



# Enclosed Belt Conveyor



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# General

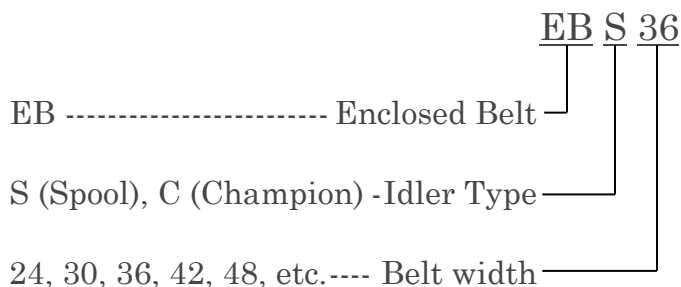
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## Introduction

This manual is intended to provide basic information regarding the general design features and installation of Warrior Mfg. Enclosed Belt Conveyors. Because Warrior Mfg. offers many sizes, options and features, not all can be covered here. Refer to the general arrangement drawing that was provided with the conveyor for more specifics. This manual contains some general installation guidelines to follow. There are many contractors that install conveyors and many have different methods and equipment available for installing the conveyors. It is recommended that a reputable and experienced contractor be used to install this equipment. Any deviations from our guidelines should be sent to Warrior Mfg. for review and approval prior to completing the work. Failure to do so may void the conveyor warranty. This equipment will not perform well if it is not installed well.

## Equipment Identification

Model numbers consist of idler type and belt width:



The equipment will have an ID tag with the order number located on the head section. The order number will be needed when making any inquiries regarding the equipment such as trouble shooting and ordering parts. Record information below for future reference.

Order #: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_

Notes:



Figure 1: Typical ID tag location

## Safety

### General Safety Statement

Safety is everyone's responsibility. Construction sites and facilities where this equipment is being installed and operated have constantly changing conditions and hazards. Be alert and focused at all times. Identify and communicate safety hazards with workers and determine appropriate safety precautions to be taken. Follow appropriate local and federal laws and safety regulations.

During installation of this equipment, the installer will be lifting and handling a variety of different items that will be heavy, awkward and many times unbalanced. The installer should be experienced in proper lifting and rigging techniques and have the proper equipment to safely lift and install this equipment to prevent injuries and damage to equipment. It is the installer's responsibility to install the equipment in accordance with established industry practices, local codes and applicable regulations. It is also recommended to consult with civil and structural engineers for seismic, soil & foundation and guying/bracing and other related requirements. Qualified and licensed electricians must be used for the electrical wiring and servicing of the equipment to ensure adequate power is supplied to the equipment.

Do not modify the equipment without first contacting and getting approval from Warrior Mfg. Some modifications could create hazardous conditions causing equipment damage and/or injury, and may void the conveyor warranty.

Operate the equipment in the manner and within the capacity in which it was intended. Misuse can cause equipment damage, severe injury, or death. Follow all lockout/tagout procedures and other applicable safety rules when doing any maintenance and making adjustments.

## Decals

The equipment has been supplied with safety labels warning individuals of potential hazards associated with operation and maintenance of the equipment. Ensure these labels remain legible at all times. Replacement labels are available from Warrior Mfg. The following images show the types of labels and the locations of typical labels.



The safety alert symbol is used to alert you to a potential personal injury hazard. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury.






WARNING indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury.





CAUTION indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE is used to address practices not related to personal injury. CAUTION signs without the safety alert symbol also have the same meaning.

Decal Number	Description	Image
40029, 40030	Warrior Mfg Logo	
40034	Warning Moving Parts	 <p><b>WARNING</b></p> <p><b>Moving parts can crush and cut.</b> Lockout power before removing guard or servicing. Do NOT operate with guard removed.</p>
40036	Warning Flying Material	 <p><b>WARNING</b></p> <p><b>Flying material can cause severe eye injury or blindness.</b> Wear safety glasses around operating equipment.</p>



40037	Warning Lock Out	 <p>The sign for 'Warning Lock Out' (40037) features a yellow triangular warning symbol with a black exclamation mark on the left. Below it is a blue circular symbol with a white padlock and a curved arrow pointing to the right, indicating a lockout procedure. To the right of these symbols is a white rectangular box with an orange header containing a warning triangle and the word 'WARNING' in bold black letters. The main text in the white box reads: 'Avoid serious injury or death. This machine MUST be locked out in accordance with current OSHA requirements before any maintenance or service is performed.'</p>
40288	Warning Moving Parts	 <p>The sign for 'Warning Moving Parts' (40288) has a red header with a white warning triangle and the word 'DANGER' in bold white letters. Below the header are two symbols: a yellow triangular warning symbol with a black silhouette of a person being struck by a moving part, and a blue circular symbol with a white padlock and a curved arrow pointing to the right. Below these symbols is a white rectangular box with black text that reads: 'Exposed conveyor and moving parts will cause severe injury or death. Lockout power before removing cover or inspection door.'</p>

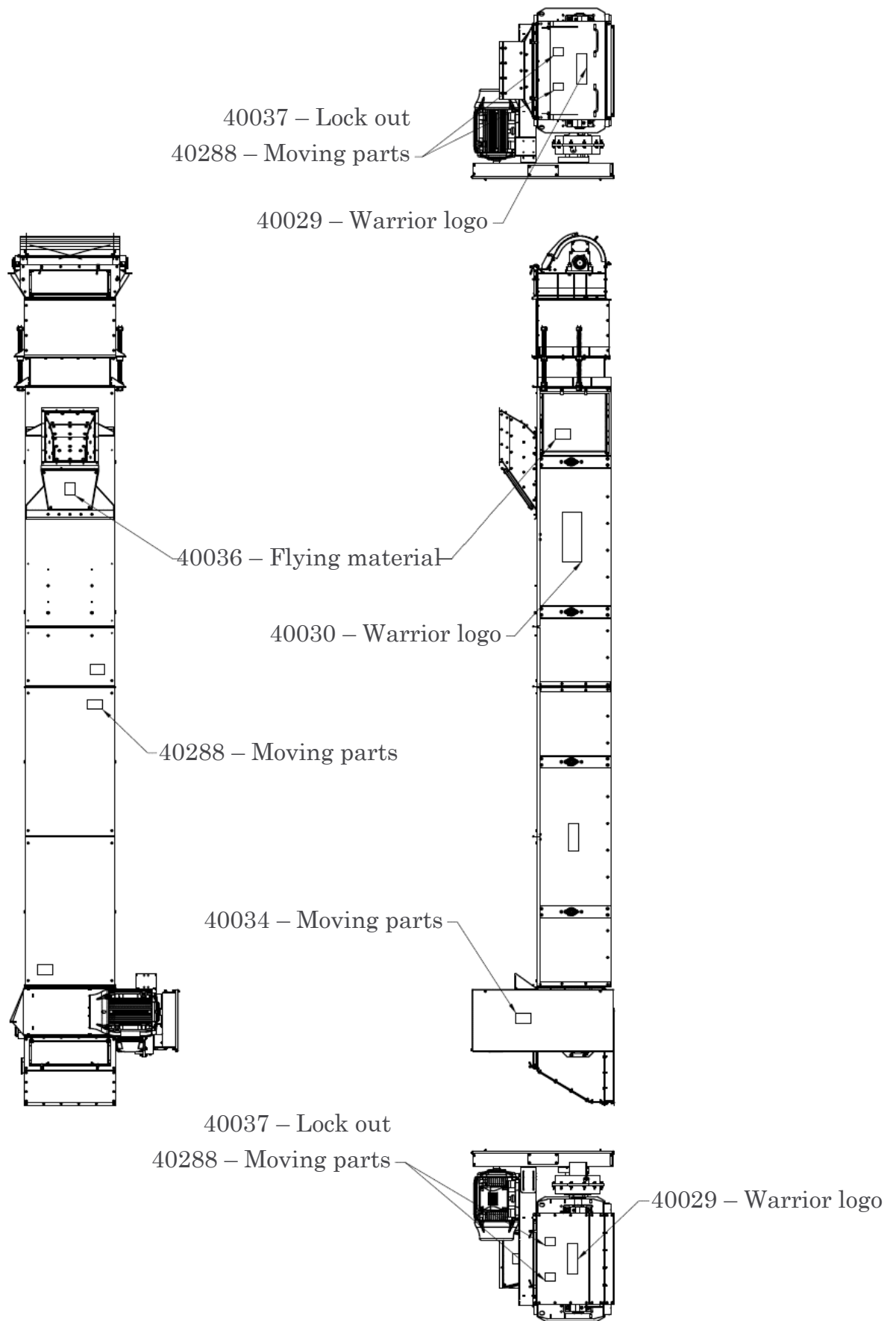


Figure 2: Typical decal locations for spool idler belts.

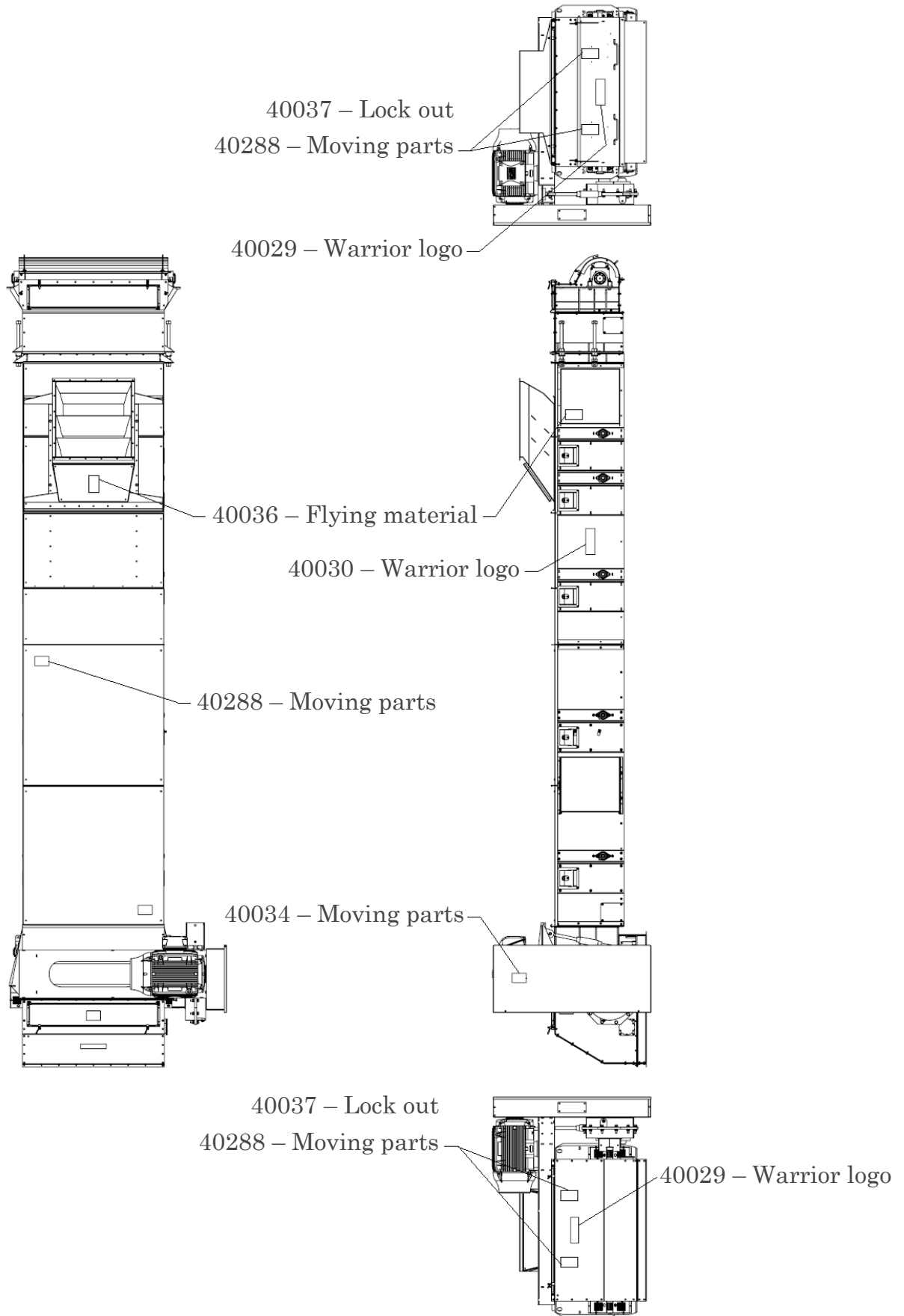


Figure 3: Typical decal locations for Champion idler belts.

