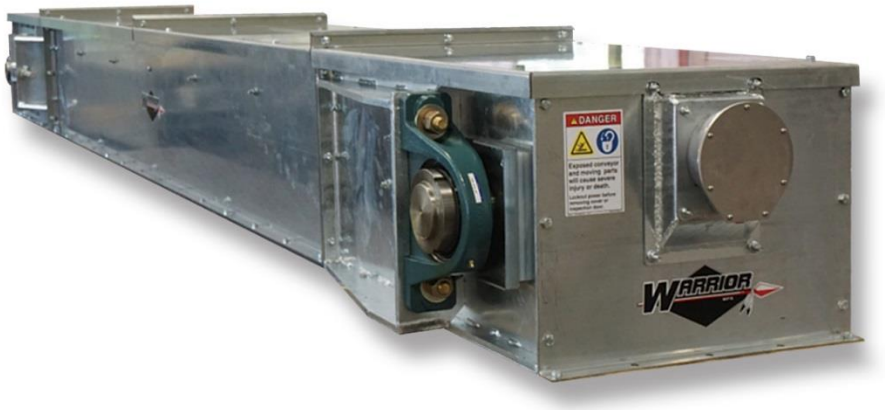
EN-MASSE CONVEYOR



1145 5th Ave SE
Hutchinson, MN

p. 320-587-5505
sales@warriormfgllc.com

www.warriormfgllc.com

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General

Introduction

This manual is intended to provide basic information regarding the general design features and installation process of Warrior Mfg. En-Masse Conveyors. Because Warrior Mfg. offers many sizes, options, and features, not all can be covered here. Refer to the general assembly drawing that was provided with the conveyor for more specific details. This manual contains 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 installs 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. Proper installation of this equipment is crucial to its' longevity and performance.

Equipment Identification

The equipment will have a serial 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 A: Equipment serial tag.

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 performing any maintenance and making adjustments.

The equipment has been supplied with safety labels warning individuals of potential hazards associated with the 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.

1


DANGER
Exposed conveyor and moving parts will cause severe injury or death.
Lockout power before removing cover or inspection door.


WARNING
Avoid serious injury or death.
This machine MUST be locked out in accordance with current OSHA requirements before any maintenance or service is performed.

2

3


WARNING
Moving parts can crush and cut.
Lockout power before removing guard or servicing.
Do NOT operate with guard removed.


WARNING
Moving parts can cut and crush.
Lockout energy source before inspection or service.

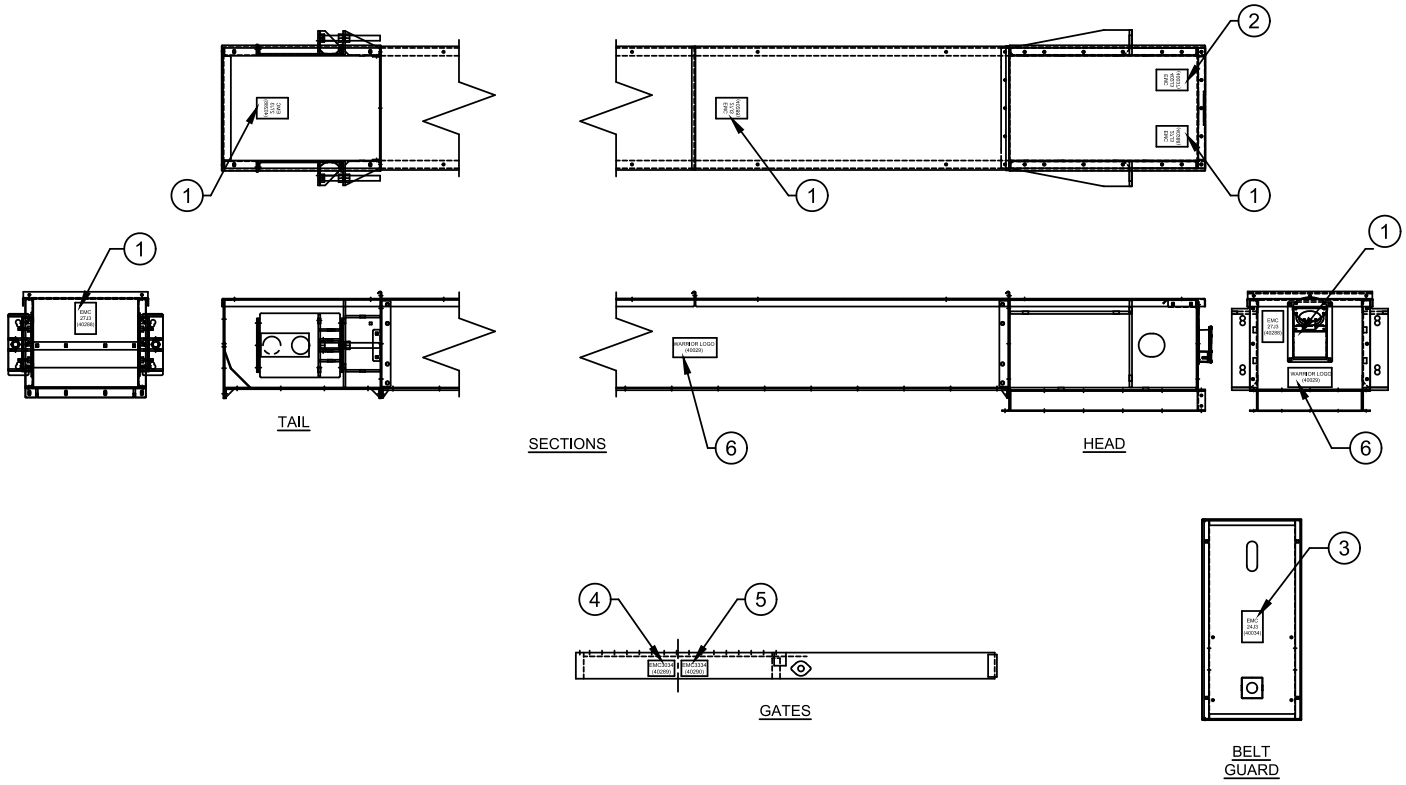
4

5


WARNING
Moving parts can crush and cut.
Lockout power before removing guard or servicing.
Do NOT operate with guard removed.


WARRIOR
MFG

6



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

General Assembly

Typical Assembly/Installation Guidelines

Proper and thorough installation will greatly impact the overall performance and operation of the equipment. The conveyor MUST be straight both horizontally and vertically within a ½" or less from the head to tail so the conveying chain does not rub and bind during operation. It is recommended that all joints between sections be caulked during installation to provide a water and dust resistant connection (Reference Figure 10 pg. 18).

NOTICE

Conveyors are not designed to support other equipment, other conveyors, other conveyor head sections, 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. 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.

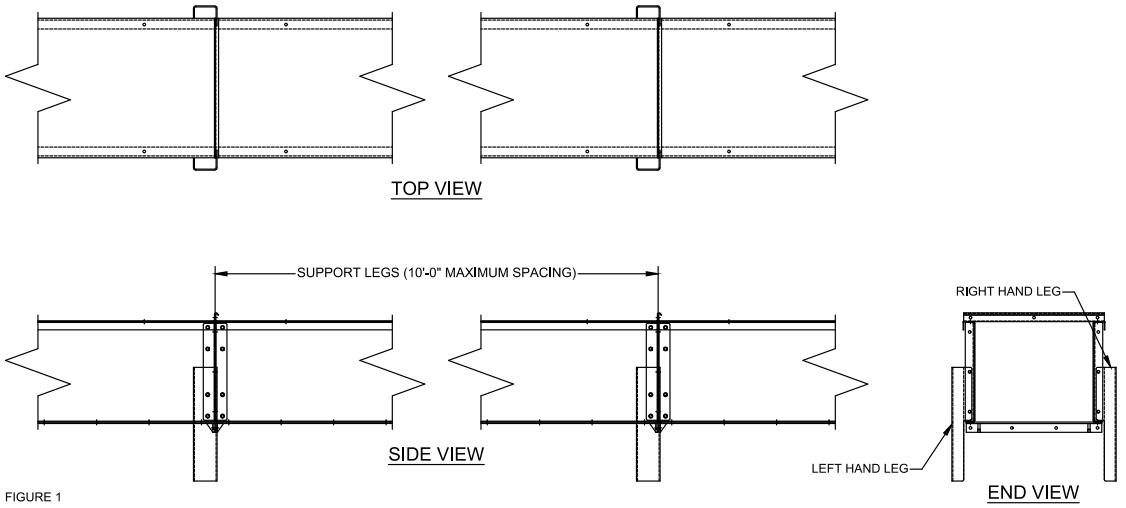


FIGURE 1

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 weight capacity. Refer to the general assembly drawing for the list of weights.

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.

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.

General Assembly Drawing

Refer to the general assembly drawing for each specific conveyor. The final assembly drawing will have an "As Approved" stamp on the front page of. Each conveyor is unique based on many variables and options including but not limited to, size, width, capacity, inlet type and other options. Pay particular attention to location of short sections, sections with gate cutout openings, knee sections and other special sections for proper placement. The general assembly drawings also contain pertinent information such as incline, horsepower, drive information, RPM, conveyed material, material depth, and capacity. Ensure the conveyor is installed and operated within the designed specifications.

Figure 1A: "As Approved" stamp found on drawings.

WARNING

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.

Head Section Installation

A typical installation will start with the head or drive section mainly to ensure the discharge location is accurately placed. Refer to manufacturer's installation instructions for gearbox, motor, and electrical components installation process. Then, continue assembling intermediate sections back to the tail. The Head/Drive section must be supported to withstand the forces and weight of the drive. The head section must be supported independently from the discharge transition. In some cases, the discharge transition is designed by others with support structures incorporated. In those cases, the transition MUST be designed to support the loads of the head while in operation. If transitioning to another conveyor, consult the conveyor's manufacturer for loading capabilities. In many cases, it is not recommended that the transition be supported by the conveyor below, and would require external support incorporated in the transition. Where applicable, head loading information is provided on the conveyor general assembly drawings for use by the contractor to appropriately design supporting structures. Support legs are the preferred method for supporting the head section. Head support locations are specified on the conveyor's general assembly drawings. 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. Figure 2 is an illustration of a head with a discharge transition.

