a hammer to make adjustment, but not move accidentally.

The conveyor belt will track to the side of the troughing idlers it contacts first when loaded. When training the belt loaded you will want to orientate yourself in a manner so the belt is traveling away from you to the head pulley. You will want to determine on which idler the belt is traveling off, start at the first idler it is traveling off of. If the belt is traveling off on multiple idlers you may want to make adjustments to some or all the idlers the belt is traveling off on. Make adjustments to each idler individually and observe results, you usually do not want to try and make all the correction with one idler.

-If the belt is going off to the right side of the conveyor you will want to adjust the idlers so the right hand side of the idler goes away from you and the left hand side goes towards you.



-If the belt is going off to the left side of the conveyor you will want to adjust the idlers so the left hand side of the idler goes away from you and the right hand side goes towards you.



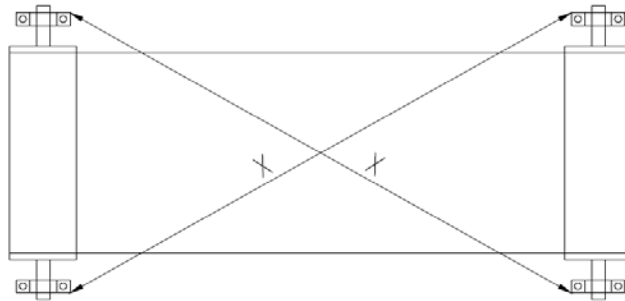
Other Items to Consider:

-Most belt training issues are caused by idlers and pulleys not being square to each other or the conveyor. Pulleys and idlers being out of adjustment can cause a conveyor to fight any corrections that are done to correct it.

If you are unsure if the idlers are square to each other and you are having problems training the conveyor belt. You may want to start by squaring all the idlers up to each other. This can be accomplished by measuring the distance from the center of the cans on the first to the second roller and making the dimension the same on both sides. Do this between the first and second, second and third and so on, you will want to do this through the whole conveyor on both the return and troughing idlers.

Or you can push all the idlers back in the slotted mounting holes if you are comfortable with that the conveyor frame is square. This will basically get you to a starting over point where you can begin again from step one.

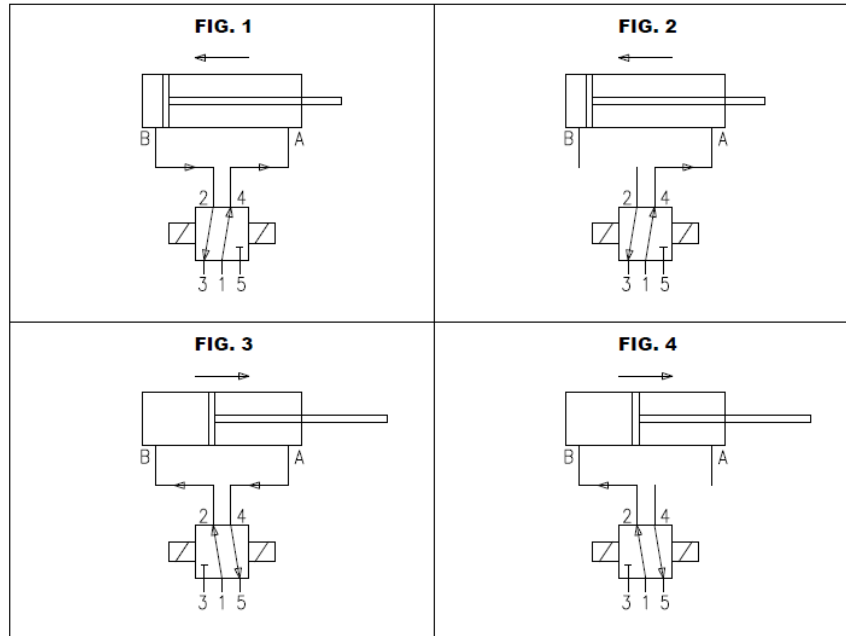
-The head pulley and tail pulley being square to each other is essential to achieve proper tracking of a conveyor belt. If you have concerns of the head pulley and the tail pulley not being square to each other you may want to check this. This can be done by measuring from the bearings of the head pulley to the tail pulley bearing. You will want to measure from the bearing on the right hand side of the head pulley to the left hand side of the tail pulley. Also measure from the left hand side of the head pulley bearing to the right hand side of the tail pulley bearing. Take these two dimensions and compare them then to square the pulleys adjust the bearings so these dimensions match.



