EN-MASSE CHAIN CONVEYOR

MODEL G™, MODEL RB™, & BULK-FLO™
ASSEMBLY, OPERATION & MAINTENANCE MANUAL

ORIGINAL INSTRUCTIONS

Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: 900201 R0

Revised: 20/2/14

This product has been designed and constructed according to general engineering standards[a]. Other local regulations may apply and must be followed by the operator. We strongly recommend that all personnel associated with this equipment be trained in the correct operational and safety procedures required for this product. Periodic reviews of this manual with all employees should be standard practice. For your convenience, we include this sign-off sheet so you can record your periodic reviews.

Date	Employee Signature	Employer Signature

a. Standards include organizations such as the American Society of Agricultural and Biological Engineers, American National Standards Institute, Canadian Standards Association, International Organization for Standardization, EN Standards, and/or others.

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1. Introduction

Tramco, Inc. En-Masse Chain Conveyors are tough, dependable, and provide efficient handling capacity for conveying a wide variety of bulk materials with minimum product degradation and substantially reduced product-to-product contamination that you find with other designs.

This manual covers three En-Masse Chain Conveyor models: MODEL G™, Model RB™ and BULK-FLO™. The MODEL G™ is frequently used in industries such as chemical, coal, food, grain, municipal solid waste, mining, plastic, paper, pulp and rubber. The Model RB™ Conveyor is specifically designed for the handling of soft stock or materials that are easily crumbled or broken, such as seed, feed, pellets and other fragile materials. And lastly, the BULK-FLO™ heavy-duty chain conveyor is designed to handle a wide variety of challenging materials such as wet and sticky products, those with varying sizes and densities, and abrasive or corrosive materials.

Product features include:

- Rugged, heavy-duty steel construction for durability in the most demanding applications.
- Dust and weather-tight construction to maintain product quality against the elements and prevent dust from escaping.
- UHMW polyethylene flights to reduce metal-to-metal contact and provide quiet, efficient operation.
- Replaceable bottoms and side liners.
- Head and tail are equipped with removable covers to facilitate maintenance.

Before using the En-Masse Chain Conveyor, give this manual to the people who will be assembling, operating and maintaining this equipment. Reading and understanding the manual will reduce downtime and equipment failure, as well as help to ensure safe and efficient operation. A sign-off form is provided on the inside front cover for your convenience.

The serial number plates are located on the head assembly and on the tail assembly. Please mark the number in the space provided for easy reference.

Model #	
Serial #	
Production Year	

2. Safety

2.1. GENERAL SAFETY INFORMATION

The Safety Alert symbol identifies important safety messages on the product and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety messages.

Why is SAFETY important?

- Accidents disable and kill.
- Accidents cost.
- Accidents can be avoided.

SIGNAL WORDS: Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.

DANGER	
	Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.

WARNING	
	Indicates a hazardous situation that, if not avoided, could result in serious injury or death.

CAUTION	
	Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

NOTICE
Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

YOU are responsible for the **SAFE** use and maintenance of your equipment. **YOU** must ensure that you and anyone else who is going to work around the equipment understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program.

Important: *Below are general instructions that apply to all safety practices. Any instructions specific to a certain safety practice (e.g., Operational Safety), can be found in the appropriate section. Always read the complete instructional sections and not just these safety summaries before doing anything with the equipment.*

- It is the equipment owner, operator, and maintenance personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when assembling, operating, or maintaining the equipment. All accidents can be avoided.
- Equipment owners must give instructions and review the information initially and annually with all personnel before allowing them to operate this product. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- Use this equipment for its intended purposes only.
- Do not modify the equipment in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the equipment. Any unauthorized modification of the equipment voids the warranty.
- Do not allow any unauthorized person in the work area.

2.2. ASSEMBLY SAFETY

- Have a minimum of 2 people handle the heavy, bulky components.
- Check all equipment for damage immediately upon arrival. Do not attempt to install a damaged item.
- If the equipment must have an open housing as a condition of its use and application, it must be guarded by a railing or fence.
- Use **rugged gratings** where necessary. If the distance between the grating and moving elements is less than 4”, the grating opening must not exceed 1/2” x 1” (or 1/2” x 2” for hopper gratings). Covers, guards, and gratings at inlet points must be installed so that personnel cannot be injured in any way.
  - Use solid covers that are designed and installed so that personnel are not exposed to accidental contact with any of the equipment’s moving parts.
  - Connect inlet and discharge openings to other equipment in order to completely enclose the equipment.
- As required by the applicable laws, standards, and good practice, the purchaser/ owner is responsible for:
  - guarding all rotating equipment such as drives, gears, shafts, and couplings
  - purchasing and providing safety devices and controls

- Before power is connected to the drive, perform a pre-start-up safety check to ensure the equipment and area is safe and that all guards are in place and secure.
- Electrical equipment must conform to the National Electric Code or National Electrical Safety Code, including requirements for the environment. Also consider:
  - ***Overflow devices*** (electrical interlocks) to warn personnel and shut off power when discharge from conveyor is interrupted.
  - ***Overload protection*** for devices (shear pins, torque limiters, etc.) and ***no speed protection*** (zero-speed switches) to shut off power in the event of an incident that might cause the conveyor to stop operating.
  - ***Safety shut-off switch*** with power lockout provisions at conveyor drive.
  - ***Emergency stop switches*** that are readily accessible.
  - ***Electrical interlocking*** to shut down feeding conveyors whenever a receiving conveyor stops.
  - ***Signal devices*** to warn personnel of imminent start up of conveyor, especially if started from a remote location.

2.3. OPERATIONAL & MAINTENANCE SAFETY

Operational safety means using common sense and knowing and observing the proper precautions.

- Have another person nearby who can shut down equipment in case of accident. It is good practice to always work with a second person.
- Do not operate equipment with any guard removed.
- Keep body, hair, and clothing away from all moving parts.
- Do not modify equipment in any way. Unauthorized modification may impair function and/or safety, and could affect the life of the equipment.
- Advise all operating personnel of the location and operation of all emergency controls and devices. Maintain clear access to these controls and devices.
- Never walk on equipment covers, gratings, or guards.
- Do not use equipment for any purpose other than that which it was intended.
- Do not poke or prod material into the equipment with a bar or stick inserted through the openings.
- The equipment are not normally manufactured or designed to handle materials that are hazardous to personnel (explosive, flammable, toxic, or otherwise dangerous materials). However, equipment may be designed to handle these materials.
- The equipment are not manufactured to comply with local, state, or federal codes for unfired pressure vessels. For example: If hazardous material is to be moved or if the equipment is to be subjected to internal or external pressure, consult Tramco, Inc. prior to any modifications.
- Be aware of hazardous locations where, without protection, people may be injured by contact with equipment or material. If equipment blocks a walkway, provide a crossover stairway or ramp for passage of personnel. If installed overhead, minimum clearance should be 7” for safety.