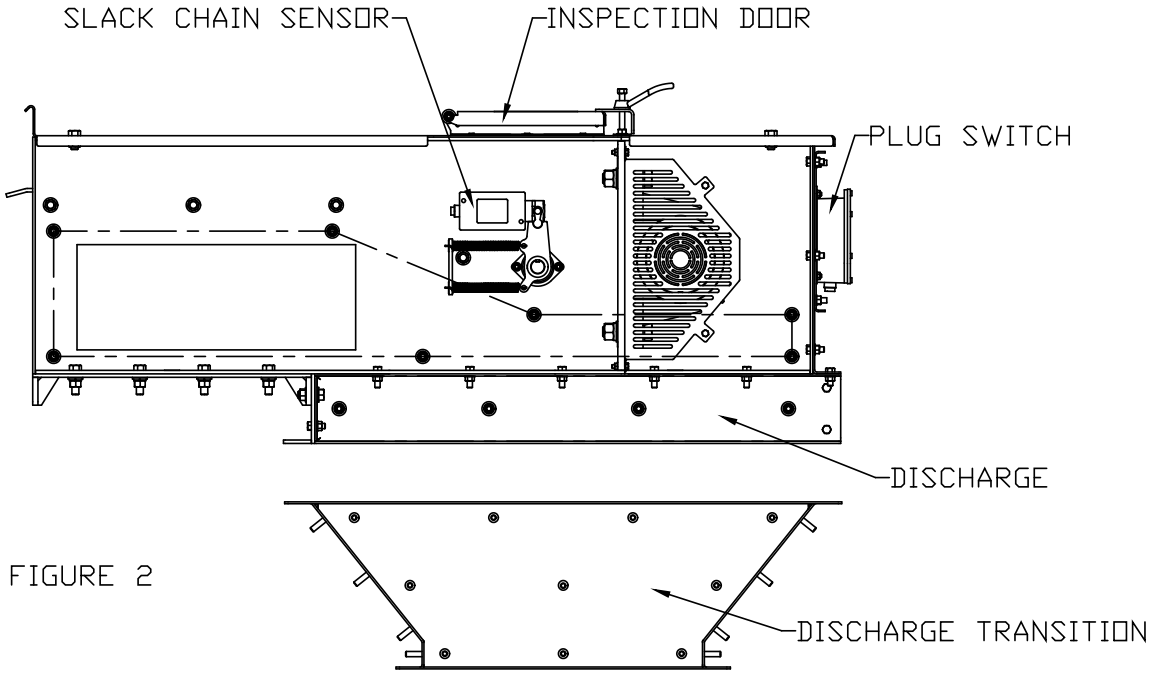


FIGURE 2

Slack Chain / Break Sensor

The head section will typically have a chain break/slack chain switch located just behind the head sprocket, where the conveying chain comes off the top of the sprocket. The mechanism is connected to a limit switch located on the outside of the head. During normal operation, the mechanism is in a neutral position, allowing the conveyor to operate. Figure 3 shows the switch assembly. The limit switch mounting side is shown on the general assembly drawings. If preferred, the limit switch can be reoriented to the opposite side.

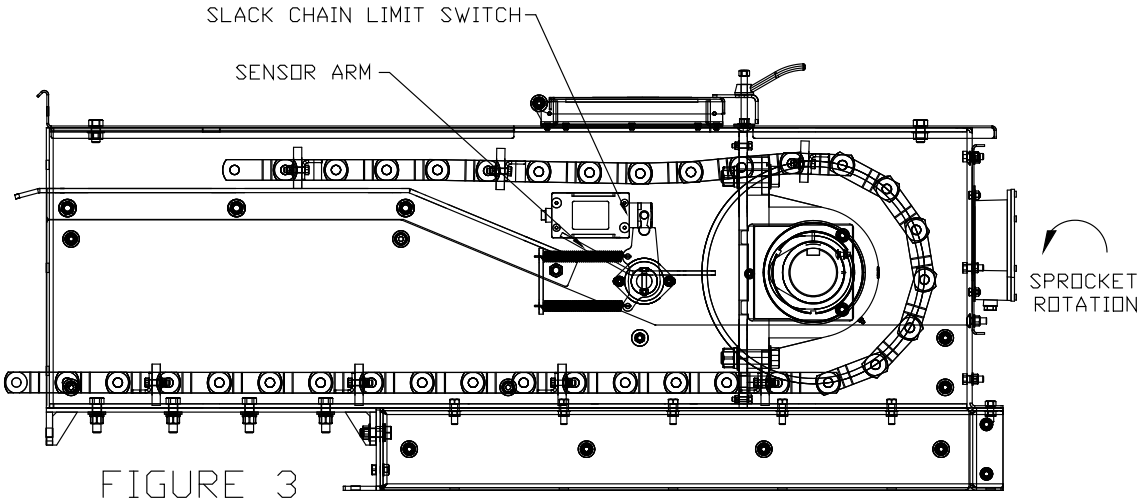


FIGURE 3

Moving limit switch to opposite side of conveyor:

1) Remove conveyor lid, and remove sensor arm bolts.
2) Remove springs, limit switch mounting bolts, spring bracket, and limit switch trigger arm locking shaft collars.
3) Remove slack chain sensor shaft, and reinstall with shaft end protruding the desired limit switch side.
4) Take limit switch, and remove the 0.875" long limit switch arm. Flip the orientation of the switch arm and reinstall on limit switch.
5) Reinstall shaft components, limit switch and springs.
6) Verify correct operation of slack chain switch. When tripped, the tip of the sensor arm should be approximately 3/4" above the top of the inclined pan.

NOTICE

This device is NOT intended to take place of regular slack chain inspections/observations! Do NOT wait until the device shuts down the conveyor to tension the chain!

If the chain should break or the chain become too slack, the conveying chain will activate the trip lever thus engaging the limit switch. The limit switch is single pole double-throw, and will trip the same contact in either direction. The switch should be wired to shut down the conveyor. Figure 4 shows the switch assembly with excessive chain slack.

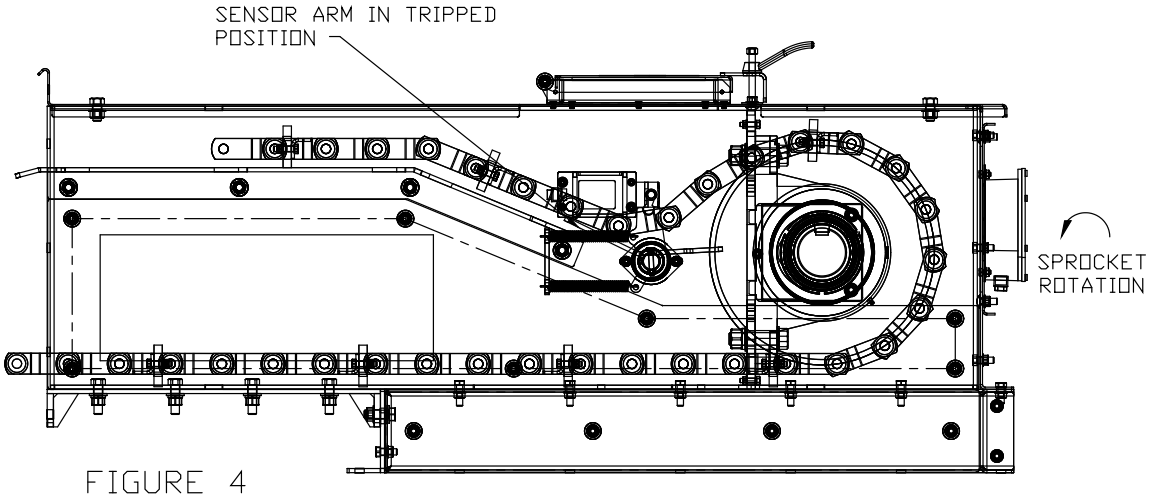


FIGURE 4

Plug Switch

Bolted construction heads will have a diaphragm plug switch located on the end panel for sensing a plugged condition. 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. Figure 5 is an illustration of material plugging the head and activating the plug switch.

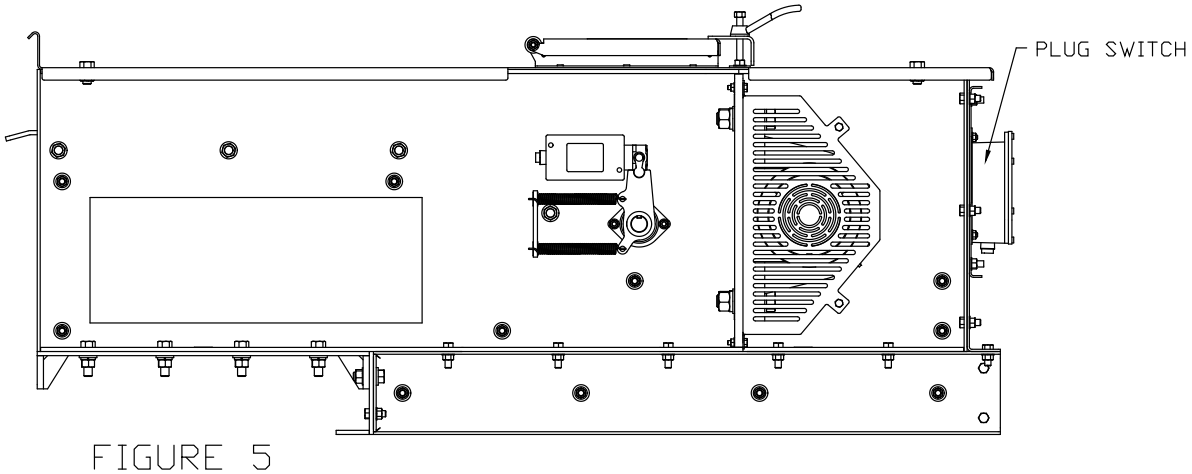


FIGURE 5

Alternatively, welded construction heads utilize a limit switch and end relief plug door to sense a plugged condition. If the discharge becomes plugged, the head will fill with material and the plug door will open, causing the limit switch to trip. The limit switch is single pole and will trip the same contact in either direction. The switch should be wired to shut down the conveyor. Refer to Figure 5A below.

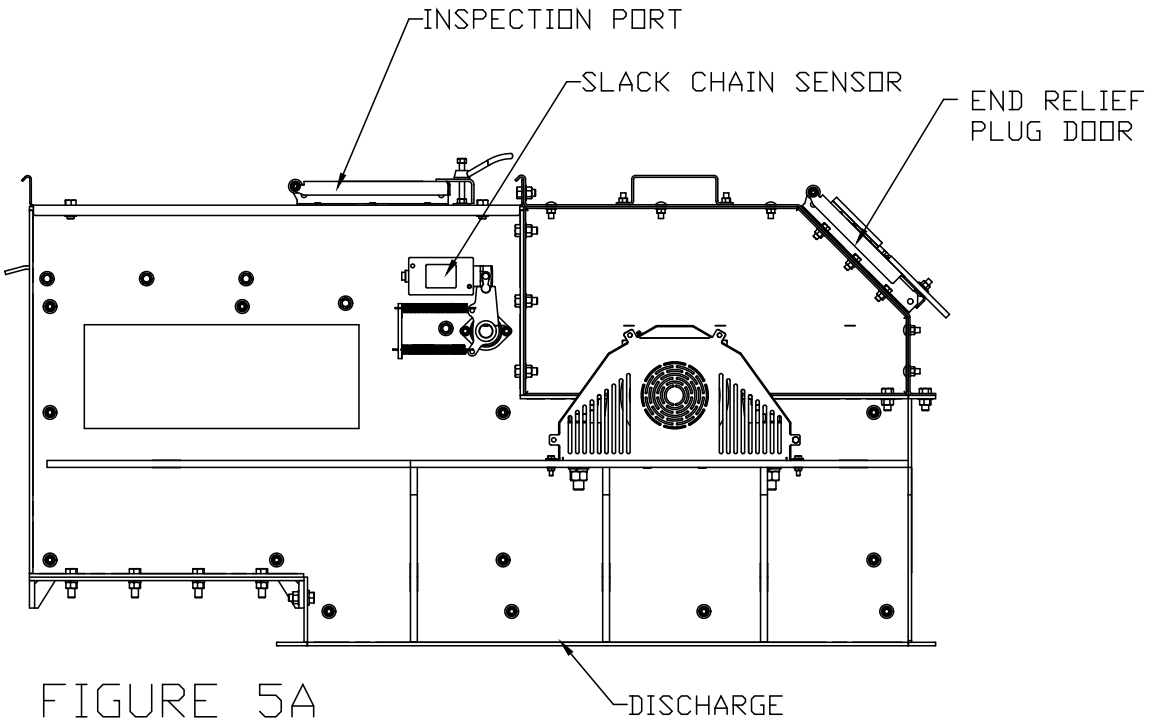
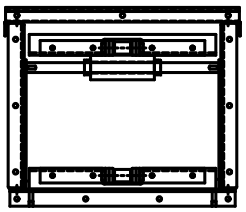