- Keep conveyor machinery clean and free of build up. Build up of material on idlers and pulleys will dramatically affect the tracking of a conveyor belt.

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Valve vs. Cylinder Leak Test

When there is continuous leakage out of a valve exhaust port, proceed as follows to determine if the leak is caused by defective valve seals or by defective cylinder seals.

A. Cylinder retracted as shown in Figure 1

1. If there is continuous leakage out of Exhaust Port "5", the valve seals are defective and must be replaced.
2. If there is continuous leakage out of Exhaust Port "3", the problem can be with the valve seals or the cylinder seals. To determine which proceed as follows:
 - A. Disconnect the line between Valve Cylinder Port "2" and the Cylinder Port "B" Figure 2.
 - B. If leakage continues out of Exhaust Port "3" and/or Cylinder Port "2", the valve seals are defective and must be replaced.
 - C. If there is a leakage out of the line from the Cylinder Port "B", the cylinder seals are defective and must be replaced.

B. Cylinder extended as shown in Figure 3.

1. If there is continuous leakage out of Exhaust Port "3", the valve seals are defective and must be replaced.
2. If there is continuous leakage out of Exhaust Port "5", the problem can be either the valve seals or the cylinder seals. To determine which proceed as follows:
 - A. Disconnect the line between Valve Cylinder Port "4", and the Cylinder Port "A" per Figure 4.
 - B. If leakage continues out of Exhaust Port "5" and /or Cylinder Port "4", the valve seals are defective and must be replaced.
 - C. If there is a leakage out of the line from the Cylinder Port "A", the cylinder seals are defective and must be replaced.



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TROUBLESHOOTING LOAD CELLS

If it is suspected that a load cell is bad it will usually be possible to identify the bad load cell using a digital multi-meter to measure six different resistance valves on the load cell.

Before measuring the load cell resistance valves, check all connections in the junction box, the plug and the receptacle, to insure there are no loose or shorted wires.

NOTE: A digital multi-meter with an ohms scale will be required to make the measurements.

Step 1: Open the load cell junction box and disconnect all the load cell wires from the terminal strip.

Step 2: Fill in the resistance values in the table shown below for each load cell.

Step 3: If the bad load cell has not been identified in steps one and two, continue with the following procedure:

- A. Reconnect ONE of the load cells to the terminal strip observing the color codes. Fill in the reading shown on the digital read out in the table shown below.
- B. Disconnect the first load cell and repeat step A for each load cell.

It will usually be obvious by looking at the readings you have recorded in the table which load cell is bad.

1. White to Green (- signal to + signal: output resistance): This value should be 350 ± 1 .
2. Red to Black (+ excitation to - excitation: input resistance): This value may vary from one load cell to another as a result of the compensating resistors in the excitation legs of the load cell. Normal values range from 375 to 435.
3. Red to Green (+ excitation to + signal) and Red to White (+ excitation to - signal): It is important that these two readings be the same within one ohm. These values may vary from one load cell to another as a result of the compensating resistors in the excitation leg of the load cell. Normal values range from 280 to 310.
4. Black to Green (- excitation to + signal) and Black to White (- excitation to - signal): It is important that these two readings be the same within one ohm. These values may vary from one load cell to another as a result of the compensating resistors in the excitation leg of the load cell. Normal values range from 280 to 310.

	WHITE TO GREEN	RED TO BLACK	RED TO GREEN	RED TO WHITE	BLACK TO GREEN	BLACK TO WHITE	ONE CELL READING
EXAMPLE 1	351	401	289	289	289	289	
EXAMPLE 2	350	425	300	300	299	299	
LOAD CELL 1							
LOAD CELL 2							
LOAD CELL 3							
LOAD CELL 4							
LOAD CELL 5							
LOAD CELL 6							
LOAD CELL 7							
LOAD CELL 8							



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Badger Turbo Meter Troubleshooting

Is the power light lit on the turbo meter scaler board?