- Handling foods subjects equipment to special codes for construction, location, and accessibility. Investigate before ordering standard components!
- Food equipment often require hinged access doors for cleaning, and such doors require special safety controls and procedures by customer to prevent personal injuries. For example: The extensive use of padlocks, with keys in the hands of only management personnel, is one means frequently used.

When performing maintenance, understand and observe the following precautions:

- Do not replace or substitute bolts, nuts, or other hardware that is of lesser quality than the hardware supplied. Consult your dealer for proper replacements.
- Perform frequent inspections of the controls, safety devices, covers, guards, and equipment to ensure proper working order and correct positioning.
- After maintenance is completed, replace and secure all safety guards, safety devices, service doors, and cleanout covers.
- Do not climb ladder if damaged, wet, icy, greasy, or slippery.
- Maintain good balance by having at least two feet and one hand or two hands and one foot on ladder at all times.
- Use required safety harnesses and climbing equipment. Consult local safety authorities.
- Perform maintenance during normal daylight hours or in adequate ambient lighting.

The Conveyor Equipment Manufacturer's Association (CEMA) has produced an audio/ visual presentation entitled "Safe Operation of Screw Conveyors, Drag Conveyors, and Bucket Elevators." Tramco, Inc. encourages acquisition and use of this source of safety information.

2.4. ELECTRIC MOTOR SAFETY

- To prevent serious injury or death, only qualified personnel should service electrical components.
- Keep electrical components in good repair.
- Ground electric motor before using.
- Inspect drive belts before using. Replace if frayed or damaged.

2.4.1. LOCKOUT AND TAGOUT PROCEDURES

To minimize possibility of serious injury or death to workers from hazardous energy release (for example, when restarting the equipment) and prevent worker deaths from all forms of hazardous energy release, follow all lockout and tagout procedures when installing and servicing equipment. Ensure that lockout and tagout procedures are adhered to. For example:

- De-energize, block, and dissipate all sources of hazardous energy.
- Lock out and/or tag out all forms of hazardous energy.
- Ensure that only 1 key exists for each assigned lock, and that you are the only one that holds that key.

- After verifying all energy sources are de-energized, service or installation may be performed.
- Ensure that all personnel are clear before turning on power to equipment.

For more information on occupational safety practices, contact your local health and safety organization.

2.5. SAFETY DECALS

- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible. See decal location figures that follow.
- Replaced parts must display the same decal(s) as the original part.
- Replacement safety decals are available **free of charge** your distributor, dealer, or factory.

2.5.1. DECAL INSTALLATION/REPLACEMENT

1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
5. Small air pockets can be pierced with a pin and smoothed out using the sign backing paper.

2.5.2. SAFETY DECAL LOCATIONS AND MESSAGES

Replicas of the safety decals that are attached to the equipment and their messages are shown in the figure(s) that follow. Proper safety procedures require that you familiarize yourself with the various safety decals and the areas or particular functions that the decals apply to, as well as the safety precautions that must be taken to avoid serious injury, death, or damage.

- Place decal 1 on the head and tail sections. Additional placements of decal 1 may be used and their locations are up to the site supervisor.
- Place decal 2 on and behind the belt or chain guard.
- Place decal 3 on all head, tail, and intermediate section covers, as well as all inspection and access opening covers.
- Place decal 4 on the motor conduit boxes.