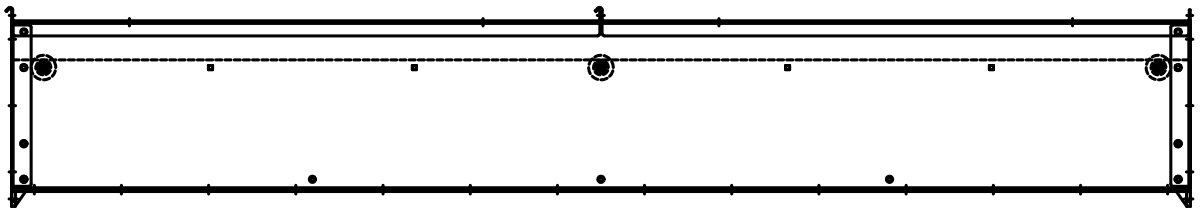
FIGURE 5A

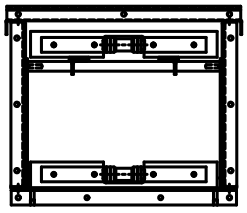
Intermediate Section Installation

Standard, full-length conveyor sections are 10 ft. in length. Some 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. Figure 6 on the next page is an illustration of the four conveyor return types.

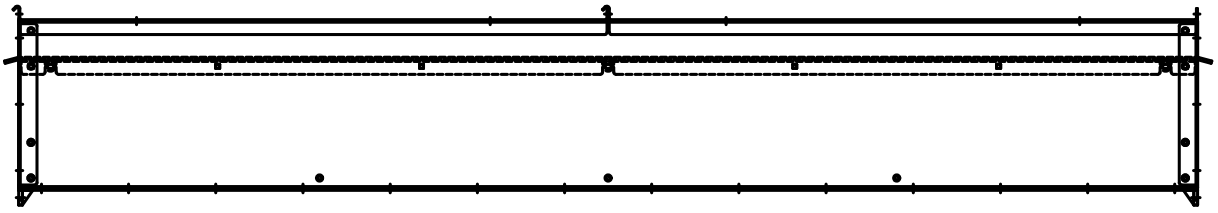


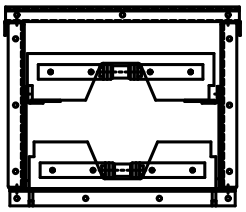
ROLLER RETURN



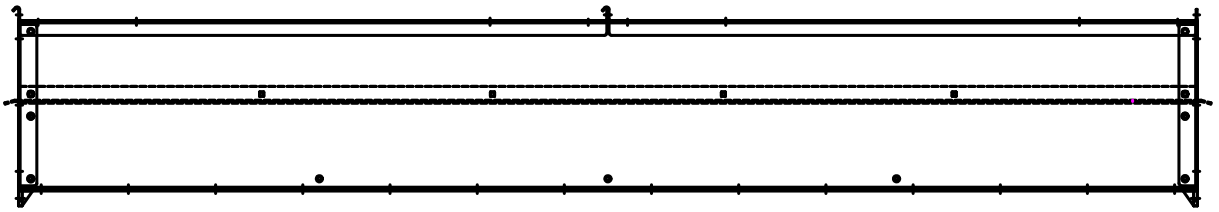


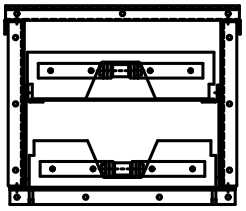
RAIL RETURN





TRACK RETURN





PAN RETURN

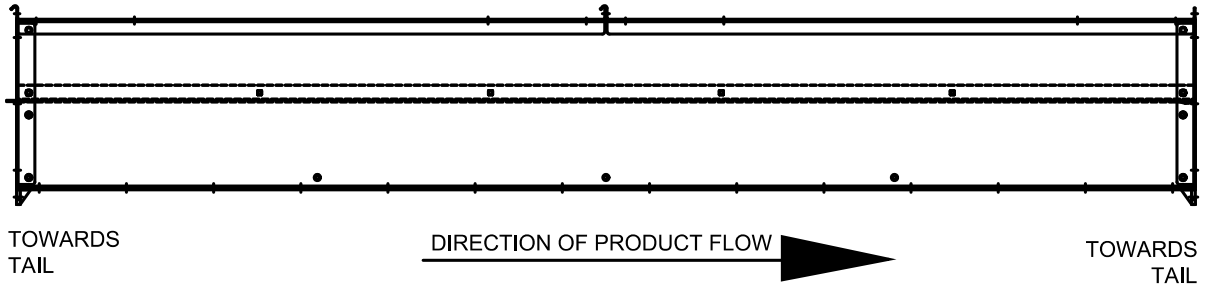
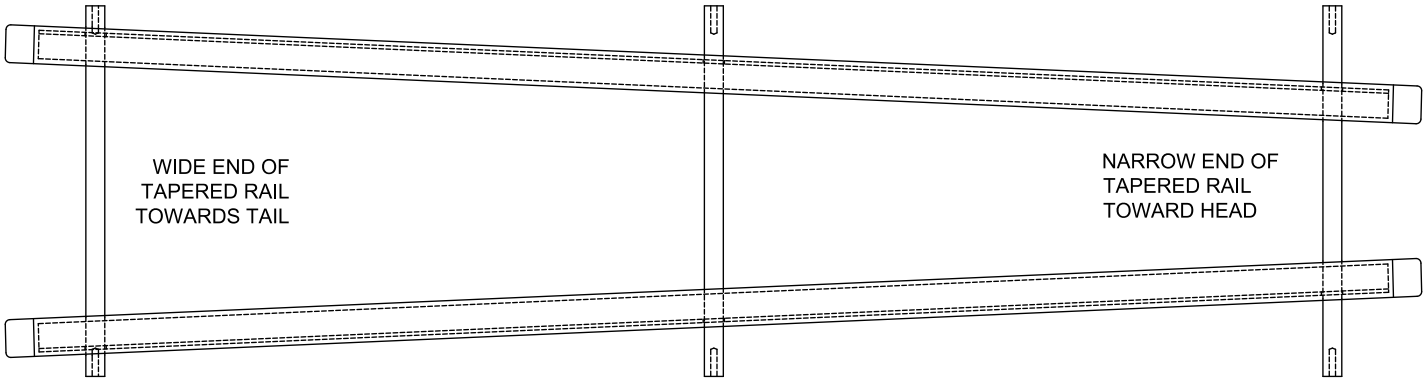


FIGURE 6

Return Rails

If the intermediate sections have return rails, note the wide and narrow ends of the rail.
The narrow end points towards the head and fits between the cutouts in the head pan. All intermediate sections will continue this pattern back to the tail. Figure 7.1 shows the orientation of the rail return.

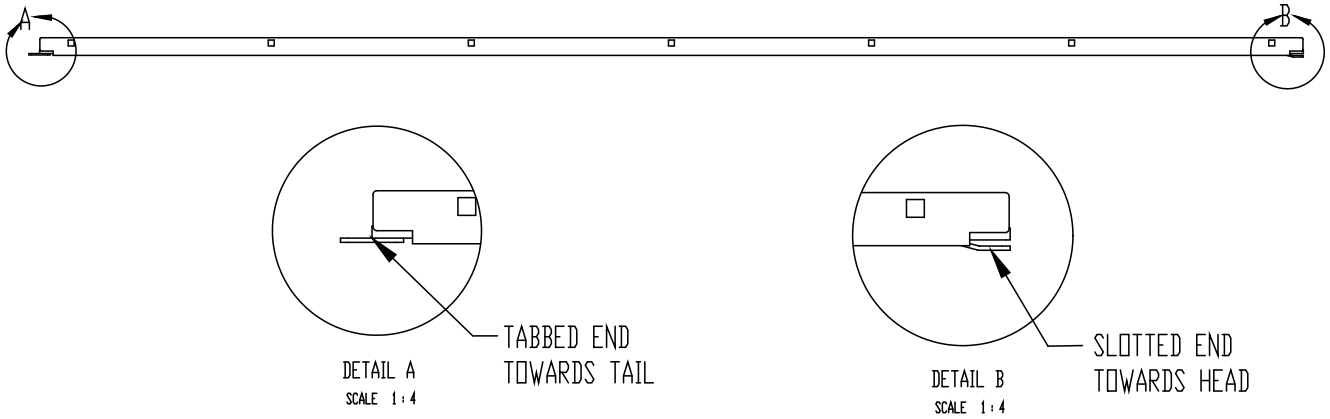


RAIL RETURN WELDMENT

FIGURE 7.1

Return Pan

If the intermediate sections have return pans, note the tab and slot in the pan. The tab points towards the tail and fits in the slot of the connecting pan. All intermediate sections will continue this pattern back to the tail. Figure 7.2 shows the pan return tab and slot details.



PAN RETURN WELDMENT

FIGURE 7.2

When installing all sections of the conveyor, ensure all interior liners are aligned even and flush when tightening bolts to prevent any lips or ledges the chain flights could catch on and damage the flights.