## **Receiving Inspection**

Inspect all equipment on each shipment immediately when unloading for any signs of shipment damage or missing items. It is the responsibility of the receiving party to note any damages/shortages on the freight bill before you sign for the shipment and then file claim with the carrier. The carrier is responsible for any shipping damages once the shipment leaves Warrior Mfg.

All equipment, including hardware, is to be inventoried by the contractor within 48 hours of receiving the shipment. Any shortages must be reported to Warrior Mfg. within that initial 48-hour period. If shortages are discovered and reported after 48 hours, it is at Warrior's discretion to charge the contractor for any and/or all of the replacement parts and hardware needed.

In many cases the equipment will arrive on multiple shipments, so segregation/organization of equipment and paperwork at the site will minimize confusion and misplaced items.

# Installation

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## General Assembly

### Typical Assembly/Installation Guidelines

How well the equipment is installed will have a huge impact on the overall performance and operation of the equipment. The conveyor **MUST** be straight both horizontally and vertically within a 1/2" or less from the head to tail so the conveying belt does not rub and bind during operation. The conveyor must also be installed level (not twisted), within 1/8" side to side, to avoid belt tracking issues. It is recommended that all joints between sections be caulked during installation to provide a water and dust proof connection.

## NOTICE

Conveyors are not designed to support other equipment, other conveyors, spouting, etc. These items must be supported by separate support structures.

The conveyor must be supported every 10 ft maximum from the head to the tail. Support legs are recommended to be attached to the flanged section joints. The Head/Drive section must be supported to withstand the forces and weight of the drive. It is recommended to support the head with a discharge transition; however, other means such as support legs may also be used. If using a field fabricated support, ensure it is of adequate strength. It is the responsibility of the contractor to properly size and fabricate these supports depending on the unique conditions for each conveyor. Contact Warrior's engineering department with any questions regarding proper support methods of the conveyor.



It is recommended the installer consult with structural engineers regarding proper support methods for the conveyor. Ensure any support structures are designed to support the equipment and weight of material being conveyed at full plugged weight capacity. Refer to the general arrangement drawing for the list of weights.

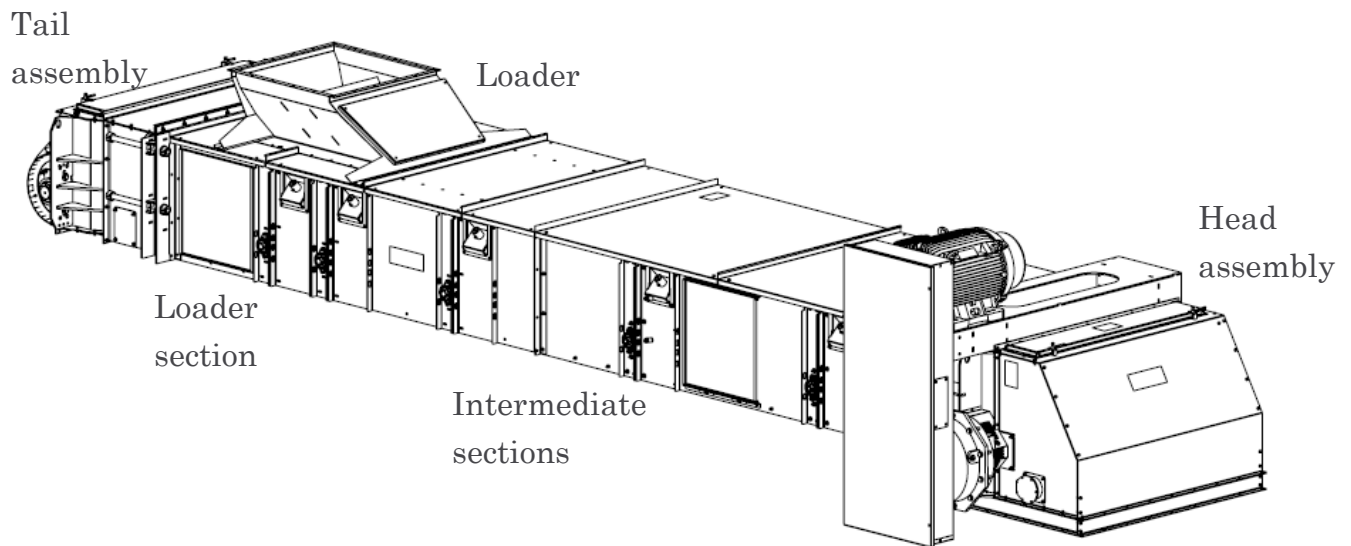
Qualified and licensed electricians must be utilized to ensure adequate electrical supply to the equipment. Refer to the general arrangement drawing for the motor requirements.

In many cases, the discharge spouting and inlet transitions are field designed and fabricated. Careful consideration needs to be given to the flow of material into the inlet of the conveyor so material fills evenly from side to side in the conveyor. Baffles may be necessary to correct side loading issues. Ensure discharge chutes are of adequate size and slope to prevent plugging issues.

### General Arrangement Drawing

Refer to the general arrangement drawing for each specific conveyor. Each conveyor is unique based on many variables and options including but not limited to, size, capacity, inlet type, and other options. Pay particular attention to location of short sections, knee sections, sections with additional idlers, and other special sections for proper placement. The general arrangement drawings also contain pertinent information such as incline, horsepower and drive information, RPM, conveyed material, belt type, belt speed, pulley size, hub style/size, and capacity. Ensure the conveyor is installed and operated within the designed specifications.

 <b>WARNING</b> 
When rigging sections of the conveyor, make sure appropriate spreader bars, slings and rigging methods are used to prevent injury to workers and damage to equipment. Do not lift more than 20 ft. of unsupported conveyor. Contact Warrior's engineering department with any questions regarding proper lifting of the conveyor.



*Figure 4: Sample belt conveyor arrangement.  
Refer to your As Approved general arrangement drawing for correct assembly sequence.*

## Head Section Installation

A typical installation will start with the head or drive section mainly to ensure the discharge location is accurately placed. Then continue assembling intermediate sections back to the tail. It is recommended to support the head with a discharge transition, however; other means such as support legs may also be used. If using a field fabricated support, ensure it is of adequate strength. It is the responsibility of the contractor to properly size and fabricate these supports depending on the unique conditions for each conveyor.

Head shaft and pulley adjustments can be made by loosening the bearing housing bolts and utilizing the jack bolt(s) under the bearing to reduce pressure on the bearing shim(s). Remove the appropriate number of shims, then back out the jack bolt(s) until belt tension rests the bearing back onto the head.

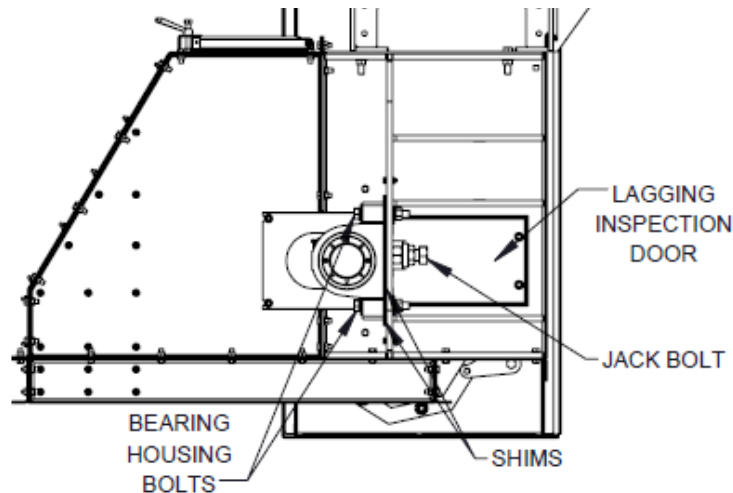


Figure 5: Head bearing adjustment and pulley lagging inspection.

Once complete, tighten bearing housing bolts and replace bearing guards.

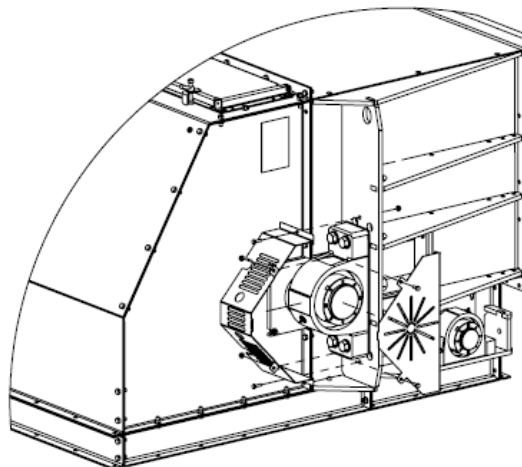
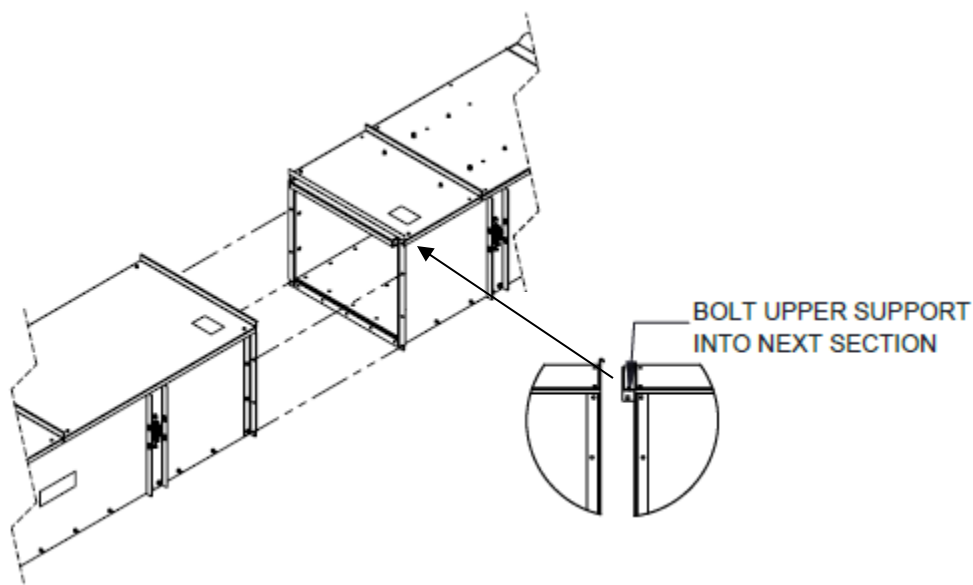


Figure 6: Typical head pulley bearing guarding.

A standard head will also have a diaphragm plug switch located on the side of the hood assembly. If the discharge should become plugged, material will fill into the head area and will depress the plug switch which should be wired to shut down the conveyor. If the plug switch is not provided as part of the order, one needs to be installed in the transition from the head discharge to prevent damage should plugging occur.

## Intermediate Section Installation

Standard, full length conveyor sections are 10 ft. in length. Most conveyor applications will require custom length short sections. Refer to the general arrangement drawing to ensure they are installed in the proper locations. Begin installing intermediate sections to the head section and work towards the tail. If there is a single short section it will generally be the first section attached to the head.