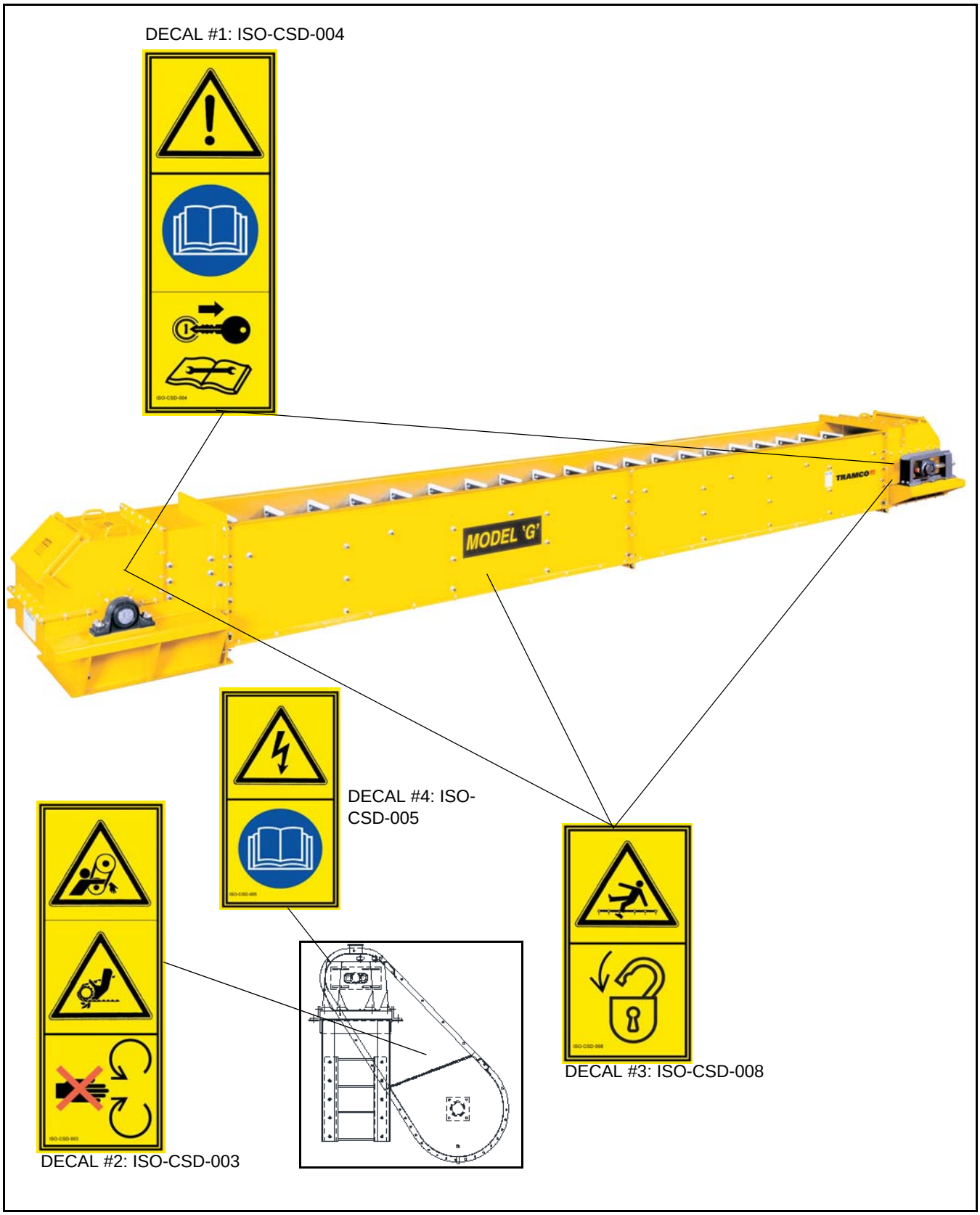


Figure 2.1 Safety Decal Location

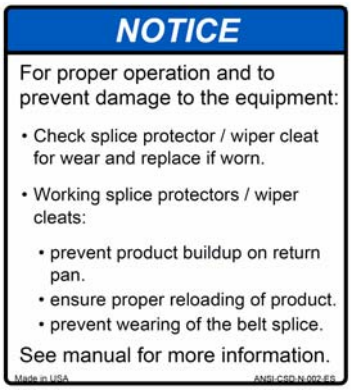
DECAL #1: ISO-CSD-004

DECAL #2: ISO-CSD-003

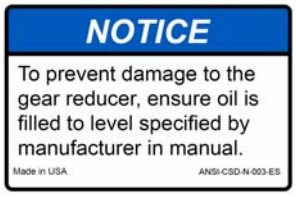
DECAL #3: ISO-CSD-008

DECAL #4: ISO-CSD-005

DECAL #1: ANSI-CSD-N-001-ES

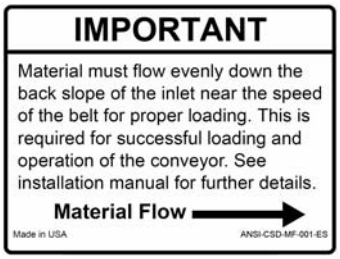


DECAL #2: ANSI-CSD-N-002-ES



DECAL #3: ANSI-CSD-N-003-ES

DECAL #4: ANSI-CSD-N-004-ES



DECAL #5: ANSI-CSD-MF-001-ES

DECAL #6: ANSI-CSD-MF-002-ES

3. Assembly

WARNING *Before continuing, ensure you have read and understand the relevant information in the safety section. Safety information is provided to help prevent serious injury, death, or property damage.*

3.1. PRE-ASSEMBLY

Important: *A qualified contractor or millwright must be used to erect the conveyor and the accompanying and structures.*

3.1.1. SHIPPING CHECK

1. Check if all items in the shipment have been received and inspect if the parts are undamaged. Inspect the casing sections, covers, buckets, chain guards, and drives for dent; and check all bolts including the bearing bolts, conveyor bolts, support leg bolts, etc. as they may have loosened during shipping.
2. Check all loose assemblies listed on the Bill of Materials (such as intermediate discharge gates, head discharge gates, gate actuators, limit switches/sensors, support legs, caulking, hardware, splice angles, mating flanges, inlet & inspection doors and drive components, etc.) have been received. Mark claims for damaged parts on the shipping papers and immediately file a claim. **Do not attempt to install a damaged item**.

Note: *Normal shipping practice will have the head and tail sections bolted to their respective intermediate sections on all En-Masse models, except the BULK-FLO™. Intermediate sections will have chain and flights wired in place, otherwise the chain will be coiled and stacked on pallets. The chain will be wrapped in dark plastic or tarpaulin to protect the UHMW flight from ultra-violet rays.*

3.2. LIFTING AND MOVING

Take extreme care to prevent damage when moving assembled conveyors or components. Spreader bars with slings are the recommended support method for lifting. The unsupported span should be no longer than 10 feet.

WARNING	
	Never lift a conveyor with only one support point. When choosing supports points for especially heavy items such as drives or gates, consider the weight of an item in relation to load balance and its bending effect.

3.3. EN-MASSE CHAIN CONVEYOR COMPONENTS

3.3.1. MODEL G™

Figure 3.1

Each Model G™ chain conveyor consists of the following components:

- Head discharge section with drive shaft
- Tail section with take-up assembly
- Intermediate trough section
- Rino seals
- Conveyor chain & flights
- Assembly bolts & alignment pins

Refer to Figure 3.2 - 3.10 for graphical representations of the components of the MODEL G™ chain conveyor.

Note: *The graphical representations of the components of the MODEL G™ chain conveyor are representative drawings only. It is the responsibility of the purchaser to consult contract drawings for specific items on each conveyor.*