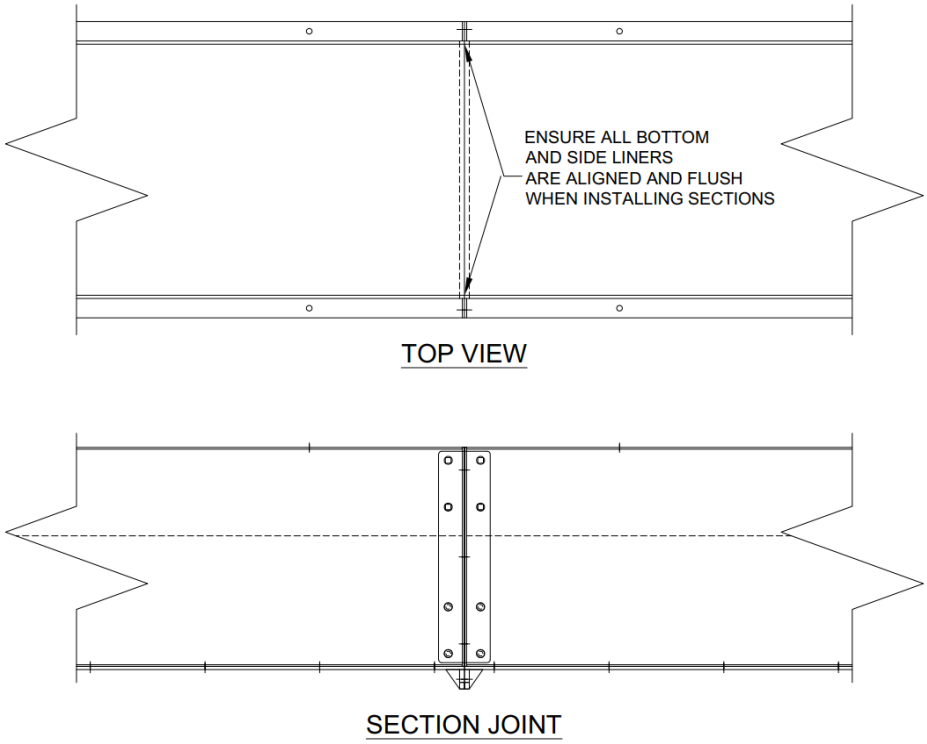


FIGURE 9

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

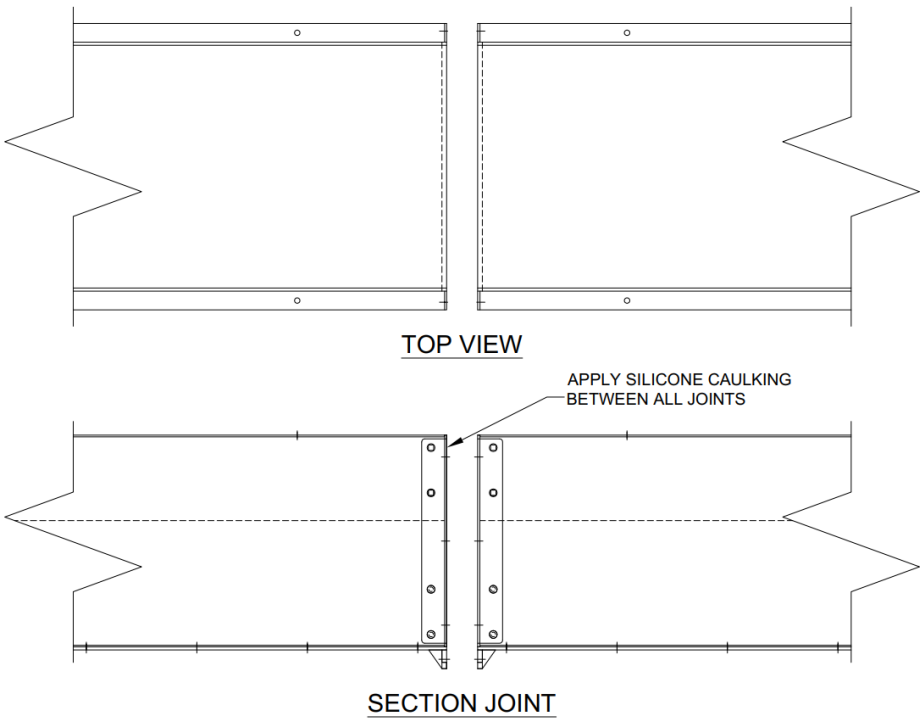


FIGURE 10

Tail Section Installation

The tail will typically be the last piece installed to the last section. As with all the other sections, ensure alignment to prevent any catch points. Prior to making the last chain connection, be sure the tail shaft take-up rods are adjusted to bring the tail shaft all the way forward towards the head. Figure 11 shows the tail take-up positioned all the way towards the head.
Chain tension will need to be checked and adjusted once the conveyor is operational. It is recommended to check the chain tension daily for the break in period of the conveyor. The amount of time required for the break in period will vary from application to application. Anytime the take-ups are adjusted, ensure they are kept even on both sides to keep the tail shaft square with the conveyor.

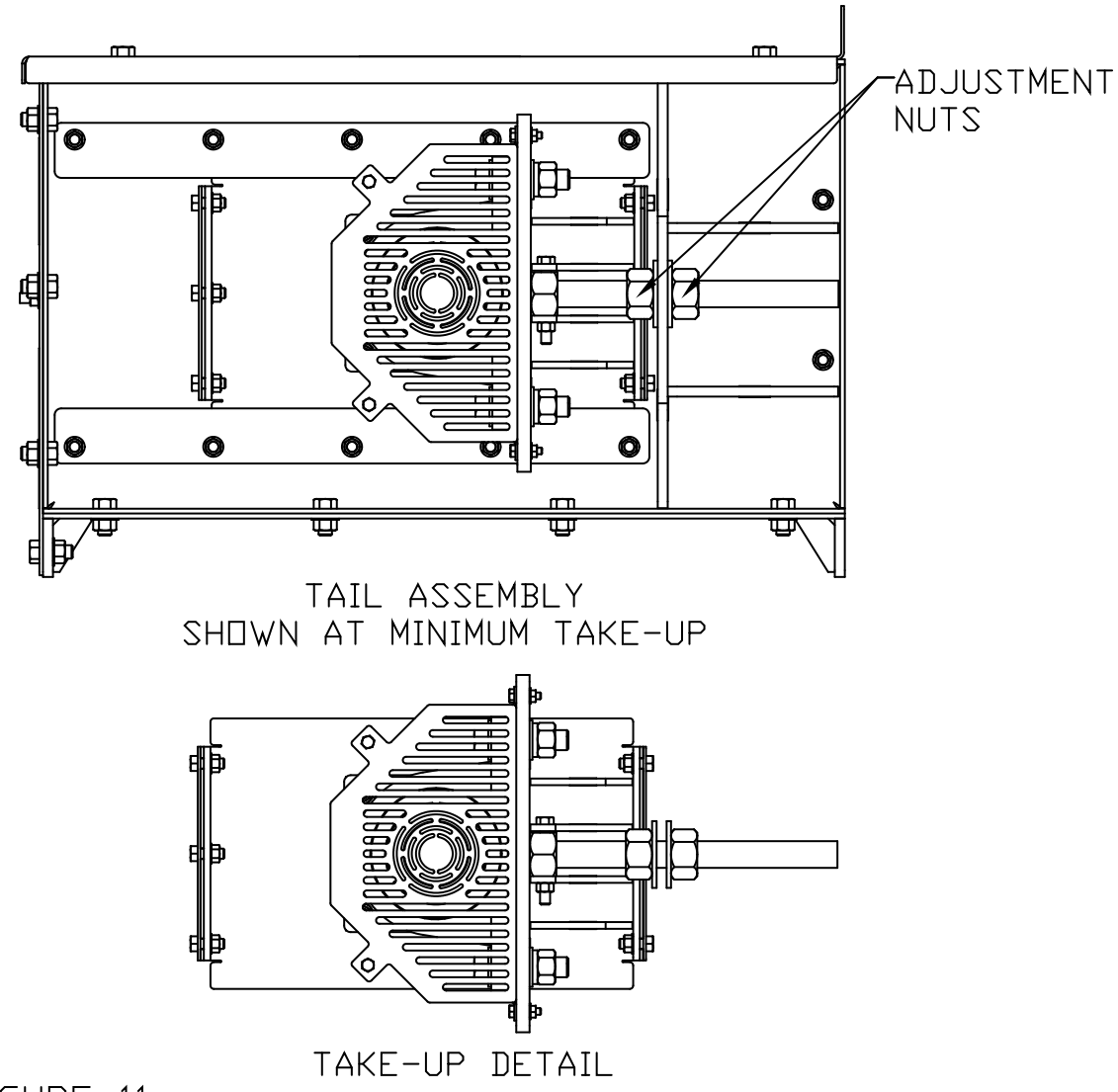


FIGURE 11

Chain Installation

The conveying chain is typically factory installed in full-length 10-foot intermediate sections. Depending on contractor/installer preference and conveyor location, the chain sections may be connected as the intermediate sections are installed, or the chain may be removed and connected as it is being fed back into the completed conveyor assembly. In many cases, the contractor may need to remove individual links from the chain to achieve the correct chain tension. In either case, ensure the chain orientation is correct for the application. Refer to the general assembly drawing for specific details.

A typical chain assembly will have the UHMW flights on the front side of the welded chain bar flights of the chain if looking at the chain installed in the bottom of the conveyor as it would be conveying material towards the head section discharge. Figure 12 is an illustration of a typical chain showing both single and double flight locations.

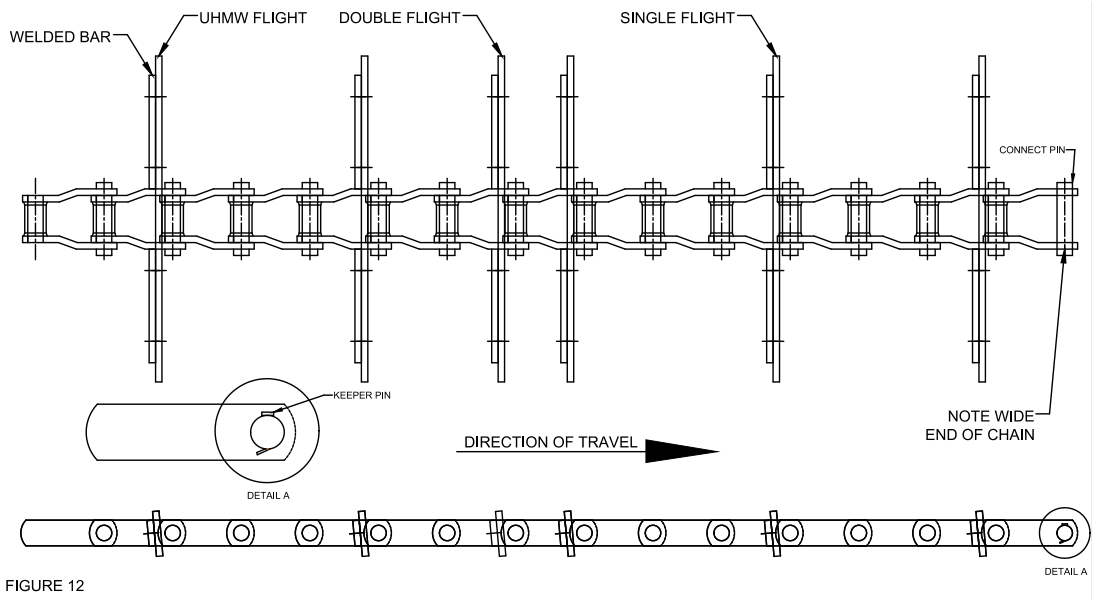


FIGURE 12

When installing the connecting pins, ensure the pin is fully seated in the chain link barrel. Be sure to not use excessive force when installing connect pins. Over-pressing the connect pins can cause the chain to not articulate and straighten out after exiting the sprocket. Refer to "DETAIL A" in Figure 12 above for the proper keeper pin orientation with respect to the direction of travel. The keeper pin must be bent adequately to not fall out in any orientation of the chain.
If the conveyor application requires return cups, they will be installed facing downward on the front side of the bar flight as described above. Reversing conveyors that require return cups will typically have them facing both

directions. Figure 13 below is an illustration of a typical chain with return cups showing the cup orientations for standard and reversing conveyors.