*Figure 7: Typical intermediate section installation technique*

When installing all sections of the conveyor, ensure all interior edges are aligned even and flush when tightening bolts to prevent any misalignment that could affect the operation of the conveyor. Also ensure that the bottom liner is flush along the entire length of the conveyor to prevent any snags that could damage the belt and splice.

Also while assembling sections, apply silicone caulking between all joints to provide a dust- and water-resistant joint.



## Loader Section Installation

Single inlet belt conveyors will generally ship with a pre-assembled loader section. This section is similar in construction to a standard section, but has a loader assembly already mounted on top of it instead of a standard lid. If the loader section is the closest section to the tail, it will also typically include an inspection door in each of the side panels. These inspection doors allow access to inspect the front side of the tail pulley and also the underside of the belt at the loader. If there is a loading issue, there will be visible grain coming back on the top side of the belt at this point. Once the loader section is installed and the belt is spliced and tensioned, the loader skirting needs to be adjusted down to the belt.

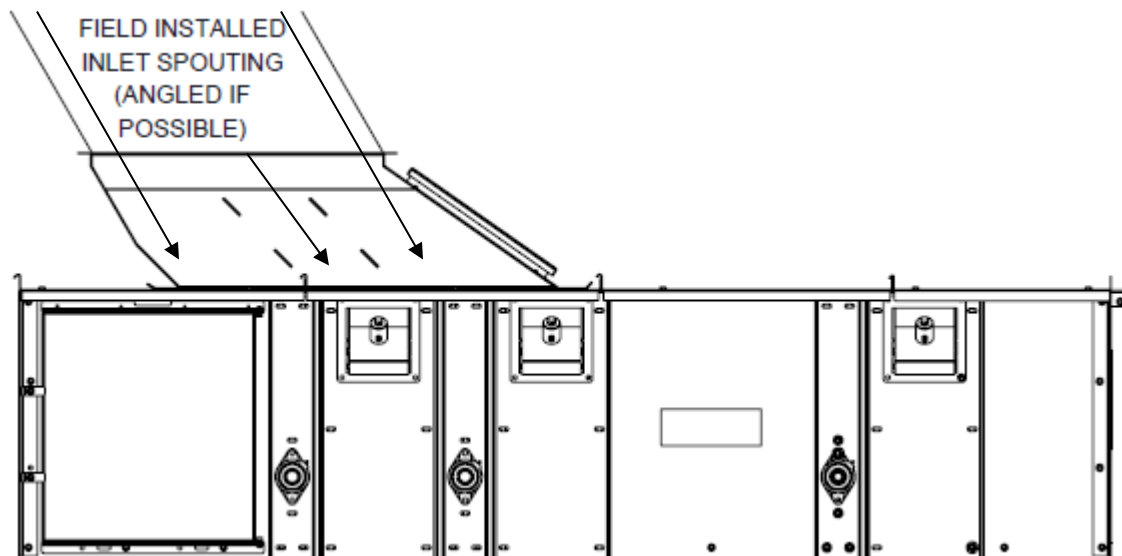


Figure 8: Standard Champion loader section installation. See Figure 9 for optional inlet gate installation.

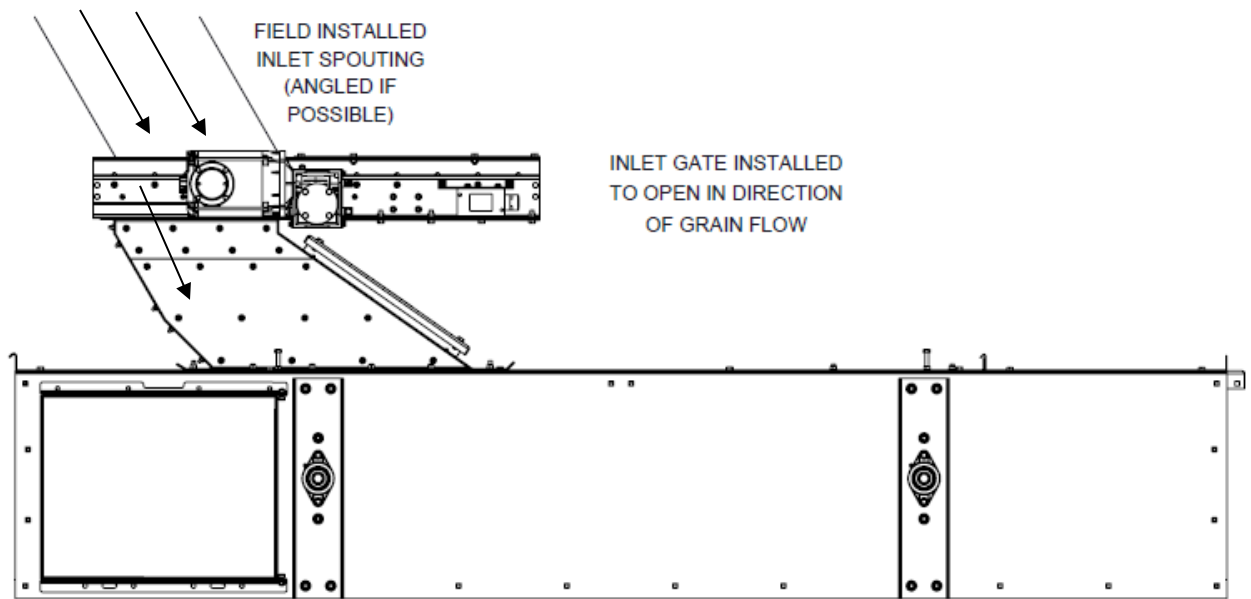


Figure 9: Standard pool idler loader section installation. Optional inlet gate shown.

## Mid-Loader Installation

Belt conveyors often require the use of multiple inlets to transfer from multiple locations. The procedure outlined below describes the steps in which a mid-loader assembly can easily be installed. The steps below outline the procedure for properly installing a mid-loader.

- A. Remove any lids near the location of where the loader assembly is to be installed. Also remove any upper supports that may interfere with the skirting below the loader.
- B. Place the loader onto the section so that the slope of the loader chute will start the material moving in the direction of the belt travel.
- C. Locate the inlet flange of the loader so the transition to the loader starts the grain moving in the direction of the belt travel.
- D. Drill out the necessary holes in the top flange of the section side panels and bolt the loader down.
- E. Trim lids to length and reinstall enclosing any open area of conveyor. Refer to Lid Installation section for details.

## Loader Skirting Adjustment

The loader assembly skirting needs to be adjusted into place once the belt has been spliced and tensioned. The skirting is designed to keep material from spilling over the side of the belt while it is loading. There is no substitute for proper loading of the conveyor. The transition into the conveyor needs to be in line with the conveyor to prevent any side loading issues.

The skirting is adjusted with the four large bolts on the corners of the loader assembly on top of the conveyor. The skirting should be adjusted so the corner of the rubber skirting lightly comes into contact with the belting of the conveyor.

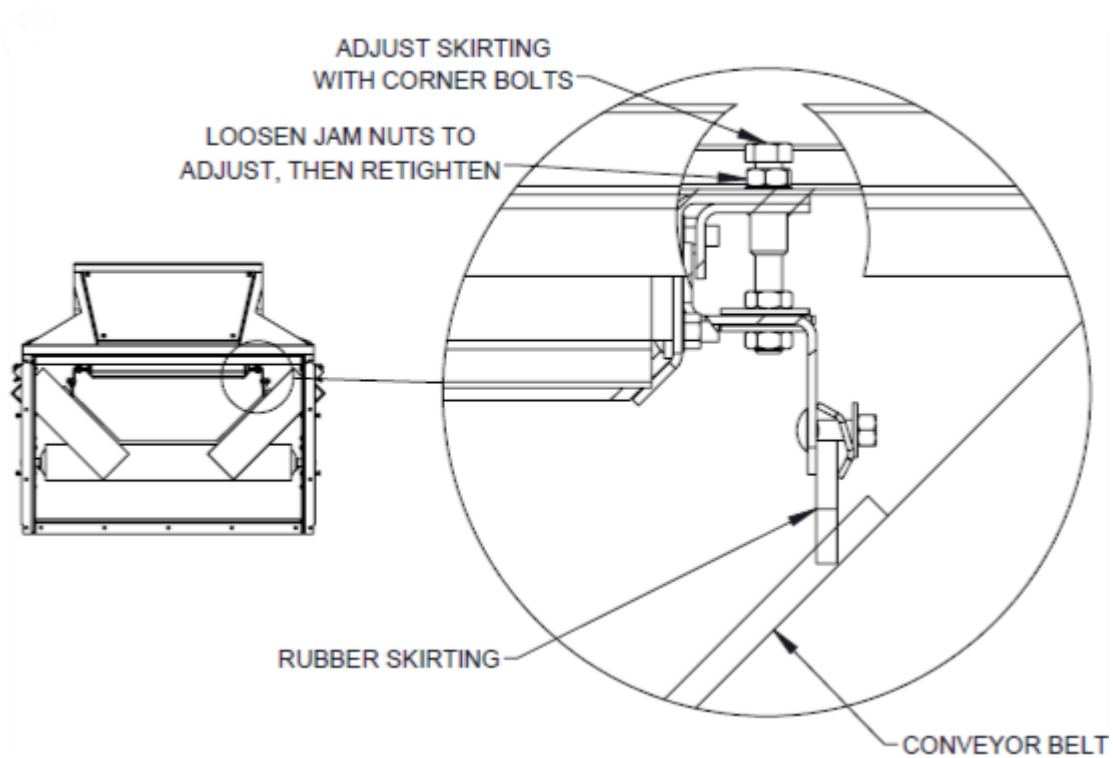


Figure 10: Loader skirting and hardware (Champion series shown, spool idler similar).

## Tail Section and Take-Up Installation

The tail section of the conveyor is generally assembled to the take-up upon shipment. The assembly of the tail and take-up is then installed to the first section of the conveyor. After final assembly of the conveyor, the belt is strung from head to tail, around the tail pulley and back to the head. The tail has a full width inspection door that is used during tensioning and run-in to watch and ensure proper belt alignment on the tail pulley. The take-up is used to maintain belt tension as the belt stretches. The tail will move rearward as the take-up is extended, so adequate room is required behind the tail during installation.

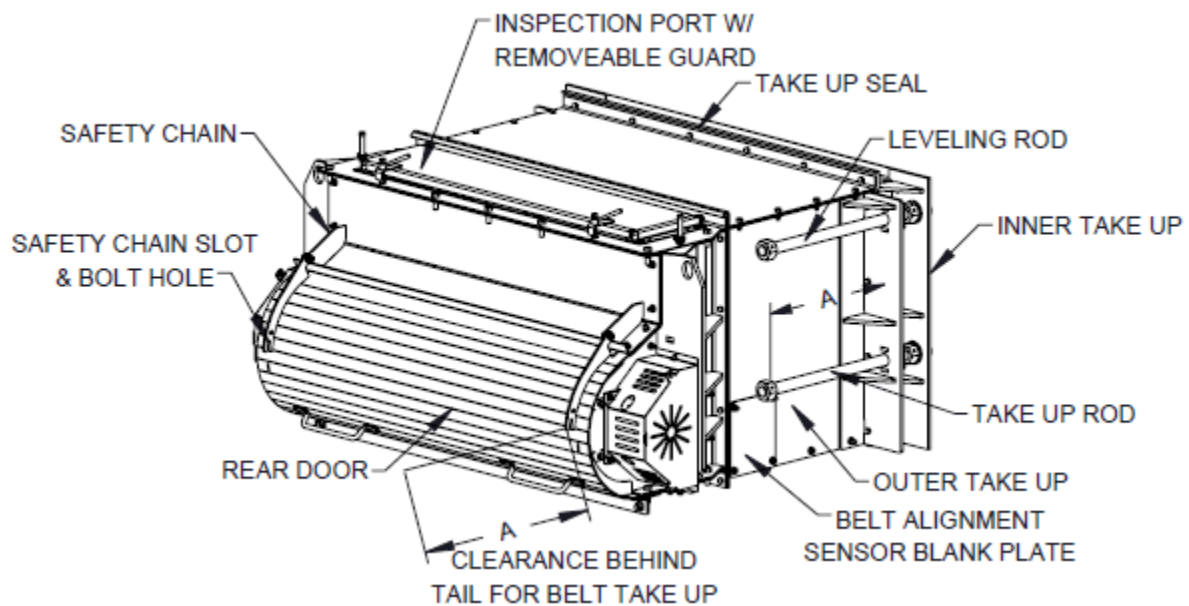


Figure 11: Typical tail components.