HEAD DISCHARGE SECTION WITH DRIVE SHAFT

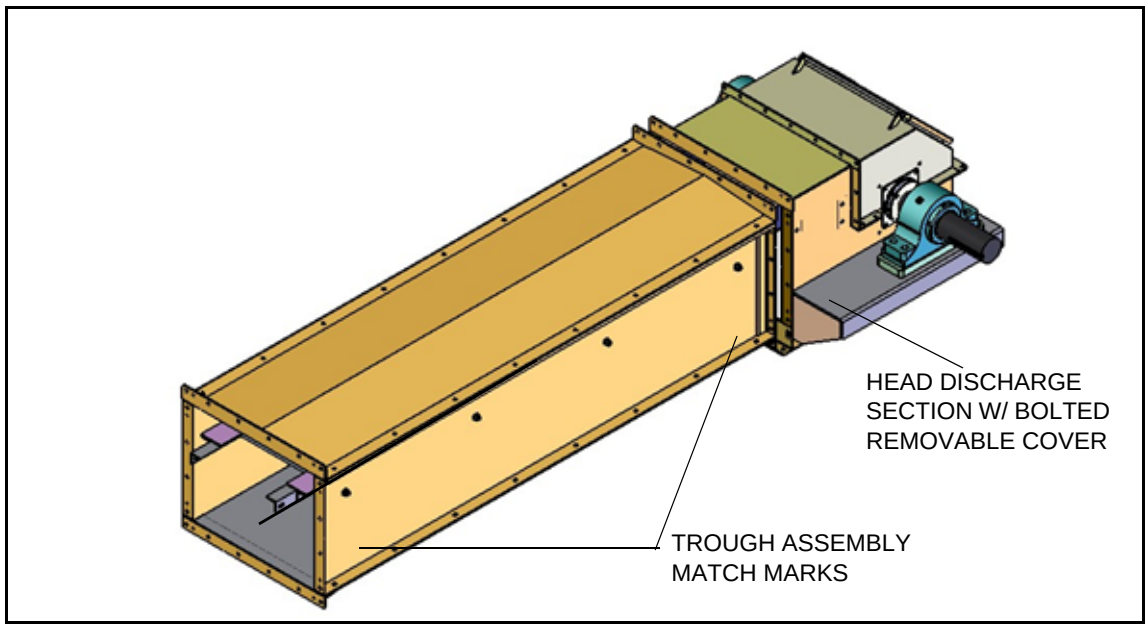


Figure 3.2

TAIL SECTION WITH TAKE-UP ASSEMBLY

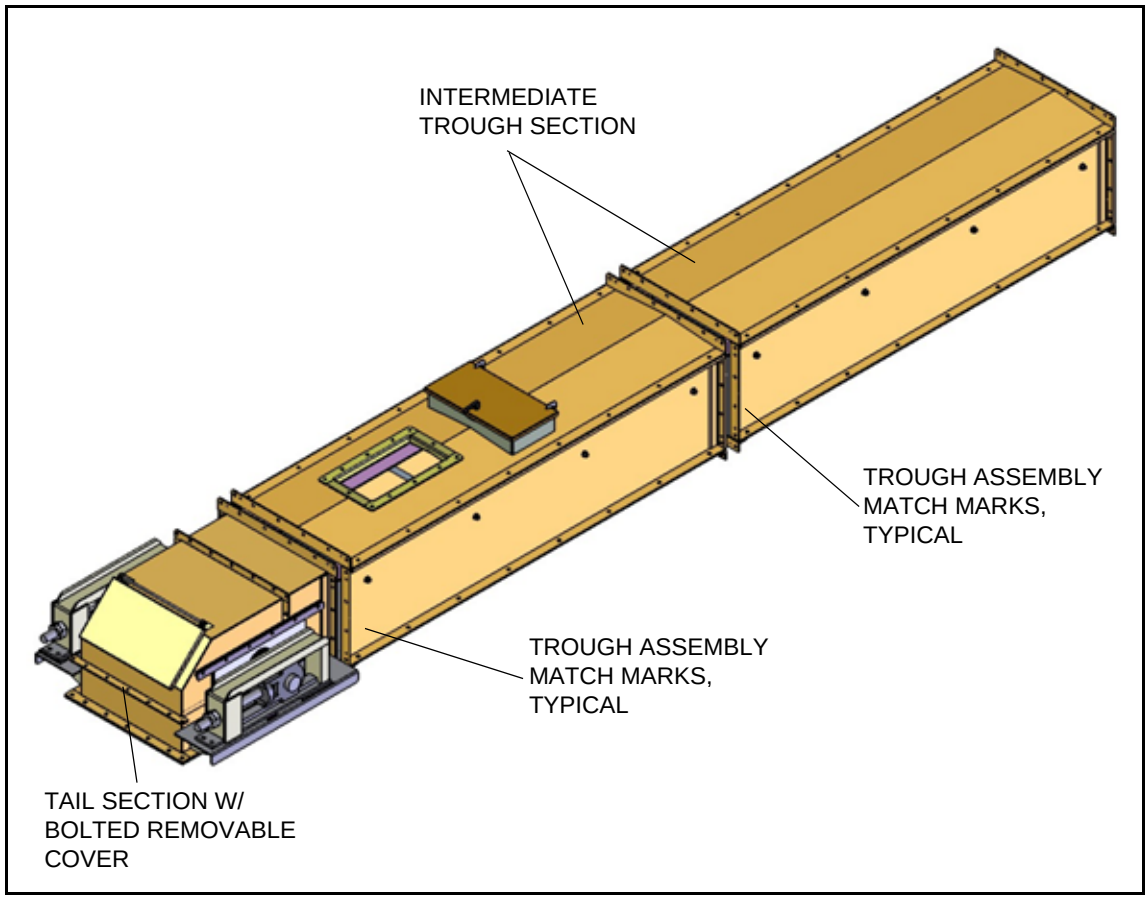
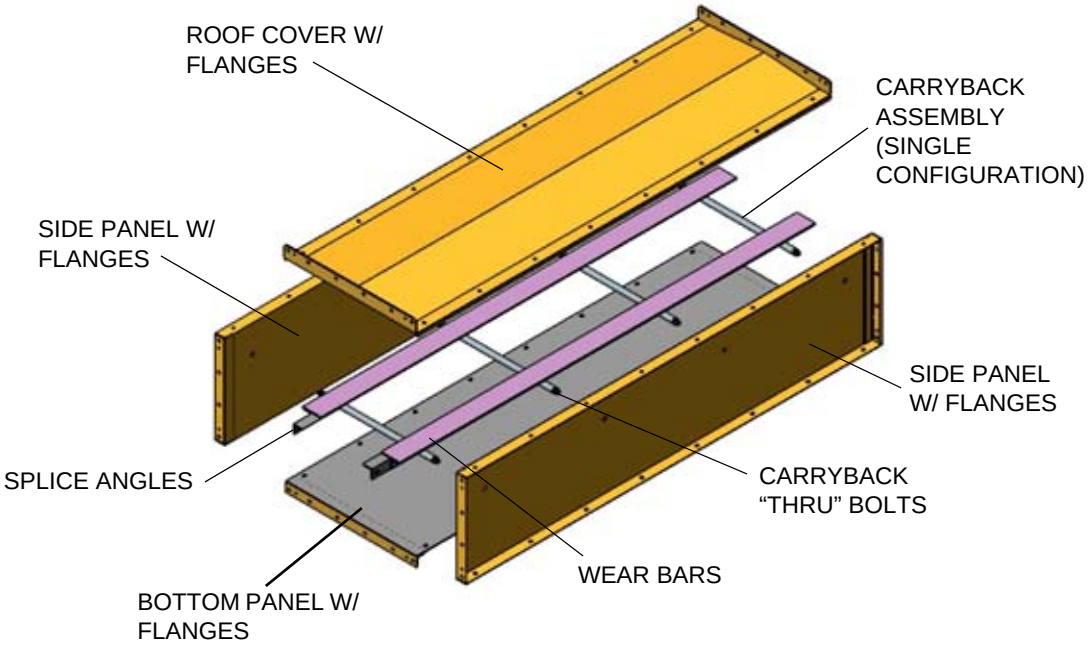


Figure 3.3

INTERMEDIATE TROUGH SECTION



NOTE: THE WEAR BARS COME IN VARIOUS SIZES. THE CARRYBACK ASSEMBLY SHOWN IS ALSO AVAILABLE IN A "TWIN" CONFIGURATION FOR LARGER CONVEYORS.