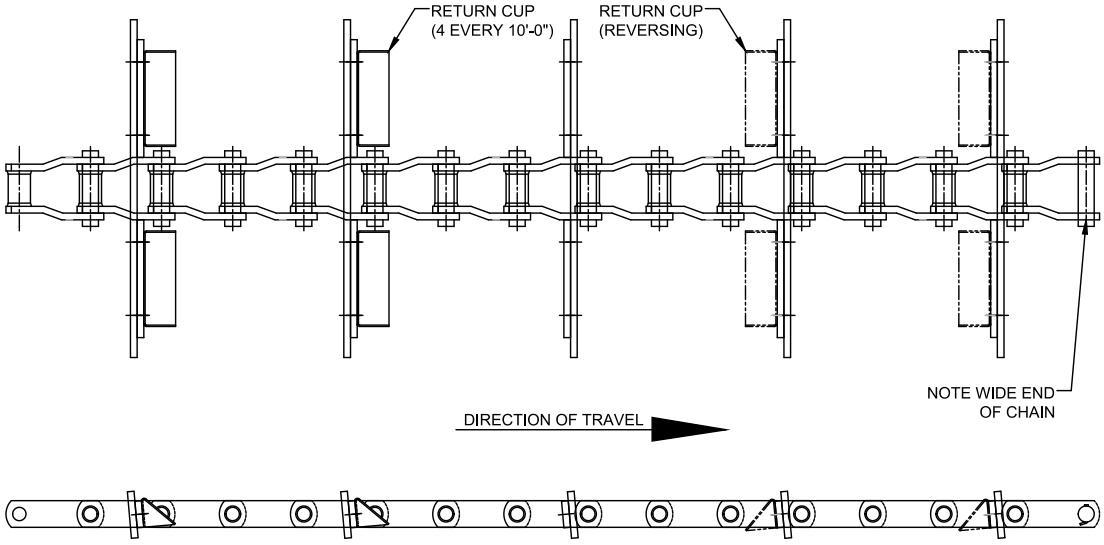


FIGURE 13

Chain Take-Up

Prior to making the last chain connection, make sure the take up is fully retracted to utilize the full adjustment of the take up. Adjust the take up to remove excess slack in the chain. Chain should have a slight sag between the head sprocket and the chain return. Check tension when starting the conveyor and while running. The chain should not dip down and hit the slack chain sensor. If the sag is excessive and trips the slack chain sensor, the chain is too loose. After the chain is tight, check that the head and tail shafts are square to the side panels. If the shafts are not square, adjust the tail take-up adjustment nuts until the shafts are square. Figure 14A illustrates chain slack at the head.

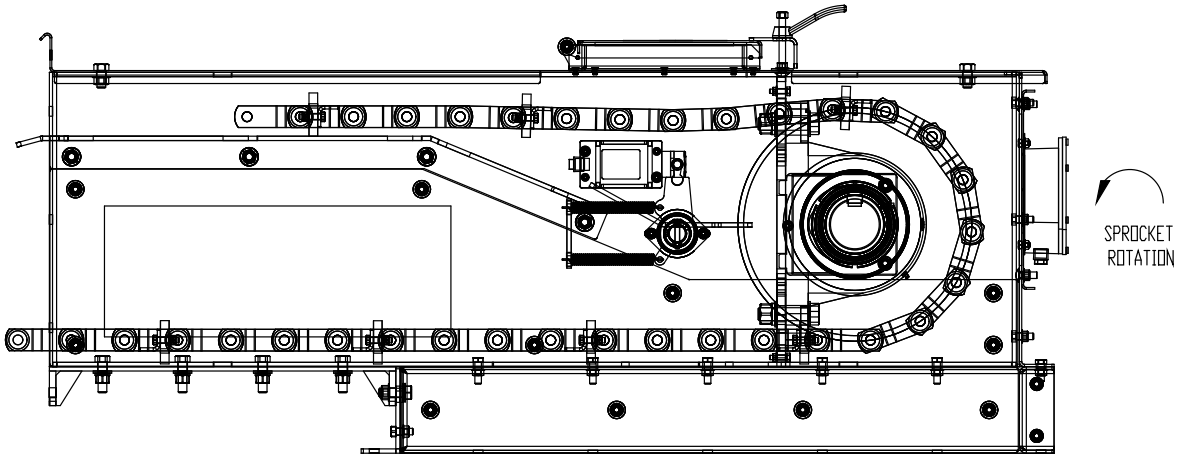


FIGURE 14A

Conveyor Knee

For conveyors with knee sections, make sure the chain is not too loose that it is dragging across the entire knee return and not to tight that it is rubbing against the lid. Figure 14B is an illustration of chain slack in a knee section.

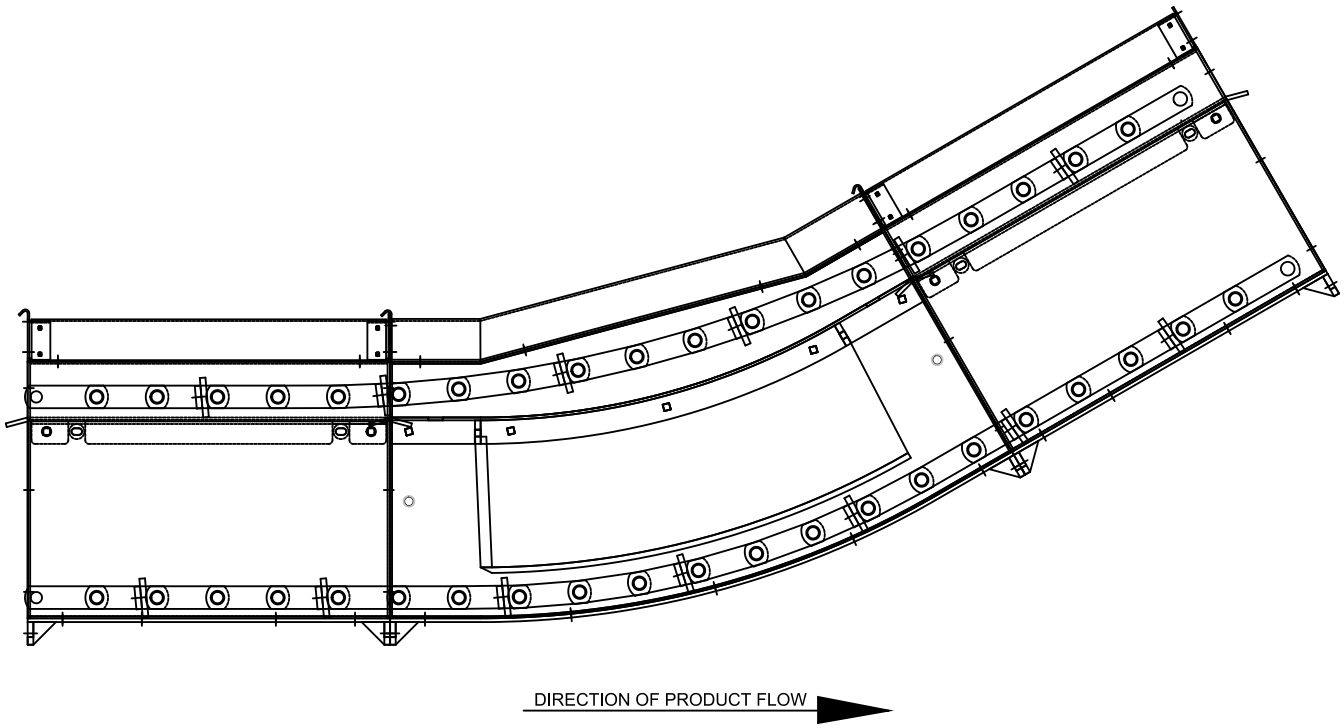


FIGURE 14B

Lid Installation

Two types of lid options are available for En-Masse Conveyors, flat, and hip lids. In both cases, two lids cover each full-length section. All flat and hip lids are shipped installed on the section assemblies.

Lids have a vertical flange on one end, and a hooked, lapping flange on the other. Starting at the tail, the forward end of the lid towards the head has a single broke flange up. The next lid forward is placed with the lapping flange hooked over the single flange to seal out moisture. The forward end of that lid has the single broke flange towards the head. Continue installing lids to the head section. Figure 16 is an illustration of a typical flat lid, while Figure 17 is an illustration of a typical hip lid.