## Belt Installation

The conveyor belting is to be installed through the conveyor, around the pulleys, and brought back together and spliced. If the belt has a cleated top, or a thicker cover on one side, that side should be away from the pulley. It may be helpful to cover the top of the return liner with general purpose flour or grain dust to prevent the belt from sticking to the bottom liner until initial startup. The belt should be strung through the conveyor so that the ends can be spliced on the top side of the conveyor, between a set of idlers. For most belt conveyor applications, especially those that are of considerable length, it is a good idea to pre-stretch the belt for several days, or even a week if possible, prior to splicing. This will reduce or eliminate the need for re-splicing of the belt after break-in.

Pre-stretching the belt is accomplished by bringing the belt up to operating tension with clamps and come-alongs prior to splicing. The belt should be re-tensioned regularly to bring the tension back up that is lost due to belt stretch.

### *Belt Splice Installation - Mechanical*

The following procedure and accompanying Figure 12 & Figure 13 for installing Flexco solid plate bolted spice kits.

- A. Square belt ends and cut to length. Square belt by marking three center points along belt at 1' to 3' intervals down the middle of the belt. Draw an average center line using these center points as a guide. Place one leg of a large steel square along the marked center line and position the other leg of the square at the point where the square cut is to be made. Draw a line along the square's leg which is perpendicular to the center line and extend it entirely across the belt. Make sure the cut is clean, square and straight. A cut made along this line will be properly squared with the belt.

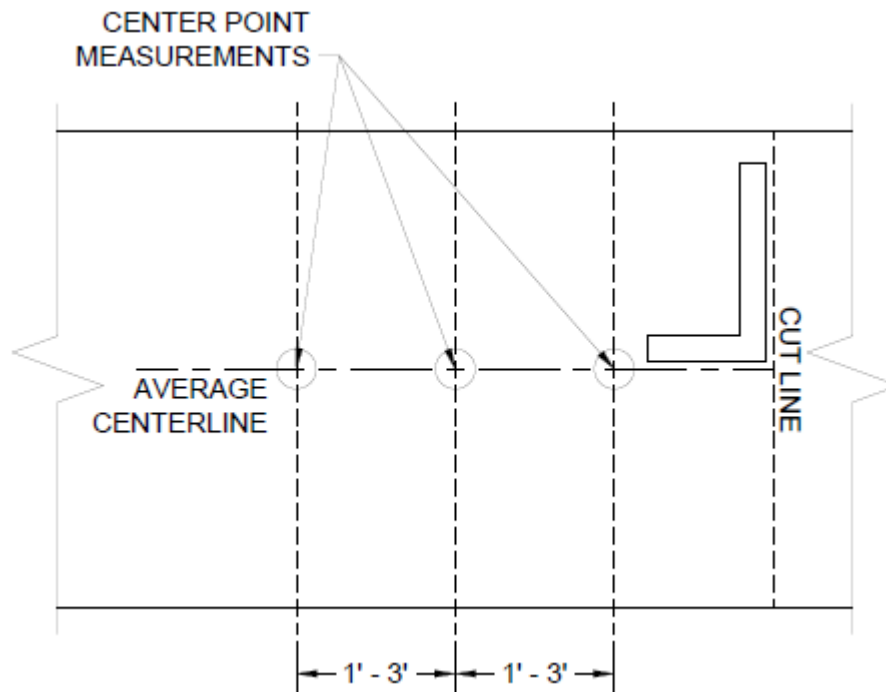


Figure 12: Cut line creation.

- B. Support belt ends with wood plank. Nail Flexco template in position with belt ends tight against lugs. Template nails are in bolt bag.
- C. Punch or bore bolt holes. Using an impact tool with Flexco Power Punch or Flexco Power Boring Bit speeds hole boring operation. Remove template. Leave plank under belt ends for a work surface. All work can be done from the top of the belt.

- D. Assemble bolts in bottom plates. Snap clip over heads of bolts. Fold one end of belt back out of the way, then insert bolts from under side along one row of holes.
- E. Using the notches in the template to align the opposite row of bolts, place the end of the belt over the bolts. Press belt onto bolts with hands. Remove template. Continue to press belt until it is in place.
- F. Place top plate over one bolt. Insert Bolthorn Tool through the other plate hole and over the second bolt to pry it into place.
- G. Assemble all top plates same way as in direction F. Start nuts down by hand far enough so that wrench will engage bolts.
- H. Before tightening fasteners, cut a piece of Flexco-Loc Tape three times the width of the belt plus six inches and cut a point on one end. Thread pointed tape between fastener teeth and top of belt, back through the bottom plates, and across the top again. This will help eliminate belt ripple and increase belt life by keep moisture and fines from deteriorating the end of the belt.
- I. Pull tape tight and hold in position by tightening a fastener at each end of the splice. Snug down all other plates.
- J. Tighten all fasteners from **EDGES to CENTER!** Tighten all nuts uniformly. The Flexco Power Tool Wrench used with an impact tool will speed this step considerably.
- K. Hammer plates in belt with metal or hard wood block in between bolts. Retighten nuts.
- L. Remove excess bolt protruding through the nuts and sand smooth.

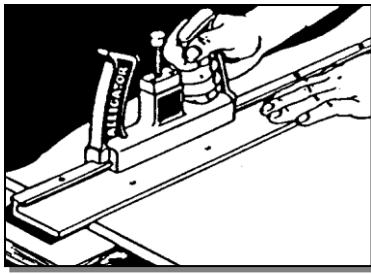


Figure 13-A

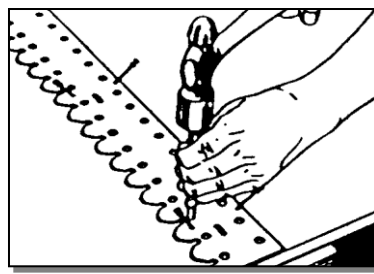


Figure 13-B

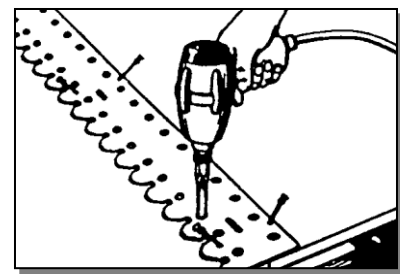


Figure 13-C

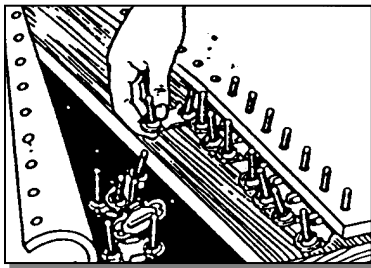


Figure 13-D

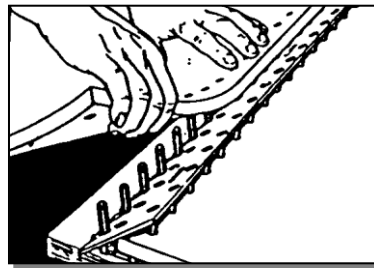


Figure 13-E

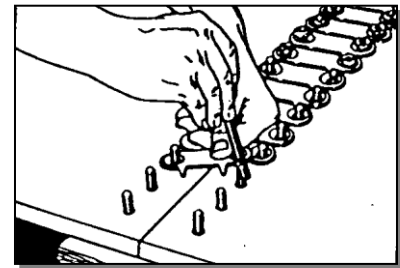


Figure 13-F

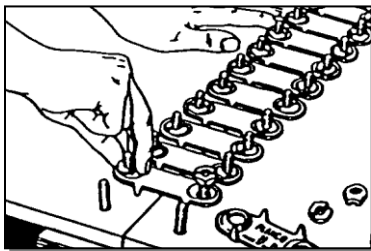


Figure 13-G

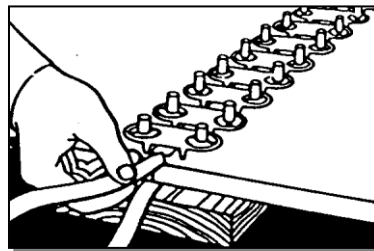


Figure 13-H

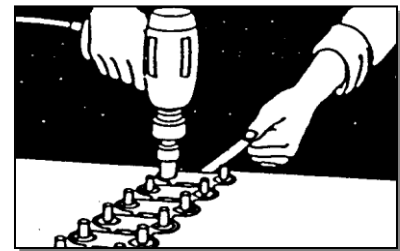


Figure 13-I

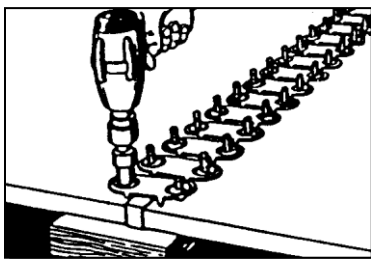


Figure 13-J

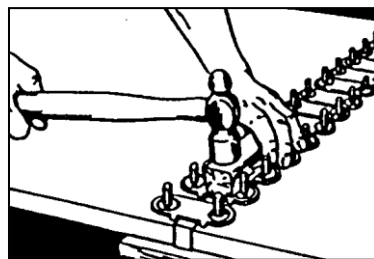


Figure 13-K

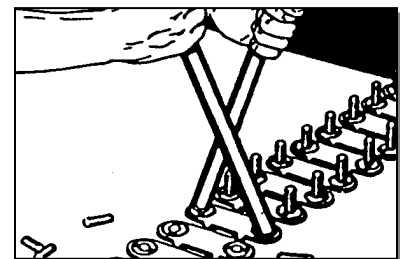
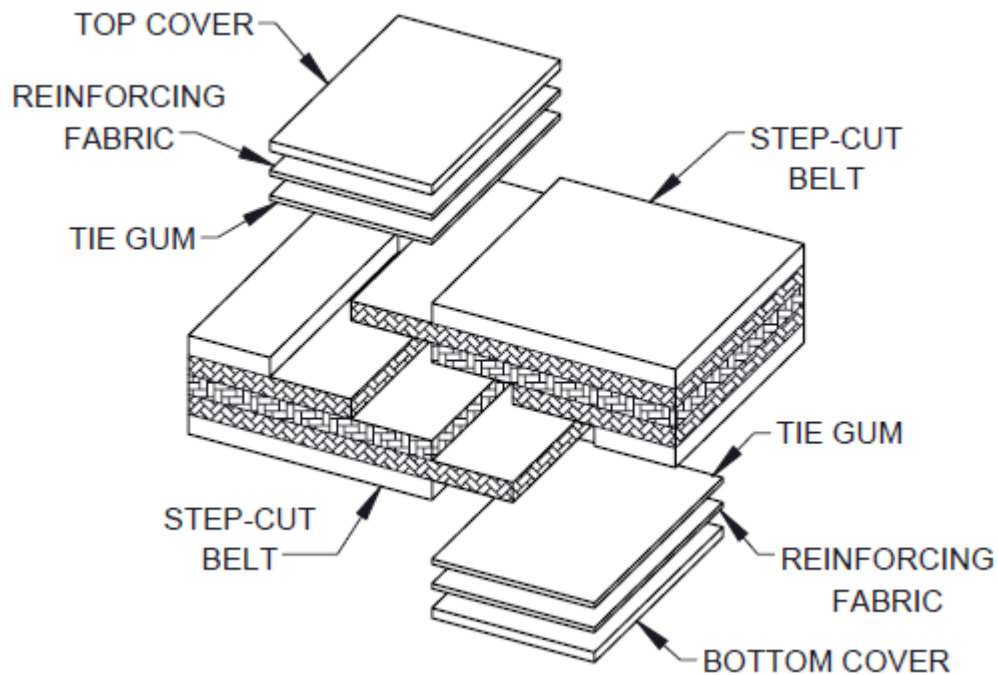


Figure 13-L

Other mechanical belt splices are available for use, and the splice manufacturer's instructions should be followed thoroughly to ensure proper operation of the conveyor. When selecting a splice, it is important that the splice be rated to operate under the conditions of the conveyor. This includes operating tension, and ensuring that the splice is anti-sparking and fire retardant.