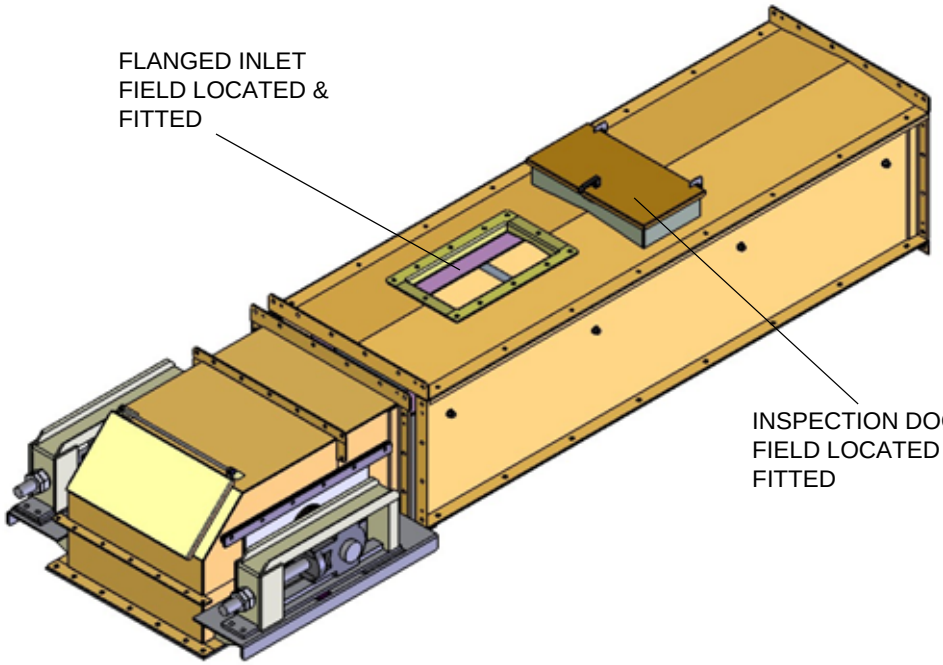


Figure 3.4

RINO SEALS

a. Head Seal

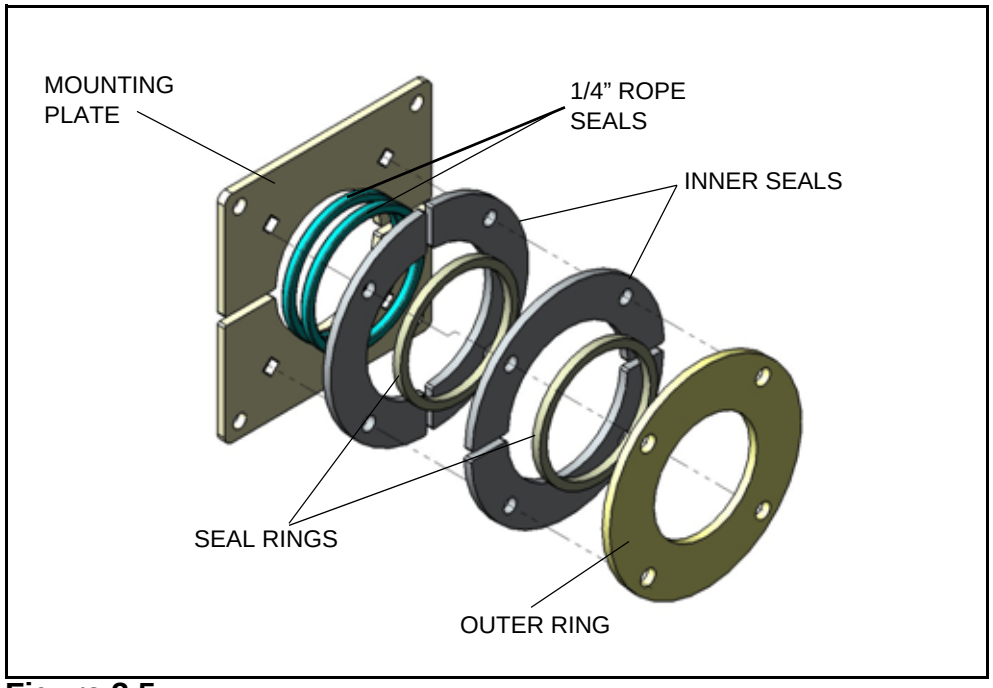


Figure 3.5

b. Tail Rino Seal

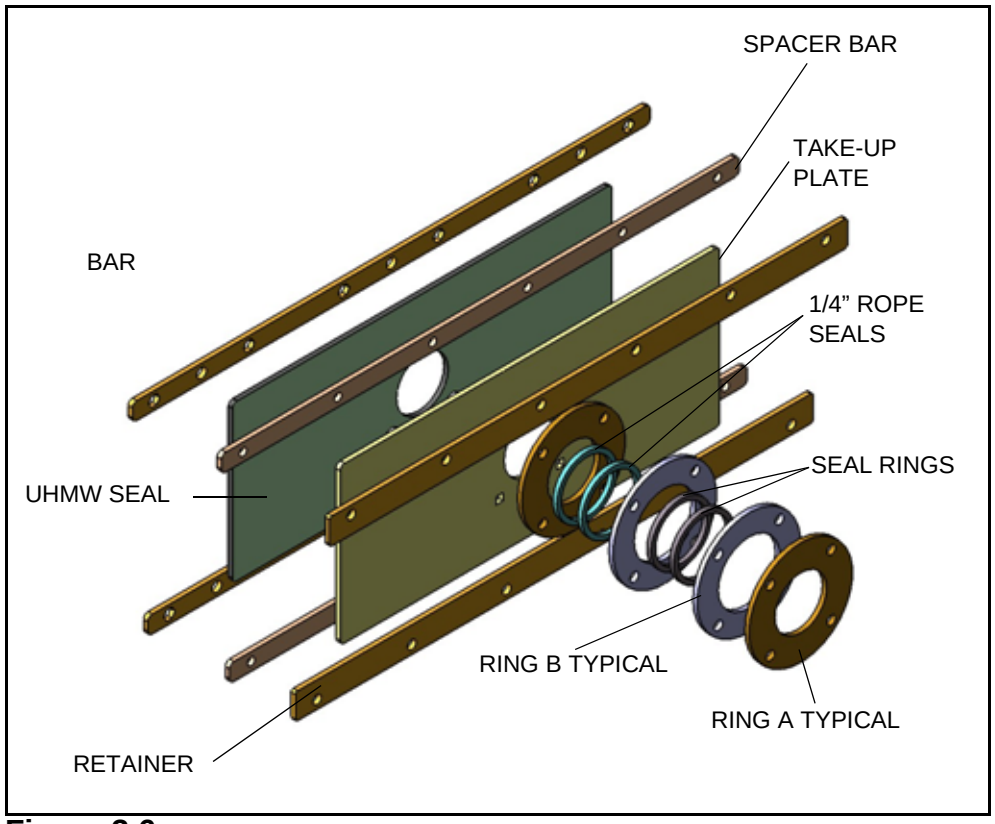
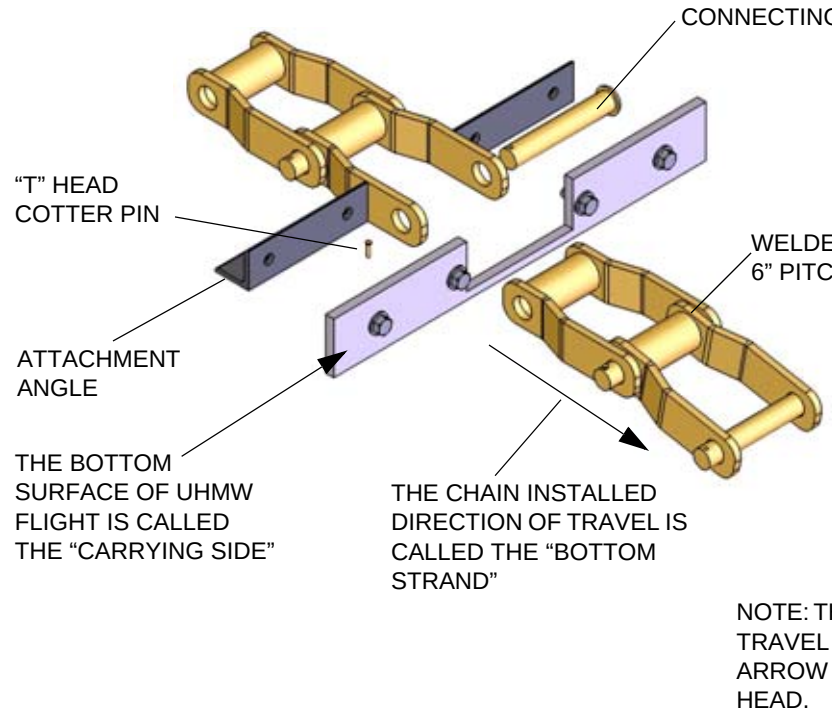
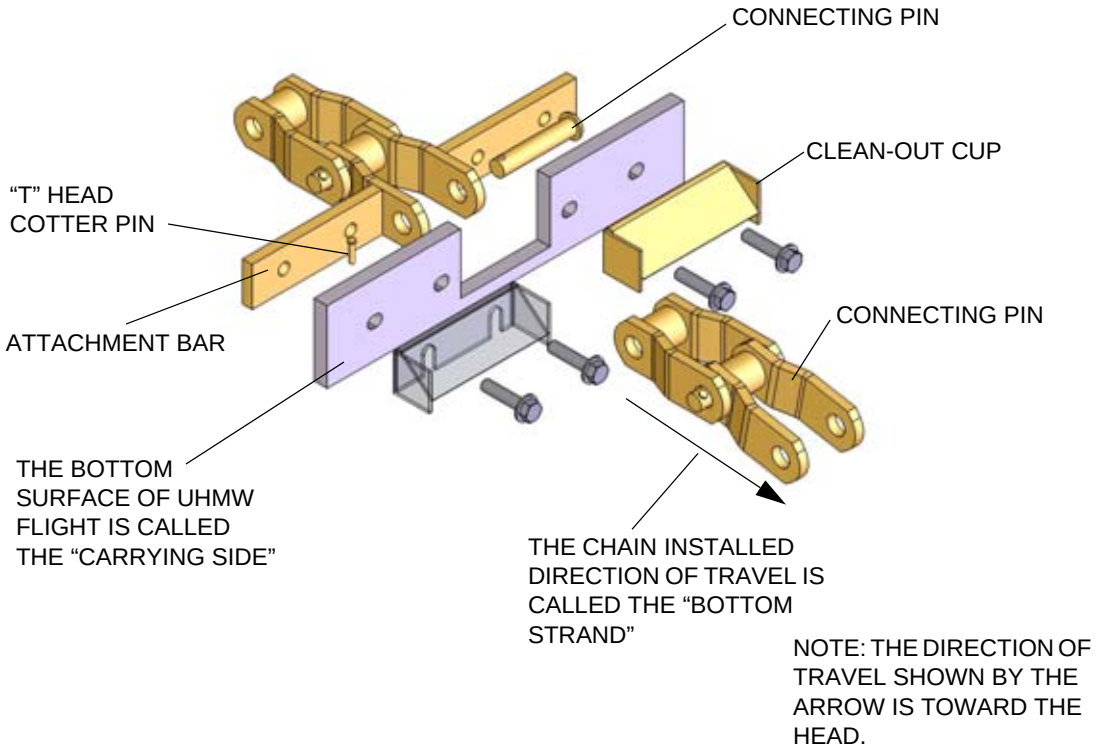