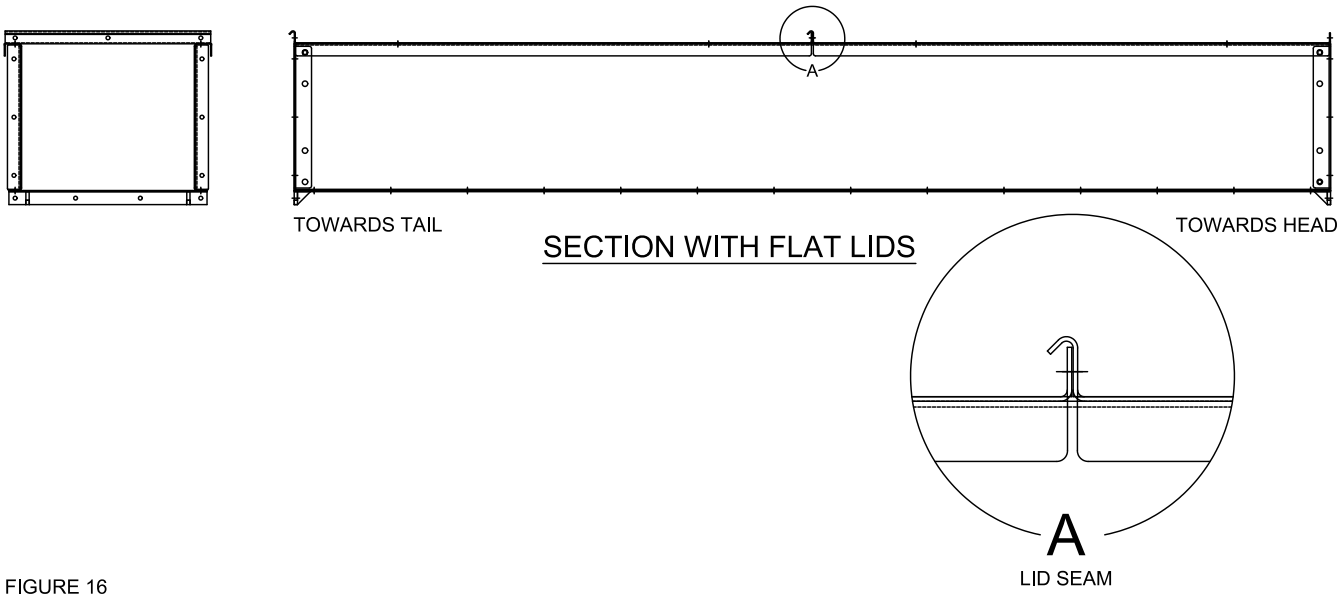


FIGURE 16

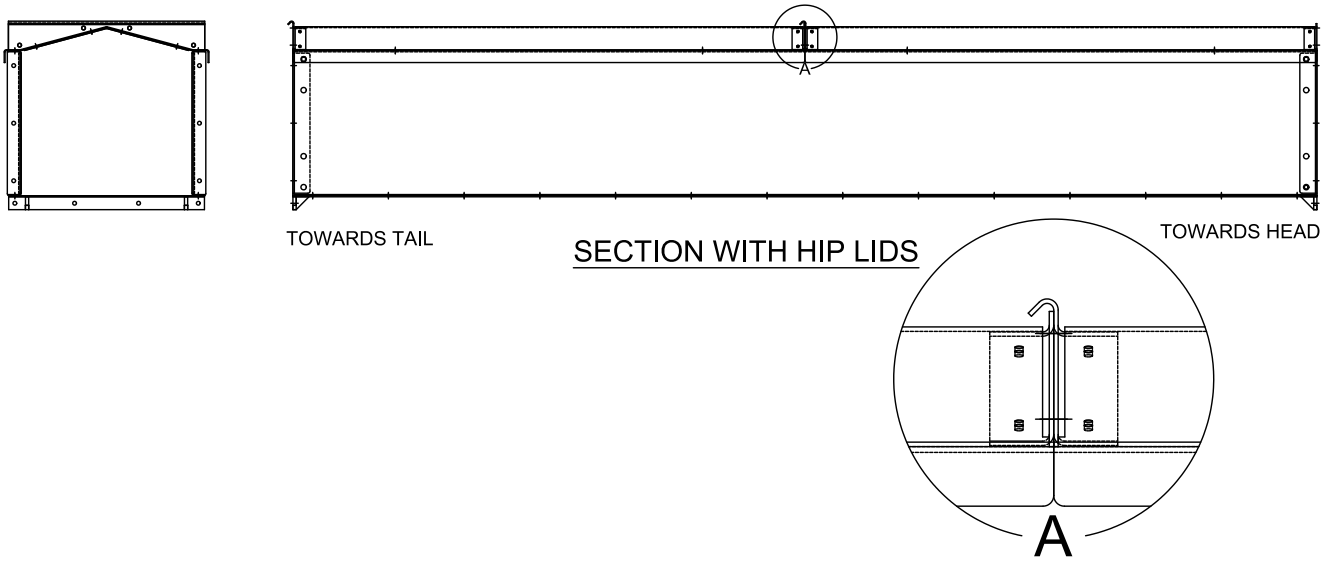


FIGURE 17

Motor/Drives

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

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.

Belted Drives

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

Belt guards and mounting brackets are universal in nature to allow adjustability. When mounting, be sure motor and reducer shafts do not rub on the safety guarding. Ensure the drive sheaves are aligned for maximum belt life and that they do not rub on the belt guard. Check tension on new drive belts frequently to prevent slippage and premature wear.

On drive installations requiring the use of a torque channel mounted to the conveyor for torque arm anchoring, ensure the ½" hardware that was supplied with the conveyor is used to mount the torque channel to the conveyor to prevent premature failure due to the high level of torque that may be applied by the drive system. Refer to the general assembly drawing. Setting the correct angle of the torque arm from the reducer to the torque channel is CRUCIAL. Maintain the torque arm as close as possible to 90 degrees to the centerline of the output shaft to the torque anchor bracket. Refer to the manufacturer's instruction manual. Figure 18 on the next page shows a head assembly with a torque channel.

NOTICE

Dodge recommends peening the shaft-bushing key on TA-II reducers. The shaft key must be installed with "THIS SIDE UP" etching in correct orientation. Shaft key should fit snug within shaft and bushing.

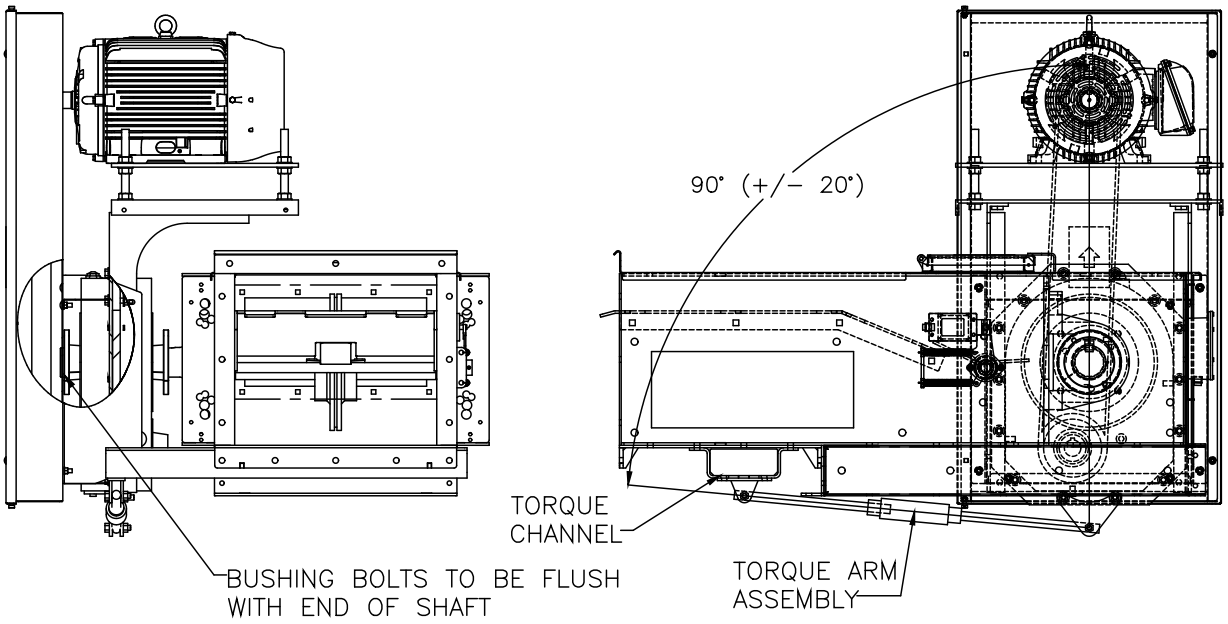


FIGURE 18

Direct Drives

Refer to the installation instructions provided by the direct drive manufacturer for proper torque-arm mounting. In some cases, the direct drive is designed with an externally supported torque-arm. The installing contractor MUST design the torque-arm support to withstand the reaction forces at startup. The torque-arm support must maintain a 90-degree angle. Refer to the equipment approval drawings for angle tolerances for the specific reducer model.

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.

Additional/Optional Equipment

Refer to the manufacturer's instructions for other optional equipment such as speed sensors, plug switches, limit switches, bearing sensors etc. for installation, operation, and maintenance of those items.

Intermediate Gate Installation

Two types of gates are available for En-Masse Conveyors, inline and cross gates. In either case, discharge openings of the appropriate size must be cut in the bottom liners and in the correct locations. The openings can either be factory cut or field cut. If field located and cut, Warrior Mfg. supplies a template that can be traced on the bottom liner to ensure proper size and shape of opening. Once cut, all edges must be deburred to provide smooth and even surfaces for the poly flights to ride on.

Once the openings have been prepared, align the gate on the opening and determine if any of the existing side panel/bottom liner holes line up with holes in the gate frame. Additional holes may need to be drilled to fully mount the gate frame to the section. All holes provided on the gate mounting flange must be drilled and bolted to properly support the gate. Figure 20 below is an illustration of a standard in-line gate.

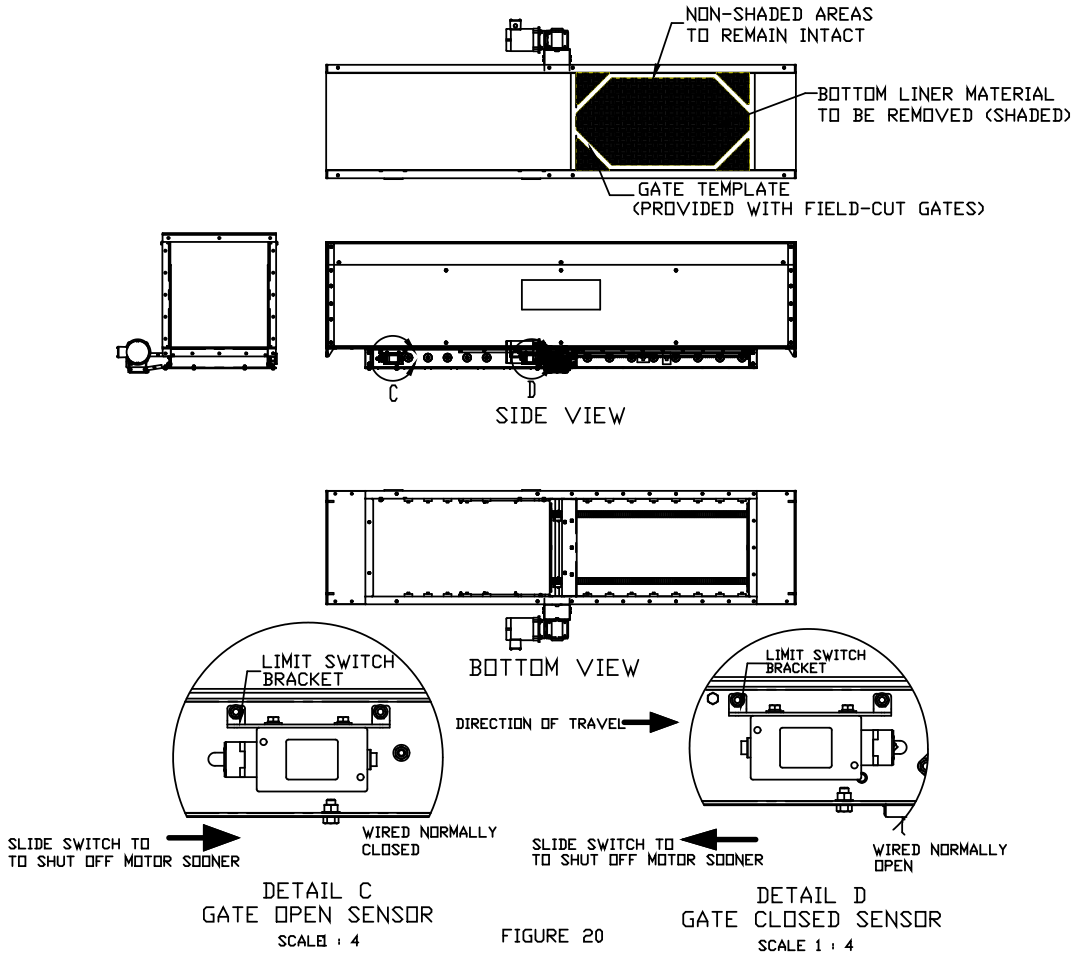


FIGURE 20

Figure 21 is an illustration of a standard cross gate. In-line and cross gate operate the same way.