## *Belt Splice Installation - Vulcanized*

For some applications, a vulcanized splice is requested or required. A conveyor with a moveable plow or with multiple intermediate discharges requires a vulcanized splice instead of a mechanical splice. A vulcanized splice joins the ends of the belt together with the use of a vulcanizing press, adhesives and filler material. Extra belt length is generally required for a vulcanized splice and it should be specified to Warrior Mfg prior to submitting the order if a vulcanized splice will be implemented. As vulcanized splices are more expensive than a typical mechanical splice, it is recommended to pre-stretch any belts that will be vulcanized for as long as time allows. The splice joins two ends of the belt that have been step-cut at the plies. These plies are glued together, then a cover strip applied on top and bottom. An electric vulcanizing press is then used on the joint to apply even heat and pressure as the cement compound hardens.



*Figure 14: Vulcanized splice example.*



## Belt Splice Protector Kit Installation

The belt splice protector kit is provided as a dual-purpose item. It is used to protect the non-sparking mechanical splice, which is made of a softer metal. The splice protectors are also used to help clean out the bottom of the conveyor sections. The splice protectors act as cleats to pull any material under the belt back to and around the tail pulley. This is essential in most applications to keep the conveyor operating properly. The kits are used on all conveyors they are feasible on, and on longer conveyors, multiple kits may need to be installed at 150ft intervals along the belt length. Splice protectors are installed with Flexco solid plate bolt kits similar to the splice itself. Cut off and sand smooth the excess bolts protruding through the nuts. The general arrangement drawing for the conveyor will list the quantity of kits required. The illustration below shows the proper spacing of the cleats. The set of cleats next to a splice will be located just ahead of the splice plates in the direction of belt travel.

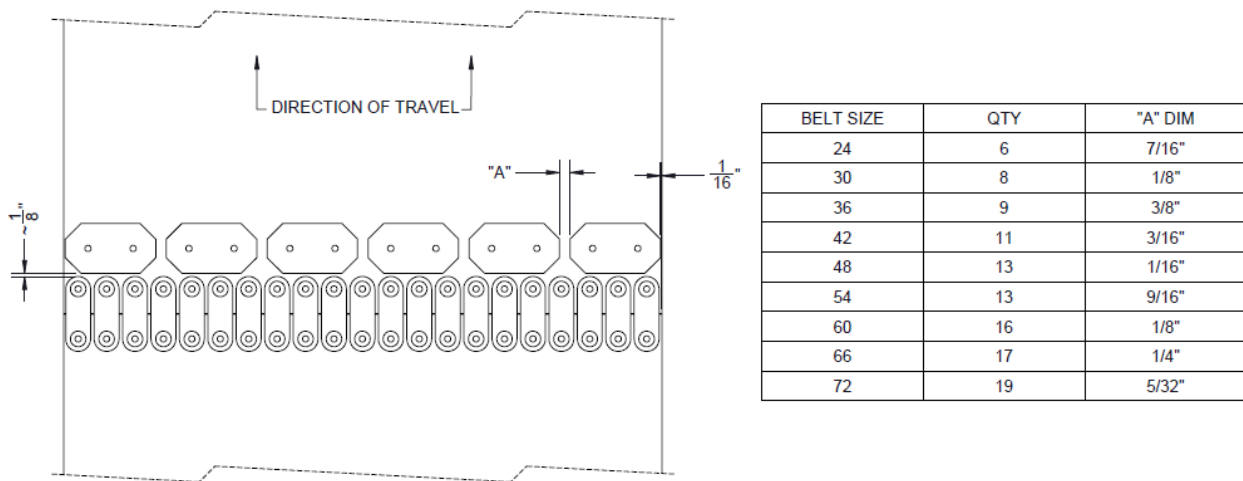
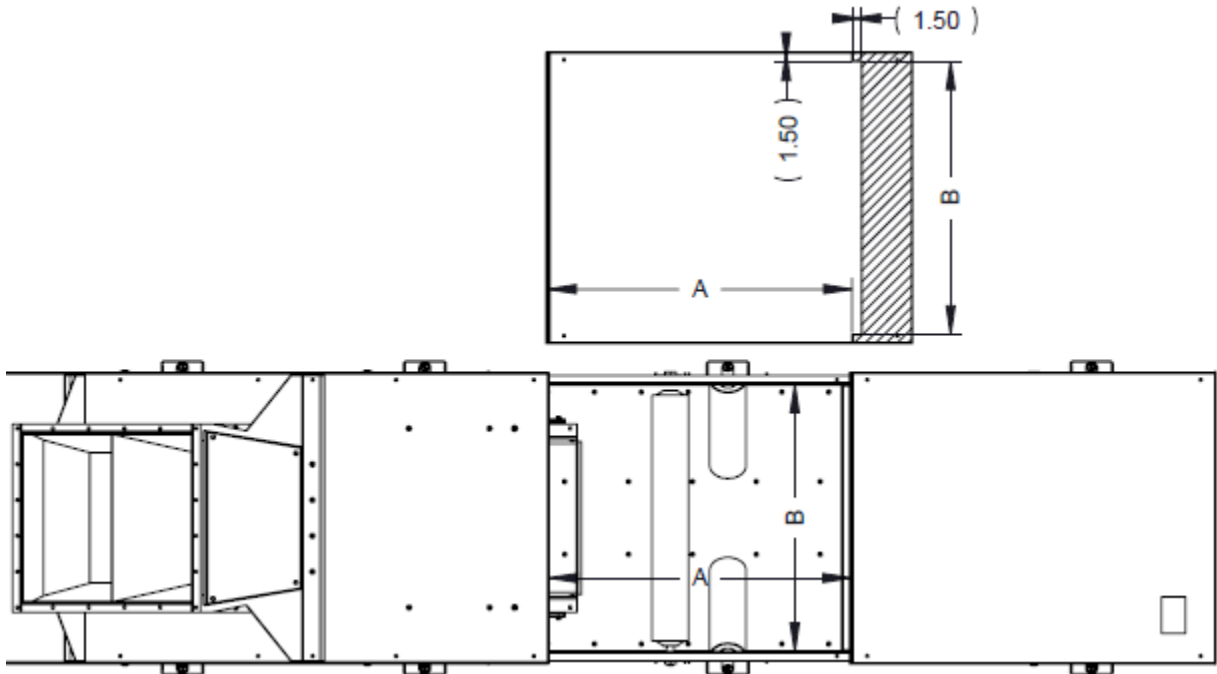


Figure 15: Belt splice protector kit installation quantities and dimensions

## Lid Installation

After all inlet points have been positioned and fastened, and after the belt has been installed, the lids that were removed during these processes can be installed. Any lids that need trimmed should have the downstream end cut to length along the edges, with a 1-1/2" tongue inside the side panels and extending underneath the adjacent unmodified lid. These joints should be fastened with sheet metal screws and sealed with a caulking appropriate for the environment.



*Figure 16: Recommended lid trimming method.*

## Motor/Drives

Refer to the general arrangement drawing to ensure the proper motor, reducer and drive package components are being installed on the equipment.

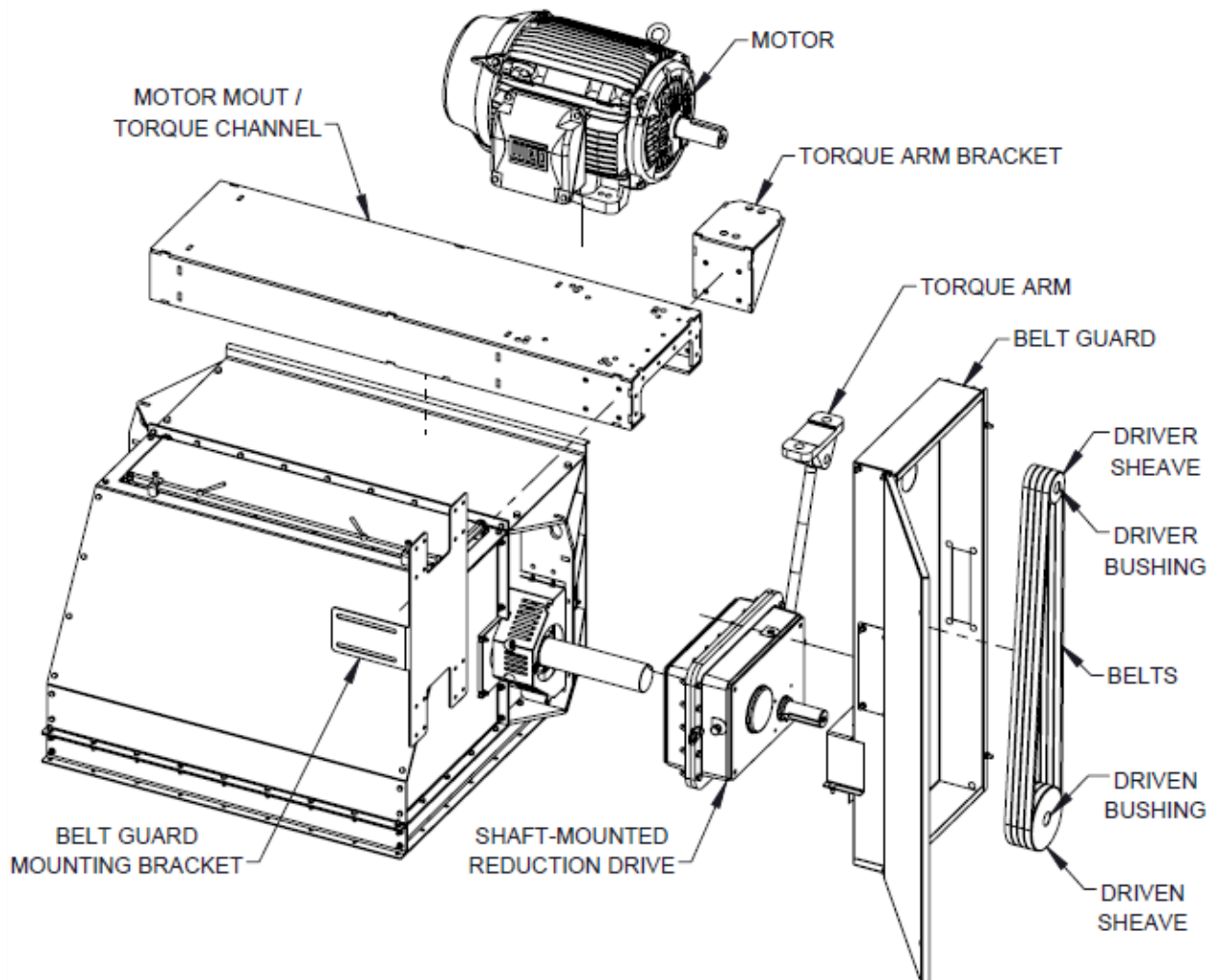


Figure 17: Typical shaft-mounted reduction drive and motor arrangement

Refer to the manufacturer's instructions on motors, reducers and drive components for proper installation, operation and maintenance intervals.

## NOTICE

Reducers are shipped without oil. Once installed, ensure reducer is filled to the proper level with oil. Refer to the reducer manufacturer's manual for proper oil type and fill level.