Figure 3.6

CONVEYOR CHAIN AND FLIGHTS



TYPICAL CHAIN AND FLIGHT ASSEMBLY



TYPICAL CHAIN AND FLIGHT ASSEMBLY
(SHOWN WITH CLEAN-OUT CUPS)

Figure 3.7

ASSEMBLY BOLTS & ALIGNMENT PINS

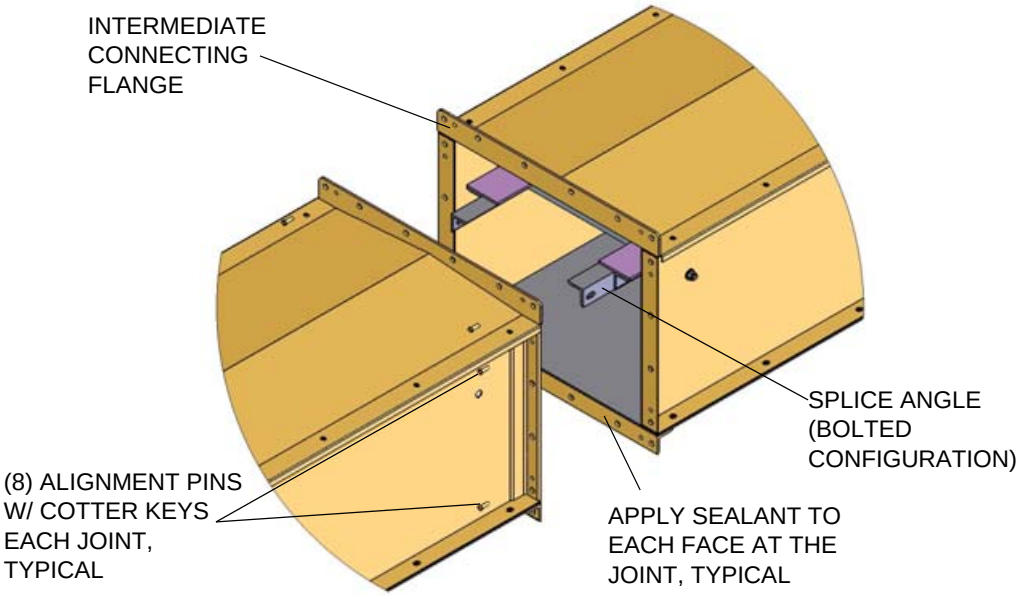
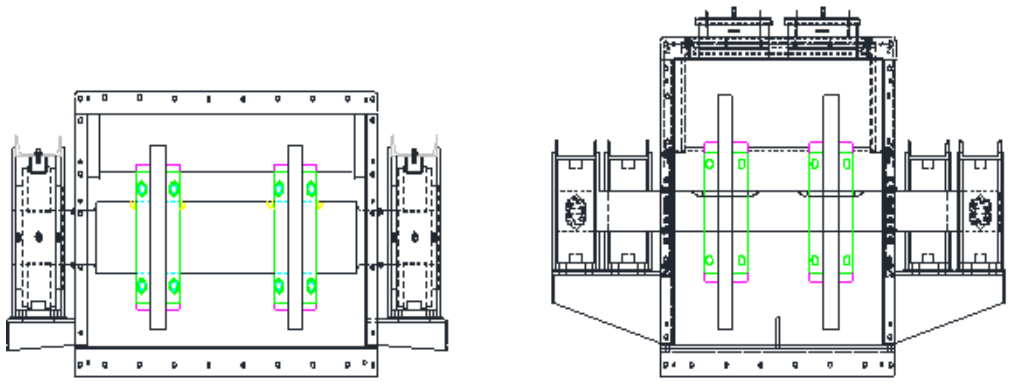