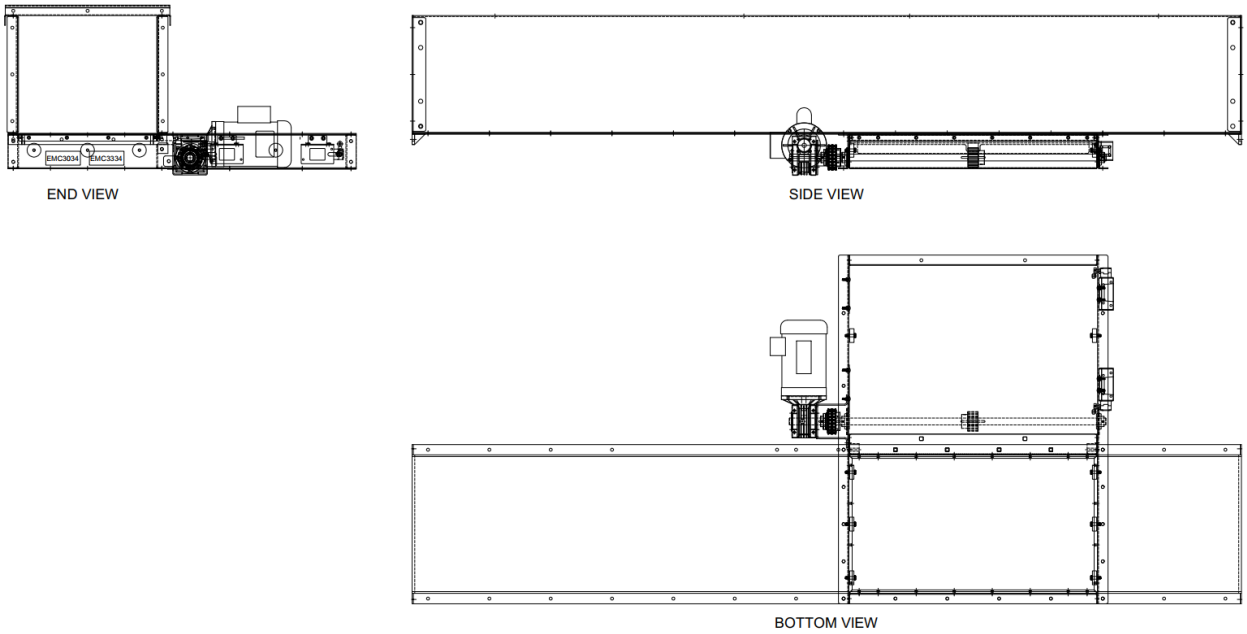


FIGURE 21

Miscellaneous Equipment

Figure 22 is an illustration of a typical knee section.

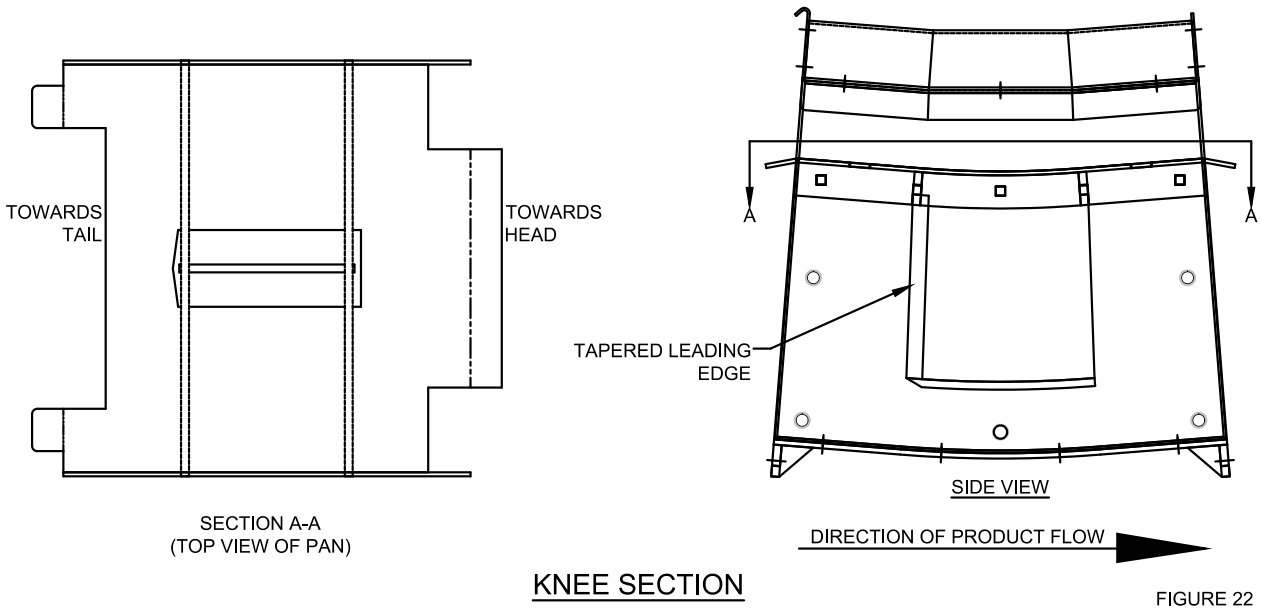
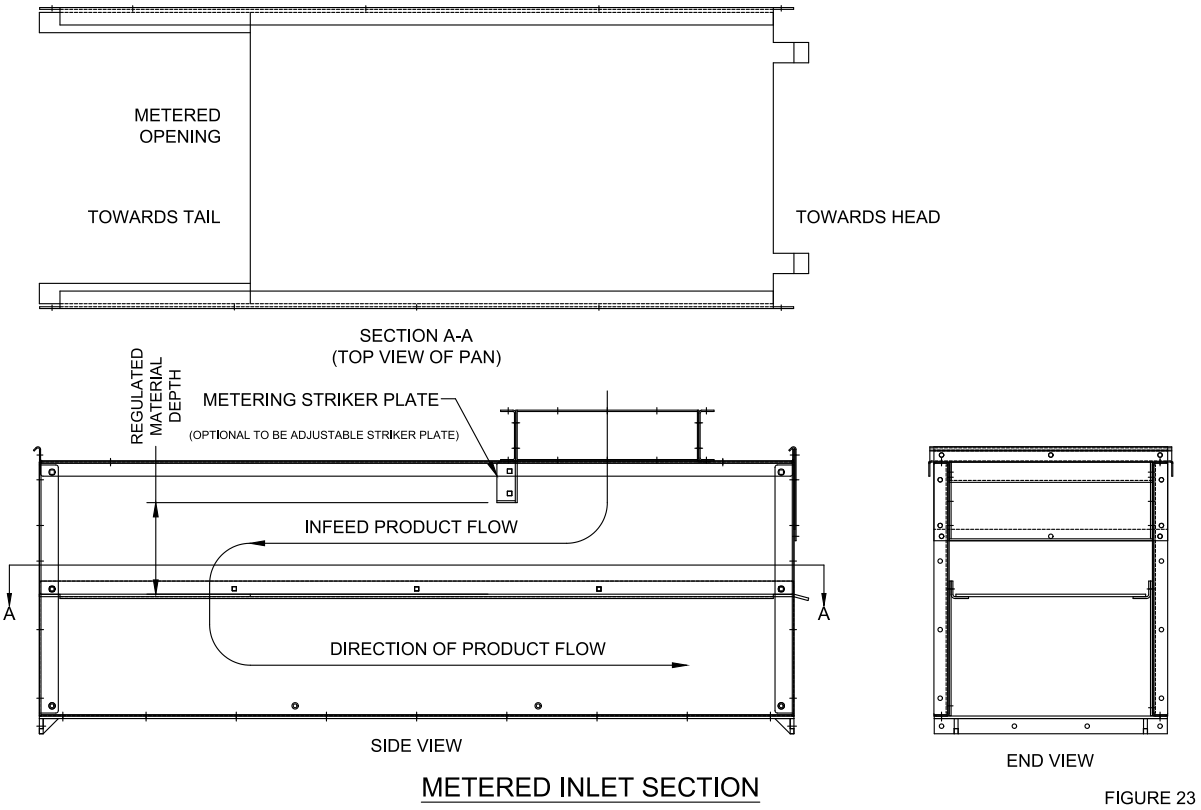


FIGURE 22

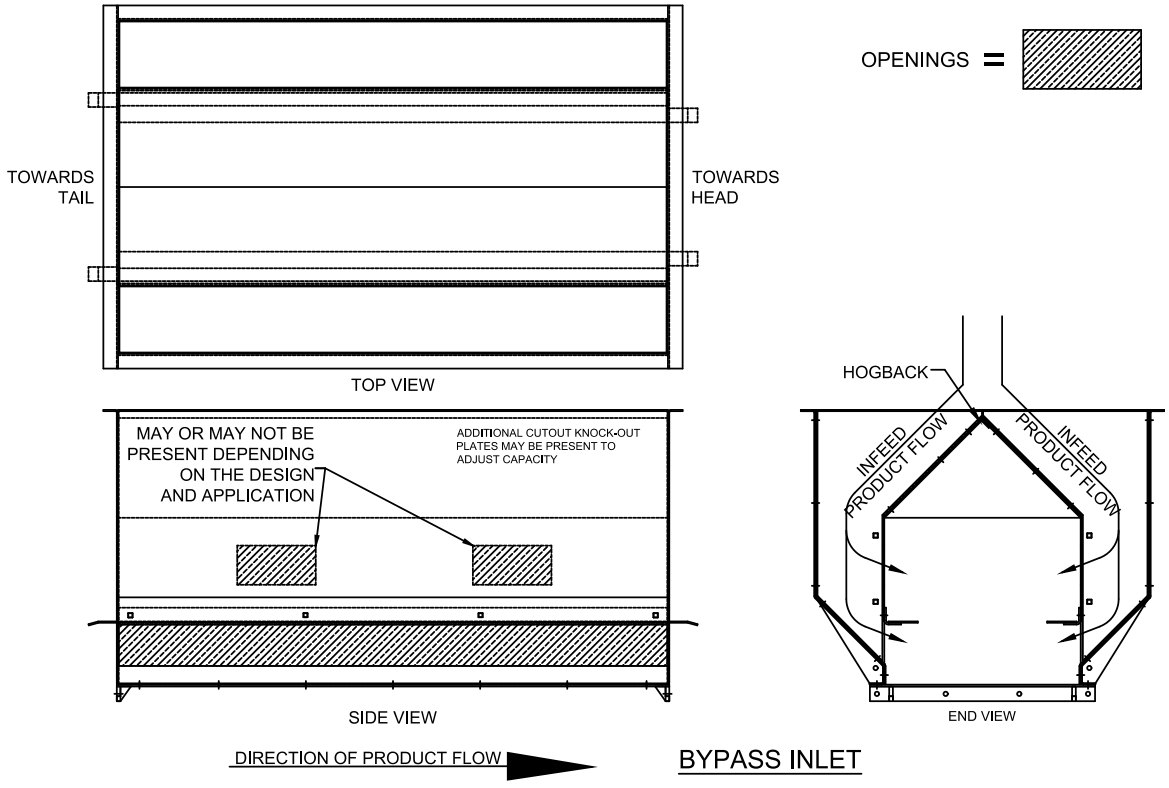
Figure 23 shows a standard metered inlet section.



METERED INLET SECTION

FIGURE 23

Figure 24 is an illustration of a standard bypass inlet.