Before installing the drive belts, jog the motor to check for proper rotation to prevent damage to the conveyor and other components.



## WARNING



To prevent failure of the torque arm, maintain the proper angle of the torque arm to the reducer. Refer to the manufacturer's instructions. Improper torque arm angle may result in severe damage to the torque arm, torque channel and other components.

### Miscellaneous Equipment

#### Moveable Plow

Warrior Manufacturing offers a moveable plow discharge for filling flat storage and other applications. The plow has its own motor and drive to traverse it up and down the length of the conveyor. An installer-supplied electrical system is required for the plow conveyor with end-of-travel limit switches. A festoon wiring system should be utilized with proper wire specified by the electrician.

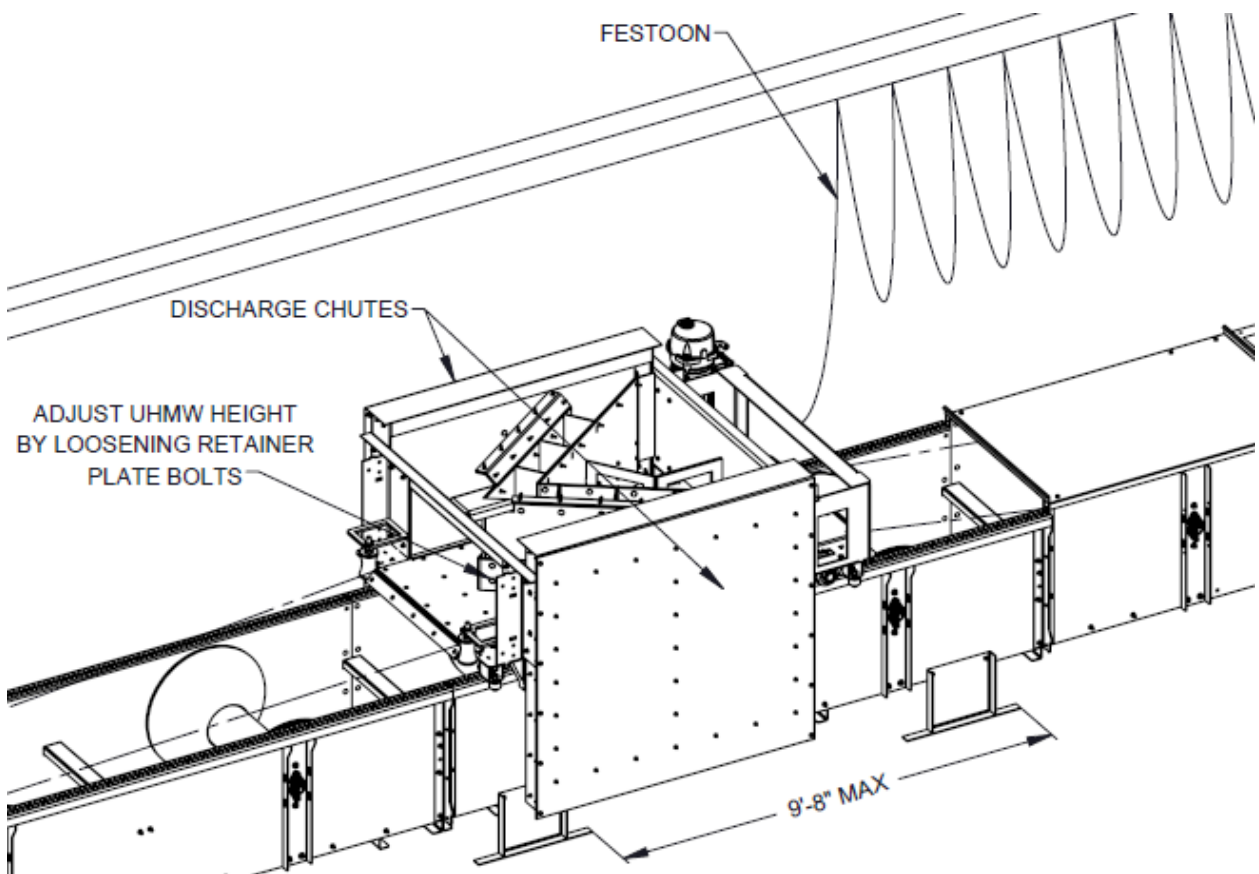


Figure 18: Moveable plow installation and adjustment.

## **Ventilation**

Enclosed conveyors are designed to keep grain dust encapsulated and moving with the grain. This is intended to cut down on housekeeping requirements and to help keep grain dust from settling on surfaces outside of the conveyor. It is generally a preferred practice to ventilate any indoor conveyors to further ensure that dust is not escaping from the conveyor. It is also a good practice to ventilate conveyors moving warm or moist material. This helps prevent buildup on the interior of the conveyor.

# Field Wiring Details



## WARNING



All power and control wiring must be performed by a qualified electrician and conform to the National Electrical Code and to all federal, state, and local codes and regulations.

### Hazard Monitoring

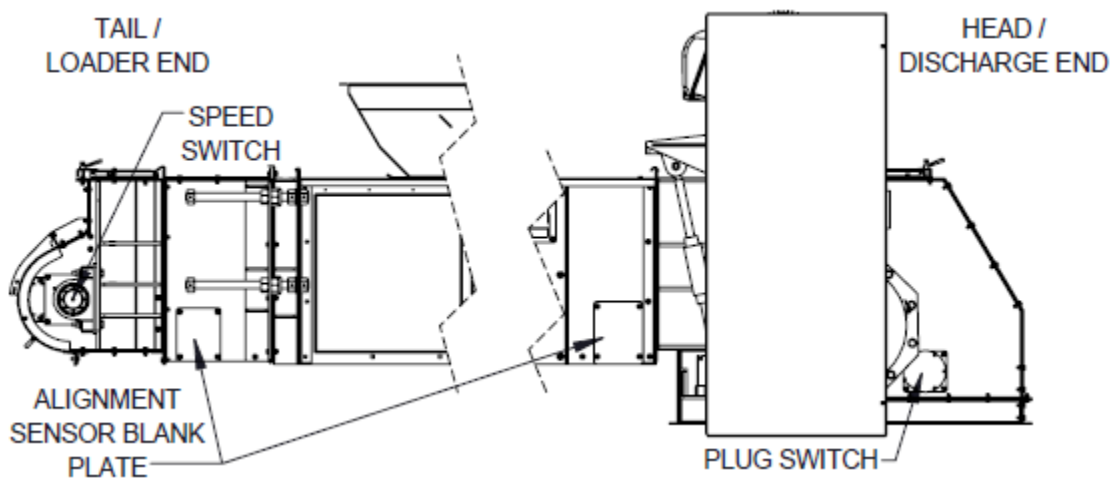


Figure 19: Standard hazard monitoring locations.

### Speed Switch

The speed switch needs to be connected and calibrated on the belt conveyor prior to running the belt unattended. A head pulley can burn through a belt in less than a minute if it the belt starts to slip on the head pulley. The speed switch monitors the difference in speed of a non-driven pulley, typically the tail pulley, versus the calibrated speed. It either shuts down the conveyor or alerts the control room of the condition so the conveyor can be stopped before any damage is done. This is only possible if the speed switch is properly wired and calibrated.

## Plug Switch

The plug switch is used to shut down the conveyor if there is a plugged condition at the discharge of the conveyor. This prevents damage to the conveyor and additional downtime due to the conveyor plugging from material being pulled back into the conveyor. The plug switch must be properly wired and tested prior to running material through the conveyor.

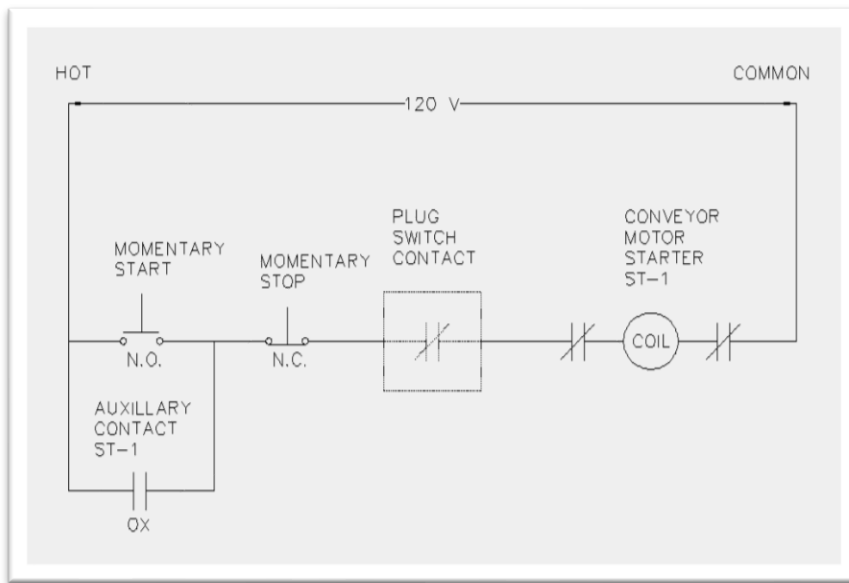


Figure 20: Typical plug switch diagram

## Belt Alignment Sensors

Belt alignment sensors are used to ensure that the belt is tracking properly and not rubbing on the housing of the conveyor. A belt rubbing on the conveyor housing can create enough heat to start a fire, it can also rub a hole through the side of the conveyor or damage the edge of the belt to the point the belt would need replaced. Belt alignment sensors are typically placed close to the head and tail pulleys on the return side of the conveyor.

## Bearing Temperature Sensors

Bearing temperature sensors are used to monitor bearing temperatures to prevent a failing bearing from causing damage or a fire. The head and tail bearings are typically monitored on a conveyor, along with any other pulley bearings. Idler bearings are not usually monitored.

# Initial Startup, Operation and Adjustment

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## Pre-Startup Inspection & Checklist

### Initial Belt Tension

Proper belt tension is important for the overall operation of the conveyor. Despite the main concern being whether the belt will slip on the head pulley, it also effects the break-in period, how well the belt carries material, how susceptible the belt is to misalignment, and idler wear. In most applications, the belt can simply be tightened to the point that there is no slippage on the head pulley when the belt is fully loaded, but sometimes a more thorough procedure is necessary.

Without any additional equipment or sensors, the only way to estimate the proper belt tension is by measuring the belt deflection when there is a weight applied to the belt. In order to obtain this measurement the belt needs to be flattened out, and a set weight needs to be applied to the belt at a set distance from the idler supports.

Warrior Manufacturing's standard tensioning procedure is as follows (reference Figure 21):

- A. Cut two 2x4 pieces of lumber to fit width wise, just inside the side panels, but still long enough to fully catch the belt. One inch wider than the belt width will work in most applications.
- B. Slide one of the 2x4s under the belt, next to an idler, and roll the 2x4 around the cone portion of a spool idler, or angled cantilever idler of a Champion conveyor, until it is positioned completely at the top of the idler with the belt on top of it. This idler should be a minimum of 15' from the head and tail pulley; if the conveyor is too short, the idler should be as close to the center of the conveyor as possible.
- C. Repeat step B for the second 2x4 on an adjacent idler that is the standard idler distance (60") away from the first idler.
- D. Place a straight edge across the width of the conveyor on top of the side panels and measure the distance from the straight edge to the belt, at the midpoint between the two 2x4s.
- E. Place 200lbs on the belt in the center of the two 2x4s. The weight should be as narrow as possible, and also long enough to cover the width of the



- belt. If necessary, an additional 2x4 may be used to help distribute the load.
- F. Measure the distance between the belt and the straightedge at the same location as step D and record the distance.
- G. Find the difference between the two measurements and compare to the documented deflection on the general arrangement drawing. If the difference is larger than the documented number, tighten the belt until it is within range.