Figure 3.8

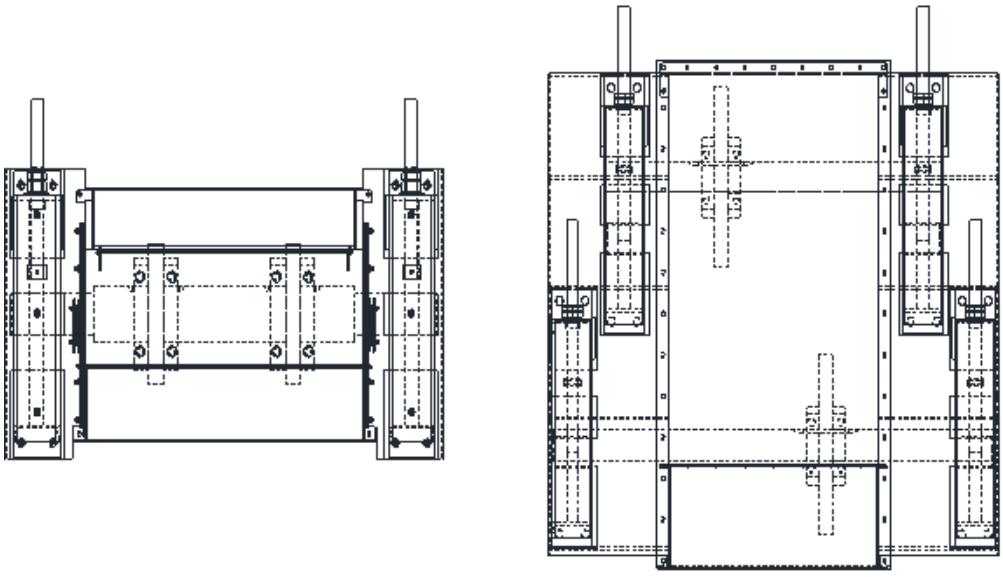
Note: *Care should be exercised when joining sections of the conveyor to see that the "Carryback", "Return Rails" and/or "Splice Angles" are properly aligned. The top surface of the joints should be flush and smooth with no projecting lips to catch the flights or flight facings. If there is a misalignment, loosen the "trough" bolts and adjust as required.*

ADDITIONAL TAKE-UP OPTION



CROSS SECTION OF ADDITIONAL TAKE-UP OPTIONS
(SHOWN WITH THE SINGLE AND DOUBLE TAKE-UP CONFIGURATIONS)

Figure 3.9



TOP VIEW OF ADDITIONAL TAKE-UP OPTIONS
(SHOWN WITH THE SINGLE AND DOUBLE TAKE-UP CONFIGURATIONS)

Figure 3.10

Note: *Both the single and dual chain configurations of the additional take-up options are available on the MODEL G™ chain conveyor and BULK-FLO™ chain conveyor models.*

3.3.2. MODEL RB™

Figure 3.11

Each Model RB™ chain conveyor consists of the following components:

- Head discharge section with drive shaft
- Tail section with take-up assembly
- Intermediate trough section
- Seals

- Conveyor chain & flights
- Assembly bolts & alignment pins

Refer to Figure 3.12 - 3.17 for graphical representations of the components of the Model RB^{TM} chain conveyor.

Note: *The graphical representations of the components of the Model RB^{TM} chain conveyor are representative drawings only. It is the responsibility of the purchaser to consult contract drawings for specific items on each conveyor.*