BYPASS INLET

Figure 25 shows a standard inlet. Figure 26 shows a typical inspection port.

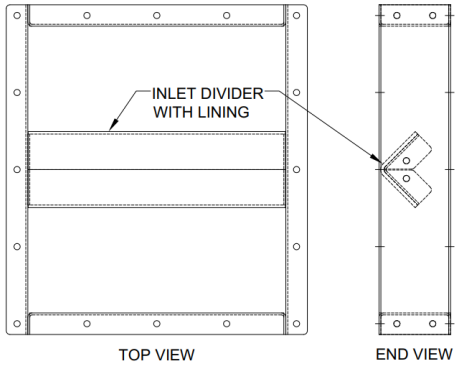


FIGURE 25 STANDARD INLET

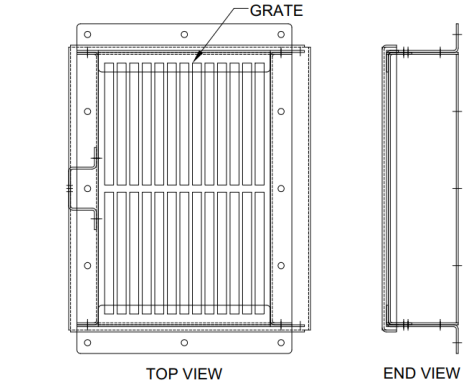
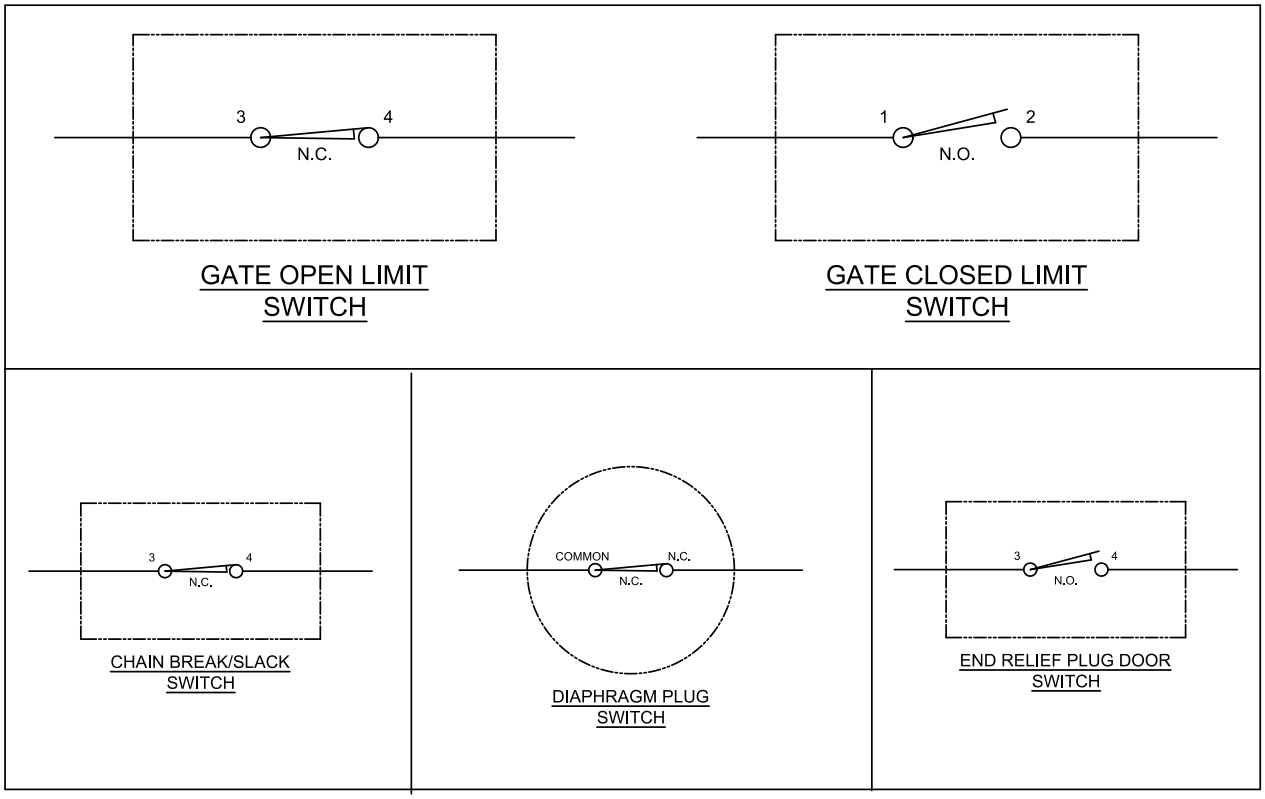


FIGURE 26 INSPECTION PORT

Field Wiring Details



⚠ WARNING ⚠

All power and control wiring must conform to the National Electrical Code and to all federal, state, and local codes and regulations.

Initial Startup, Operation and Adjustment

Pre-Startup Inspection & Checklist

Initial Chain Tension

Prior to starting conveyor for the first time, check at tail and head sections to ensure there is not excessive slack in chain. Chain should have a slight sag between the head sprocket and the chain return. Ensure take up rods have been adjusted evenly on both sides. Final tensioning will be done while running under load.

Startup Preparation

As mentioned earlier, make sure the motor rotation has been checked with the drive belts removed to prevent damage to the conveyor chain and other 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.

En-Masse Conveyor Startup Checklist

	PRE-STARTUP INSTALLATION INSPECTION
☐	Verify the conveyor is installed straight and true.
☐	Verify the reducer has been filled with oil.
☐	Ensure all joints are sealed with caulk as needed.
☐	Ensure all hardware is installed and tight.
☐	Verify reducer installation and proper angle of torque arm. Ensure proper hardware is used.
☐	Verify head sprocket is centered.
☐	Verify motor rotation. Remove drive belts to prevent any damage if reversed.
☐	Verify tail sprocket is centered and take-up is adjusted evenly.
☐	Verify initial chain tension.
☐	Ensure conveyor has been cleared of tools and foreign objects.
☐	Verify auxiliary equipment such as speed switches, plug switches, slack chain, etc. have been installed and tested.
☐	Ensure all electrical connections are complete and secure.
	INITIAL STARTUP
☐	Position observers at the head and tail areas to observe initial startup.
☐	Jog conveyor and observe for any issues.
☐	Continue running conveyor while observing any catch points, binding or unusual noises.
☐	Continue listening for any noises and inspect drive and drive belts.
☐	Verify proper chain tension, typically on return side of head sprocket. Chain should have slack but not touching slack switch.
☐	Verify head shaft RPM matches general arrangement drawing.
	INITIAL OPERATION
☐	Begin feeding product slowly while observing product flow and listen for any unusual noises.
☐	Refer to general arrangement drawing for material depth, material type and speed information.
☐	Observe proper chain tension under load. Adjust as needed.
☐	Slowly increase flow to full capacity while observing for any issues.
☐	Verify no feeding or discharge issues. Ensure material depth is even across conveyor width.
☐	Observe drive belts for slippage and proper operation.
☐	Continue monitoring chain tension, adjust as needed.

Initial Operation

Startup

Safely position workers at head and tail areas to observe chain operation on initial startup. If there are initial issues such as catch points or excessive chain slack, the equipment should be immediately stopped to prevent damage.

Jog the conveyor at first to check for any issues, then run the conveyor and listen for any unusual noises and watch for slack chain as it comes off the head sprocket; Correct and/or adjust as needed. Do NOT over tension chain; This only causes premature wear on chain and sprockets and puts undue stress on shafts and bearings. Chain should have a slight sag between the head sprocket and the chain return. Final tensioning will be done by observing slack when starting the conveyor and while running under load. At no time should the chain dip down and hit the slack chain sensor.

Continue to run the conveyor while observing and listening down the length of the conveyor for any catch points and unusual noises. Ensure bottom liners, side liners, and return rails are smooth and even.

Once initial operation and adjustment have been accomplished, verify head sprocket/shaft RPM matches general assembly drawing.

Operation

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

Chain tension will be the greatest while conveying at full capacity. This is the best time to observe and adjust proper chain tension. Chain should have a slight sag between the head sprocket and the chain return. Chain tension should be

checked and adjusted often during the initial break in period. An inspection and adjustment schedule can be established once tensioning frequency and history is established.

Verify head shaft RPM and material depth closely match the general assembly drawing to ensure proper capacity can be attained and to prevent operational issues. Check new drive belts for slippage and proper tension, as they will stretch. Slipping drive belts will wear prematurely and cause the conveyor to slow down, thus not conveying to capacity.

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 en-masse 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.
	Bent/broken chain flights	Repair or replace flights. Determine cause.
	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.
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 & orientation 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.
	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.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
		Verify amperage of all three phases at the motor. 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 into conveyor. Clean out conveyor.
		Verify plug switch is not activated
	Excessive slack in chain or broken chain	Repair/replace chain. Verify chain brake/slack switch is not activated.
	Material plugging at discharge	Material not discharging. Inspect discharge spouting for blockages, flat angles and adequate size.
	Electrical issues	Verify 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.
Head plugging while discharging at intermediate opening	Improper discharge opening in bottom liner	Verify proper opening is cut in bottom liner. Portions of opening must extend completely to sides of conveyor.
	Inadequate number of return cups	Install additional return cups. Some materials will carry over on top of chain more than others.
	Chain speed too fast for material depth, material followability and opening length.	Slow down conveyor or increase discharge length. Regulate conveyor inlet to lower material depth.
	Discharge gate not fully open	Determine reason for gate not fully opening.
	Material plugging at discharge	Material not discharging. Inspect discharge spouting for blockages, flat angles and adequate size.

Maintenance

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. In most cases, some lids will need to be removed to inspect inside the conveyor.

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 chain 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. Look and listen for any unusual noises or changes to the 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 of overheating.

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

- Check/adjust chain tension, re-splice chain when take-up has no more adjustment. Note: Warrior's drag conveyor chain is considered worn out when it elongates (stretches) 5%. For example, a 120" length of chain is worn out when it reaches 126".
- 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 its not plugged which can build pressure and cause seals to leak.
- Check safety devices such as plug switches, chain brake/choke switch, 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's 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 sprockets for any issues. Check that sprockets remain centered on shaft and set screws are tight.
- Inspect sprockets for wear, replace as needed.
- Inspect chain and flights for wear and any signs of damage, bent flights etc.
- Check wear of bottom liners, side liners and return rail/roller system. Repair or replace as needed.

Some of the primary areas to look for wear monthly would be the:

- return rails, rollers, or pans depending on the type of conveyor. The area under the inlet into the conveyor may begin showing signs of wear before other areas. This will depend on the velocity of material coming into the conveyor. A dead box or cushion box may be needed just above the conveyor to slow down the material and evenly distribute it into the conveyor.
- Knee or bend section. If conveyor has a knee, there is typically a shoe that holds the chain down in the lower portion of that section where material is being conveyed. Removing the bottom on the knee will be needed to inspect this area.

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.
- Loosen the drag chain tension to relieve the stress on the bearings and shafts.
- 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

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.