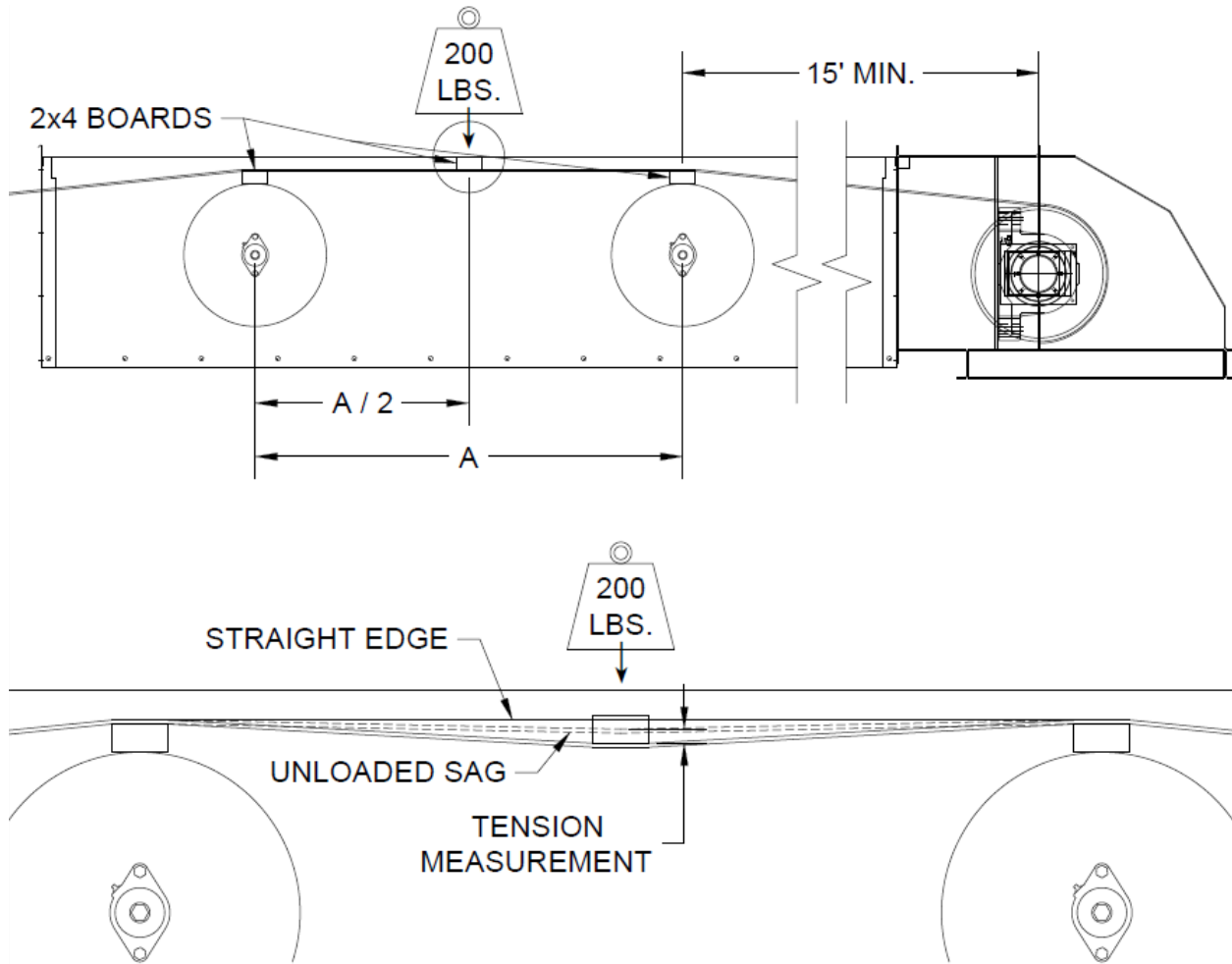


Figure 21: Initial belt tension procedure.

## **Startup Preparation**

As mentioned in previous sections, make sure the motor rotation has been checked with the drive belts removed to prevent damage to the conveyor and/or drive components.

Ensure all tools, parts and equipment are clear of the conveyor and workers are safely located before initial startup. The checklist on the following page can be used as a reference for starting up the equipment for the first time.

# Warrior Mfg



## Belt Conveyor Startup Checklist

PRE-STARTUP INSTALLATION INSPECTION	
<input type="checkbox"/>	Verify the conveyor is installed straight and true.
<input type="checkbox"/>	Ensure all joints are sealed with caulk as needed.
<input type="checkbox"/>	Ensure all hardware is installed and tight.
<input type="checkbox"/>	Verify head pulley is centered.
<input type="checkbox"/>	Verify reducer installation and proper angle of torque arm. Ensure proper hardware is used.
<input type="checkbox"/>	Verify the reducer has been filled with oil.
<input type="checkbox"/>	Verify motor rotation. Remove drive belts to prevent any damage if reversed.
<input type="checkbox"/>	Ensure belt is spliced correctly and splice is straight.
<input type="checkbox"/>	Verify tail pulley is centered and take-up is adjusted evenly.
<input type="checkbox"/>	Verify initial belt tension.
<input type="checkbox"/>	Ensure conveyor has been cleared of tools and foreign objects.
<input type="checkbox"/>	Verify auxiliary equipment such as speed switches, plug switches etc. have been installed and tested.

INITIAL STARTUP	
<input type="checkbox"/>	Position observers at the head and tail areas to observe initial startup and tracking.
<input type="checkbox"/>	Jog conveyor and observe for any issues.
<input type="checkbox"/>	Continue running conveyor while observing any catch points, binding or unusual noises.
<input type="checkbox"/>	Continue listening for any noises and inspect drive and drive belts.
<input type="checkbox"/>	Verify head shaft RPM matches general arrangement drawing.
<input type="checkbox"/>	Calibrate motion sensor with tail pulley running full speed and no material on the belt.
<input type="checkbox"/>	Check belt alignment at head pulley, tail pulley and intermittently on the conveyor.
<input type="checkbox"/>	Verify proper belt tension on regular intervals.
<input type="checkbox"/>	Position observers at the head and tail areas to observe initial startup.

INITIAL OPERATION	
<input type="checkbox"/>	Begin feeding product slowly while observing belt tracking and listen for any unusual noises.
<input type="checkbox"/>	Refer to general arrangement drawing for material depth, material type and speed information.
<input type="checkbox"/>	Observe belt tracking as material is added and adjust pulleys as necessary.
<input type="checkbox"/>	Slowly increase flow to full capacity while observing for any issues.
<input type="checkbox"/>	Verify no feeding or discharge issues.
<input type="checkbox"/>	Observe drive belts for slippage and proper operation.
<input type="checkbox"/>	Continue monitoring belt tension and belt tracking. Adjust as needed.

## Startup and Tracking

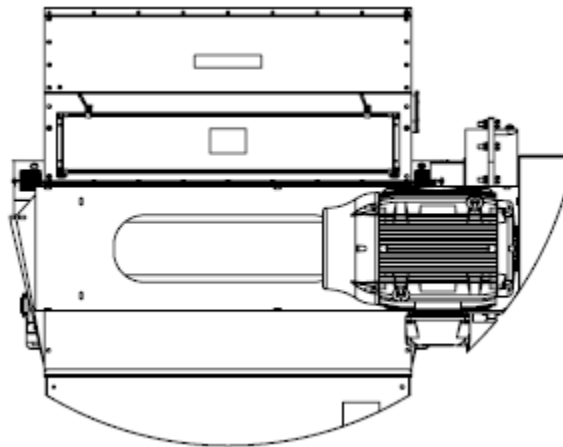
### Startup

Safely position workers at head and tail areas to observe belt operation on initial startup. Ensure that a speed switch is installed and properly wired prior to startup of the belt. If there is slippage at the head pulley, immediately stop the conveyor and re-tension the belt. A slipping head pulley can burn through a belt in a very short amount of time. The speed switch should be calibrated immediately upon initial startup.

### Head Pulley Tracking

Upon initial startup of the conveyor, check the belt tracking at the head and tail of the conveyor. The belt should run at the center of the pulley at both the head pulley and tail pulley. Remove shim(s) to bring the head shaft in on opposite side belt tracks towards. The belt will begin to track towards the side being moved in. Refer to the Head Section Installation section of the manual for more detail.

If belt tracks to this side, remove shims from the OPPOSITE side to adjust it IN

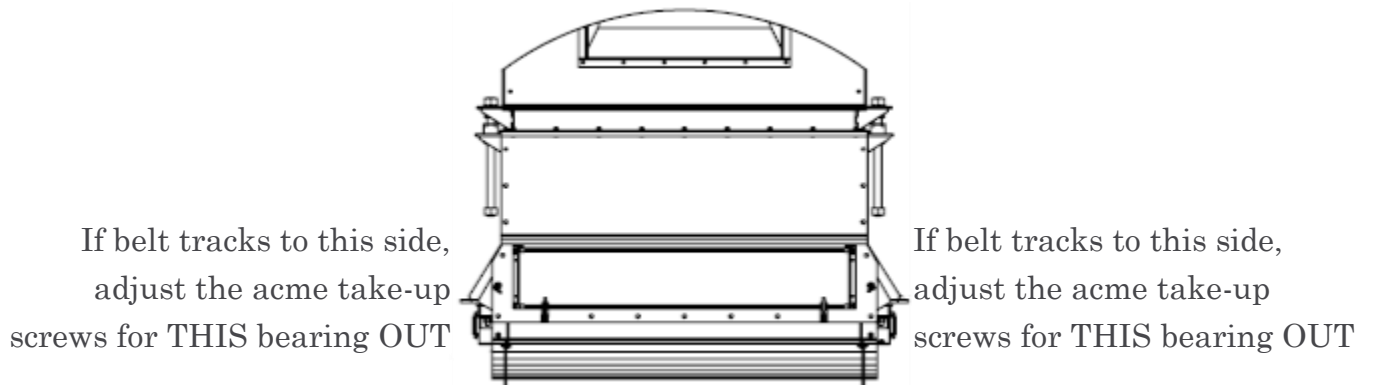


If belt tracks to this side, remove shims from the OPPOSITE side to adjust it IN

*Figure 22: Correction of belt tracking at head.*

## Tail Pulley Tracking and Take-Up Adjustment

Small adjustments may be needed at the tail pulley to keep the belt tracking in the middle of the pulley. If the belt tracks to one side, adjust the take-up on that side outward to get the belt tracking in the middle. Refer to the Tail Section and Take-Up Installation section for more detail. Be sure to recheck the belt tracking at the head.