If yes: Proceed to A.

If no: Check voltage across terminals 2 and 3 on scaler board. The voltage should be 120 volts AC if this voltage is not there the board is not receiving power to active it. There is a problem with the wiring or power supply to the board.

A. Is the pulse light on the scaler board blinking when water is run thru the meter?

If yes: Proceed To Step A2

If no: Proceed To Step B

A2. Possible problem with board or signal getting to batch control. Turn power to meter off, take jumper wire and attach to terminal 2 (power terminal) on scaler board. Turn power to meter back on and tap other end of jumper wire to terminal 8 on scaler board. Observe counter on batch control or manual station.

If Counts Appear:

If a count appears every time power is applied to terminal 8 the counter and the wiring between the meter and counter are ok. If this is the case it is possible that there is an issue with the scaler board. Recommended solution: Replace scaler board.

If Counts Do Not Appear:

If counts do not appear every time power is applied to terminal 8 there is an issue with the counter or wiring to counter. Recommend solution: Trouble shoot to determine issue with counter or wiring.

B. If pulse light does not blink when water is run thru the meter and the board power light is ON proceed as follows.

Turn power to meter off and record calibration number. Set calibration number on board to 9999. Disconnect wires going to terminal 1 and 2 from meter transmitter (Green and black wires coming from underneath board). Attach jumper wire to terminal one, turn power to meter back on. Tap jumper wire to terminal 2.

If pulse light blinks:

If pulse light blinks when doing this then board is working properly, proceed to Step C.

If pulse light does not blink:

If pulse light does not blink when doing this there is an issue with the scaler board. Recommend solution: Replace scaler board.

C. If pulse light blinks after completing step B, hook wires back up to terminals 1 & 2, leave calibration switches at 9999 and proceed as follows.

Section 9

Remove bronze head assembly and inspect rotor and spindle for damage or wear, inspect to make sure no blades are damaged or worn. Spin rotor by hand and observe for blinking pulse light on scaler board or counts on batch control.

If rotor is damaged, worn or does not spin freely:

Rotor and spindle need to be replaced.

If rotor is not damaged or worn and spins freely and no pulse is generated when rotor is spun:

C2. Check to see if water flow (GPM) is within specification for proper meter operation. Also verify water line strainers are not plugged. If neither of these is the cases proceed to C3.

C3. If the meter is receiving sufficient flow and the turbine is in good condition there may be an issue with the transmitter. Recommended solution: Replace transmitter.

Once all tests are complete return calibration number back to recorded settings

Badger Turbo Meter Replacement Parts

PN# 0072500	Scaler Board
PN# 0072511	2" Rotor and Spindle Kit
PN# 0072508	3" Rotor and Spindle Kit
PN# 0072509	2" or 3" Head Gasket
PN# 0072510	2" or 3" Tetreseal Gasket
PN# 1142354	Transmitter, PFT-3E



Silo Capacities

(All Capacity Listed Below Are Theoretical)

11'-11" Diameter Round Silo

Silo Size (BBL)	Silo Height (Cylindrical Part-Ft)	Max.-Min. BBLs.	Cubic Ft	Tons @ 96#	Tons@75#
400	12	400-333	1600	76.8	60
565	18	565-470	2260	108.5	84.7
735	24	735-612	2940	141.1	110.2
900	30	900-750	3600	172.8	135
1065	36	1065-887	4260	204.4	159.7
1230	42	1230-1025	4920	236.1	184.5
Per Ft Of Height			111.5	5.3	4.1