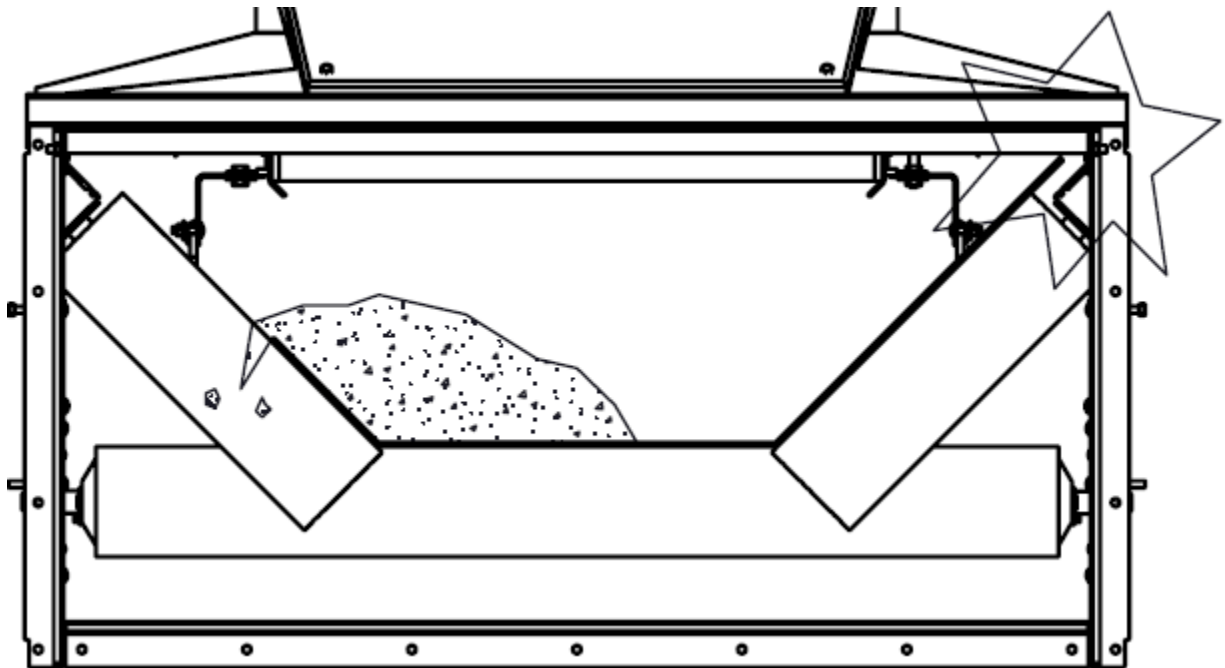


*Figure 23: Correction of belt tracking at tail.*

## Operation

Once initial startup and adjustments have been completed, conveyor is ready for operational checks. Start conveyor and begin to slowly add material at reduced capacity while observing material flow at loader locations and at head discharge. If the system allows, start out at 25% capacity. Look and listen for any unusual sounds. Ensure material is loading and discharging properly. Check conveyor belt for proper tracking at all load points, head pulley and tail pulley. If operation is satisfactory, adjust capacity to 50%, then to 75%, and then to full capacity while observing for proper operation, loading, tracking, and discharge of material.

Watch for warning signs of side loading at loader inlets. Side loading could push the belt to track towards the under-loaded side. This may lead to spill over the belt on the over-loaded side, and rubbing of the belt on housing components on the under-loaded side.



*Figure 24: Side-loading effects.*

# Troubleshooting

When troubleshooting the equipment, consider the basic theory of operation and, depending on the issue, evaluate the entire system. What effect could other equipment have on the performance, such as other equipment feeding the conveyor, spouting, and dust collection systems? Pay particular attention to when it happens, is there a pattern? Does the issue occur all the time or just when loaded to capacity or partial capacity? Does it happen at the beginning of loading, at the end or somewhere in-between?

Below is a list of common problems in the industry associated with belt conveyors. It is not a full comprehensive list of all the possible problems one may encounter. This list is meant to lend assistance in resolving issues. If there is a problem that is not on the list or if you have any questions, contact Warrior Mfg. for assistance.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Actual capacity less than rated capacity	Change in material density	Check current material lbs/cu ft, compare against design specs.
	Change in material flow	Verify proper capacity is being supplied into conveyor.
	Head shaft RPM slower than design speed	Verify correct sheaves on reducer and motor.
	Drive belts slipping	Check/adjust drive belt tension.
	Material depth lower than design specs.	Verify proper capacity is being supplied into conveyor. Correct inlet restriction.
	Material plugging at discharge	Material not discharging. Inspect discharge spouting for blockages, flat angles and adequate size.
	Conveyor not filled evenly across	Spouting/inlet issue. Modify spouting/baffles for even flow.
	Conveying belt slipping on head pulley	Check/adjust conveying belt tension.
		Inspect condition of head pulley lagging. Replace if lagging is worn or glazed.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Motor running high amperage/over amperage	Change in material density	Check current material lbs/cu ft, compare against design specs.
	Change in material flow	Verify proper capacity is being supplied into conveyor.
	Head shaft RPM faster than design speed	Verify correct sheaves on reducer and motor.
	Conveyor over filled, material depth higher than designed	Regulate control feed into inlet
	Material plugging at discharge	Material not discharging. Inspect discharge spouting for blockages, flat angles and adequate size.
	Material plugging in tail area	Open and clean out tail area. Determine cause of excess material being returned.
	Electrical issues	Verify good electrical connections and proper wire size for distance.
		Verify voltage at motor, all three phases. Ensure voltage does not drop under load and equal on all three phases.
		Verify amperage at motor, all three phases. Ensure amperage is balanced between phases.
	Verify high amperage limit set correctly on control	
Unable to start conveyor	Drive issues	Verify proper motor rotation or reducer malfunction. Check for proper sheaves.
	Foreign object in conveyor	Look for obstruction in conveyor
	Conveyor over filled/plugged	Verify proper capacity is being supplied to the conveyor. Clean out conveyor.
		Verify plug switch is not activated/defective.
	Conveying belt stuck to bottom liner	Apply general purpose flour or grain dust between bottom conveying belt and bottom liner.



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Unable to start conveyor (continued)	Material plugging at discharge	Material not discharging. Inspect discharge spouting for blockages, flat angles and adequate size.
	Electrical issues	Very as stated above (see electrical issues above under high amperage)
	Soft start	If a soft start is being used, it may not be able to supply line voltage thus reducing motor starting torque.
Excessive material spilling off conveying belt	Improper loading of material onto belt, material spilling off belt	Ensure spouting is delivering material in line with conveyor loader and loading onto belt conveyor evenly. Baffles may be needed in spouting.
	Loader skirting out of adjustment, material spilling off belt	Check loader skirting for proper adjustment to the conveyor belt. Replace worn/damaged skirting.
	Blockage along conveyor, material spilling off belt	Remove blockage from conveyor
	Material plugging at discharge, material carried back to tail area.	Material not discharging. Inspect discharge spouting for blockages, flat angles and adequate size.
Material plugging in tail area	See excessive material spilling causes above	See excessive material spilling solutions above.
	Missing or inadequate number of splice protector kits	Splice protectors help drag material back to tail and reload material onto belt. Ensure adequate number of splice protectors installed.
	Worn, damaged or missing tail pulley flippers	Inspect tail pulley for missing, damaged or worn flippers. Replace as needed. Flippers help reload material onto the belt.
Belt tracking to one side at tail pulley	Tail pulley not square with conveyor	Verify take-up is adjusted evenly, side to side. Adjust to track belt in middle of tail pulley.
Belt tracking to side, one section of belting	Belt splice not square	Verify splice is square to centerline of belt. Cut and re-splice if needed.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Belt tracking to one side down length of conveyor	Improper loading of material onto belt	Ensure material is evenly distributed on belt from side to side. Ensure spouting is delivering material in line with conveyor loader and loading onto belt conveyor evenly. Baffles may be needed in spouting.
	Intermediate idlers out of square with centerline of conveyor	Loosen idler bearing brackets on side of conveyor, slide forwards or backwards to align/adjust tracking.
	Conveyor intermediate sections out of alignment	Verify intermediate sections straight and true down entire length of conveyor. Ensure no sections are twisted from side to side. Ensure conveyor is adequately supported.
Belt tracking to one side on head pulley	Head pulley not square with conveyor	Remove or add shims under head shaft bearings to adjust tracking.
	Worn head lagging or material buildup on pulley	Inspect lagging for buildup or uneven wear. Replace lagging as needed.

# Maintenance

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## General Maintenance and Routine Inspection

A regularly scheduled maintenance and inspection program should be implemented to keep the equipment in good operating condition and reduce downtime. The program should include housekeeping, routine inspection and lubrication based on operating frequency and operating environment.

Routine inspections can reveal small issues needing minor adjustment before they become big problems requiring downtime and repair. Listen for any unusual noises that may indicate need for adjustment or repair.

On newly installed equipment, check belt tension multiple times the first day of operation. Check daily for the first couple weeks during the break-in period and adjust as needed. New drive V-belts will need the same attention. During this break in period, do an overall inspection of the installation to ensure fasteners remain seated and tight. Also look and listen for any unusual noises or changes to operation of the equipment and investigate to determine if corrective actions are needed. Inspect drives, head and tail bearings to ensure they remain secure and look for any signs overheating.

Regularly scheduled inspection, maintenance and lubrication intervals should be established. The following are some items to consider:

- Check/adjust belt tension, re-splice belt when take-up has no more adjustment.
- Check V-belt tension/alignment and inspect for damage/wear. Replace in matched sets.
- General housekeeping for cleanliness and accumulation of dust and debris on motors and reducers so they can dissipate heat, also to prevent fire and explosion hazards. Check reducer breather vent to ensure it is not plugged, which can build pressure and cause seals to leak.
- Check safety devices such as plug switches, rub blocks, speed switches, and other electrical devices for proper operation.
- Refer to manufacturer's instructions on motors, reducers and bearings for proper maintenance and lubrication intervals. Use the appropriate grease and oil as specified. Follow reducer manufacture recommendations on oil level and oil change intervals.

- Check bearings and drive components for signs of looseness or overheating, leaks etc.
- Inspect head and tail pulleys for any issues. Check that pulleys remain centered on shaft and flippers remain in good condition on tail pulley.
- Inspect head pulley lagging for wear, replace as needed.
- Inspect conveyor belt for damage, wear, and other defects that could cause unexpected downtime. Determine if belt condition is a result of long-term use or other issues/adjustments that need to be made.
- Inspect splice for signs of deterioration and ensure fasteners remain tight.
- Inspect splice protectors for missing or damaged cleats, replace as necessary.
- Inspect loader skirting for proper contact with belt. Adjust/replace as needed.
- Check wear of bottom liners replace as needed.

If the conveyor will be shut down for more than one month, perform the following operations:

- Remove all foreign material from the conveyor.
- Inspect the surface coatings.
- Lubricate and protect all bearings and drives according to the manufacturer's instructions.
- Coat all exposed metal surfaces with rust prevention oil according to the manufacturer's instructions.
- Prior to start-up, perform the installation and operation instructions in this manual.

# Warranty Statement

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**WARRANTY** - All items manufactured by Warrior Mfg., LLC are warranted against: defects, quality in material, or quality in workmanship for one (1) year from the date of shipment (but not against damage caused by accident, abuse, or faulty installation). Any product proved defective in such manner within one (1) year of shipment will be repaired or replaced free of charge. The responsibility of Warrior Mfg., LLC under this warranty is limited to supplying a new or functionally operative part. The warranty does not include: the cost of labor involved or required in diagnosing trouble, removing or installing a new part or parts, nor does it include any damage to any part or parts to which a Warrior Mfg., LLC product may be attached or which may have arisen for any reason whatsoever. No allowance will be made for repairs, alterations, or changes unless specifically authorized in writing and signed by an executive officer of Warrior Mfg., LLC. All freight costs incurred in returning any product to Warrior Mfg., LLC shall be borne by the customer.

**LIMITATIONS OF WARRANTIES** - Warrior Mfg., LLC implies no product warranties beyond those stated herein.

**LIMITATION OF LIABILITY** - Liability of Warrior Mfg., LLC to the purchaser for damages arising out of the: manufacture, sale, delivery, use, or resale of the equipment, whether based on warranty, contract negligence, or otherwise, shall be limited to and shall not exceed the cost of the repair or replacement of the defective part or parts. Upon expiration of the warranty, all such liabilities shall terminate. The seller shall not be liable to the purchaser or user for: loss of anticipated profits, loss by reason of plant shutdown or non-operation, increased expenses of operation of other equipment, or other consequential loss or damages of any nature arising from any cause, whatsoever, by reason of the manufacture, sale, delivery, and/or use or resale of the equipment covered by this quotation or sales order.

**FIELD MODIFICATIONS** - No field modifications shall be permitted on new nor existing equipment without **PRIOR WRITTEN AUTHORIZATION** from **WARRIOR MFG., LLC, AND THE OWNER**. Repair of unapproved field modifications which are made without the express written authorization of Warrior Mfg., LLC, and the Owner shall be at the **CONTRACTOR'S EXPENSE**. The Contractor shall be held liable for the design of all equipment (new and existing) on which field modifications are made prior to receipt of written authorization from product manufacturer and the Owner – even if approval is given after the modification has been made.