*All Weights Figured for Cement

*Tons@75# For Aerated Material

*Multiply Last Column by 0.66 for Flyash

Cubic Feet of Cone 11'-11" Silo = 264 Cubic Feet

11' Diameter Round Silo

Silo Size (BBL)	Silo Height (Cylindrical Part-Ft)	Max.-Min. BBLs.	Cubic Ft	Tons @ 96#	Tons @ 75#
335	12	335-278	1340	64.3	50.2
475	18	475-397	1910	91.6	71.6
620	24	620-516	2480	119	93
765	30	765-637	3050	146.4	114.3
905	36	905-754	3620	173.7	135.7
1045	42	1045-873	4190	201.1	157.1
Per Ft Of Height			95.0	4.5	3.5

*All Weights Figured for Cement

*Tons@75# For Aerated Material

*Multiply Last Column by 0.66 for Flyash

Cubic Feet of Cone 11' Silo = 206 Cubic Feet

Lo-Pro Intruss Silo's

Plant	Silo Size (BBL)	Max.-Min. BBLs.	Cubic Ft	Tons @ 96#	Tons @ 75#
Lo-Pro 5	215	215-179	860	41.2	32.2
Lo-Pro 10	225	225-187	900	43.2	33.7
Lo-Pro 12	235	235-195	940	45.1	35.2
Lo-Pro 12N	200	200-166	800	38.4	30
Lo-Pro 12T-CM	235	225-187	900	43.2	33.7
Lo-Pro 250	250	250-207	1000	48	37.5
Lo-Pro 327	327	327-272	1308	62.7	49
Lo-Pro 427	427	427-356	1708	81.9	64

*All Weights Figured for Cement

*Tons@75# For Aerated Material

*Multiply Last Column by 0.66 for Flyash

Capacity of Lo-Pro Intruss Silo Square (10' x 10') Extension

Extension Height (Ft)	Extension Size (BBL)	Max.-Min. BBLs.	Cubic Ft	Tons @ 96#	Tons @ 75#
4	100	100-84	400	19.2	15
8	200	200-168	800	38.4	30
12	300	300-252	1200	57.6	45
16	400	400-336	1600	76.8	60
20	500	500-420	2000	96	75
Per Ft Of Height			100	4.8	3.7

*To Determine Silo Capacity, Add capacity of Intruss and Extension

*Per Ft of Height Value Only Valid For Extension

*All Weights Figured for Cement

*Tons@75# For Aerated Material

*Multiply Last Column by 0.66 for Flyash

The Following Plants Accept Intruss Silo Extension:

LP10	Up To 725 Extension	LP 12T-CM	Up To 725 Extension
LP12	Up To 735 Extension	LP 250	Up To 550 Extension

*Lo-Pro 327 & 427 Do Not Acceptable In Truss Silo Extensions

Useful Silo Capacity Information

-High bin signal located 3 foot down from top of silo. Subtract the following from capacity to find capacity at high bin signal:

	Cubic Ft	Tons @ 96#	Tons @ 75 #
For 11'-11" Dia.	334.5	16.0	12.5
For 11" Dia.	285.1	13.6	10.6
10'x10' Rect. Ext.	300	14.4	11.2

Cement Weight

Bag of Cement = 96 lbs = 1 cubic foot
 Nominal Weight (Aerated) = 75 lbs

Barrel of Cement = 4 Bags = 376 lbs
 @ Nominal Weight (Aerated) = 300 lbs

Flyash Weight

Bag of Flyash = 75 lbs = 1 cubic foot
 Nominal Weight (Aerated) = 50 lbs

Barrel of Flyash = 4 Bags = 300 lbs
 @ Nominal Weight (Aerated) = 200 lbs

Calculating Tons (Cement) of Silo Knowing Barrels:

$$\underline{\hspace{1cm}} \text{ BBL} \times 300 \text{ lbs/BBL} = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ lbs Aerated}$$

$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ lbs Aerated} / 2000 \text{ lbs/ton} = \underline{\hspace{1cm}} \text{ ton Capacity of Silo}$$

Calculating Tons (Flyash) of Silo Knowing Barrels:

$$\underline{\hspace{1cm}} \text{ BBL} \times 200 \text{ lbs/BBL} = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ lbs Aerated}$$

$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \text{ lbs Aerated} / 2000 \text{ lbs/ton} = \underline{\hspace{1cm}} \text{ ton Capacity of Silo}$$