HEAD DISCHARGE SECTION WITH DRIVE SHAFT

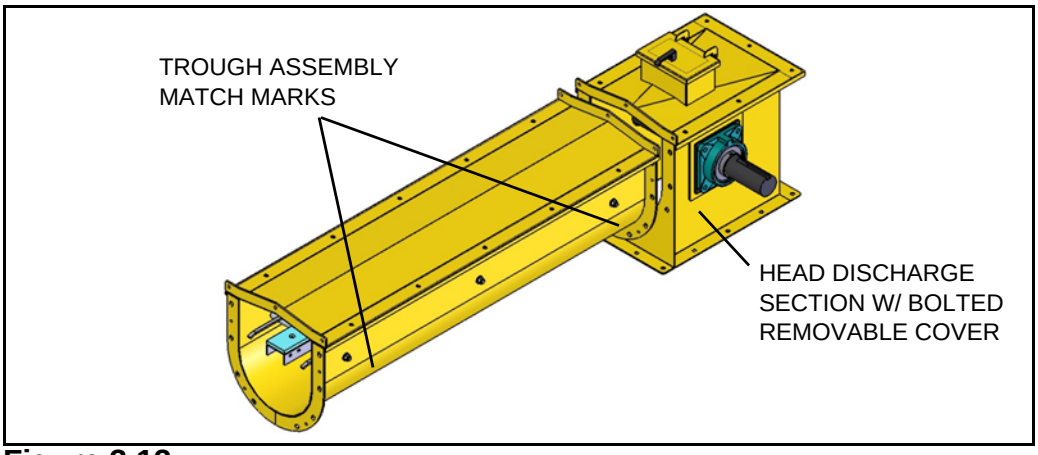


Figure 3.12

TAIL SECTION WITH TAKE-UP ASSEMBLY

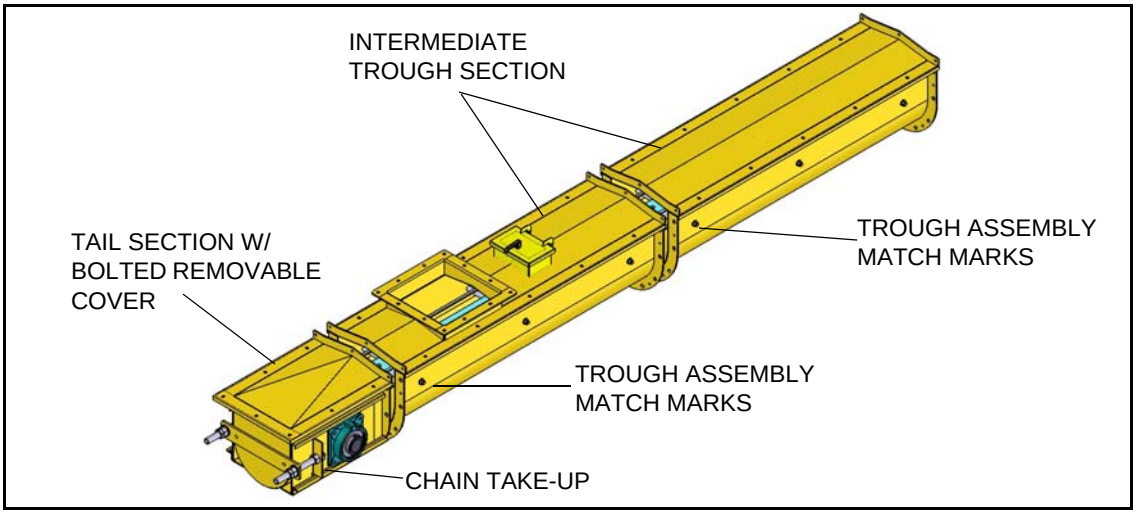


Figure 3.13

INTERMEDIATE TROUGH SECTION

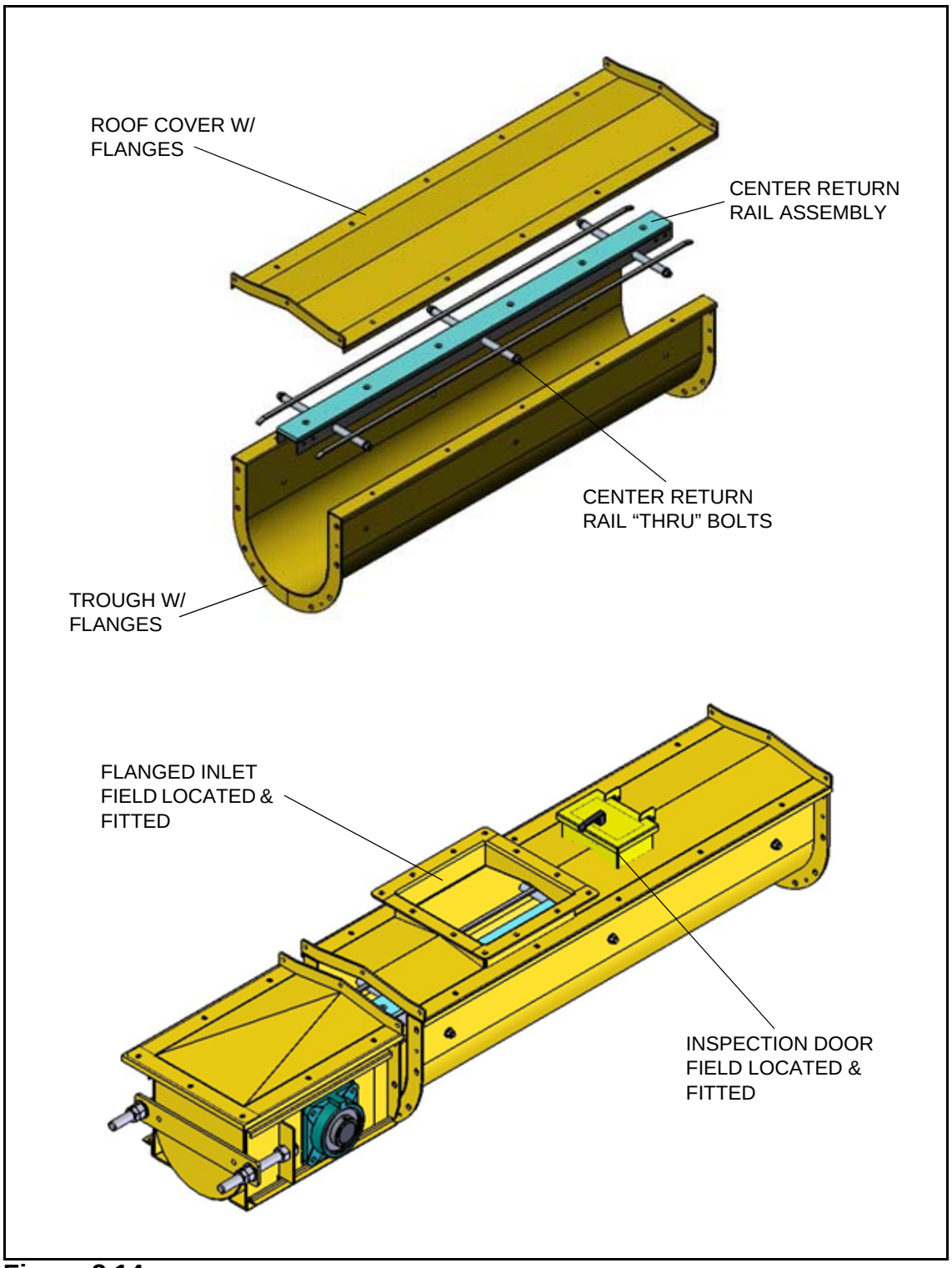


Figure 3.14

SEALS

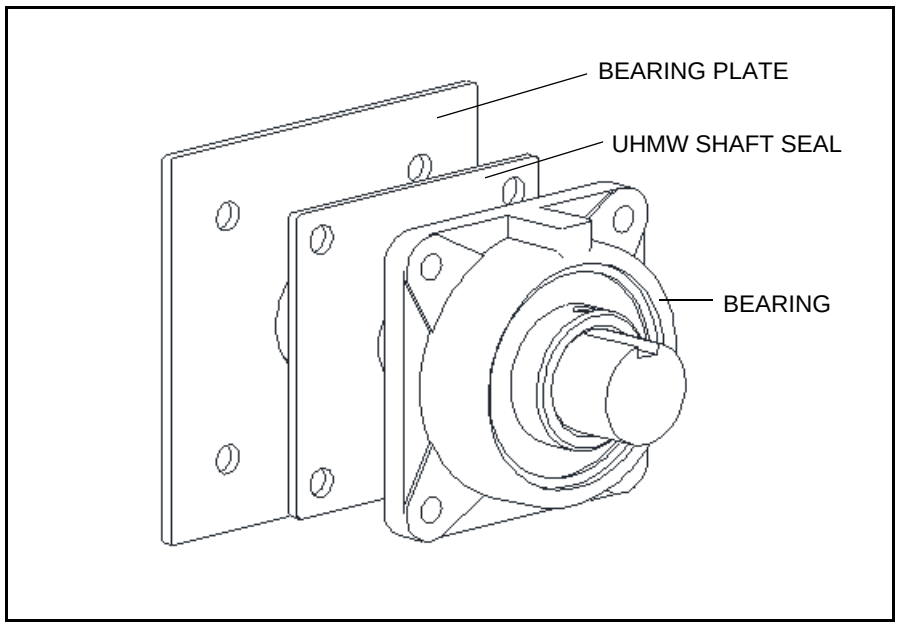


Figure 3.15

CONVEYOR CHAIN AND FLIGHTS

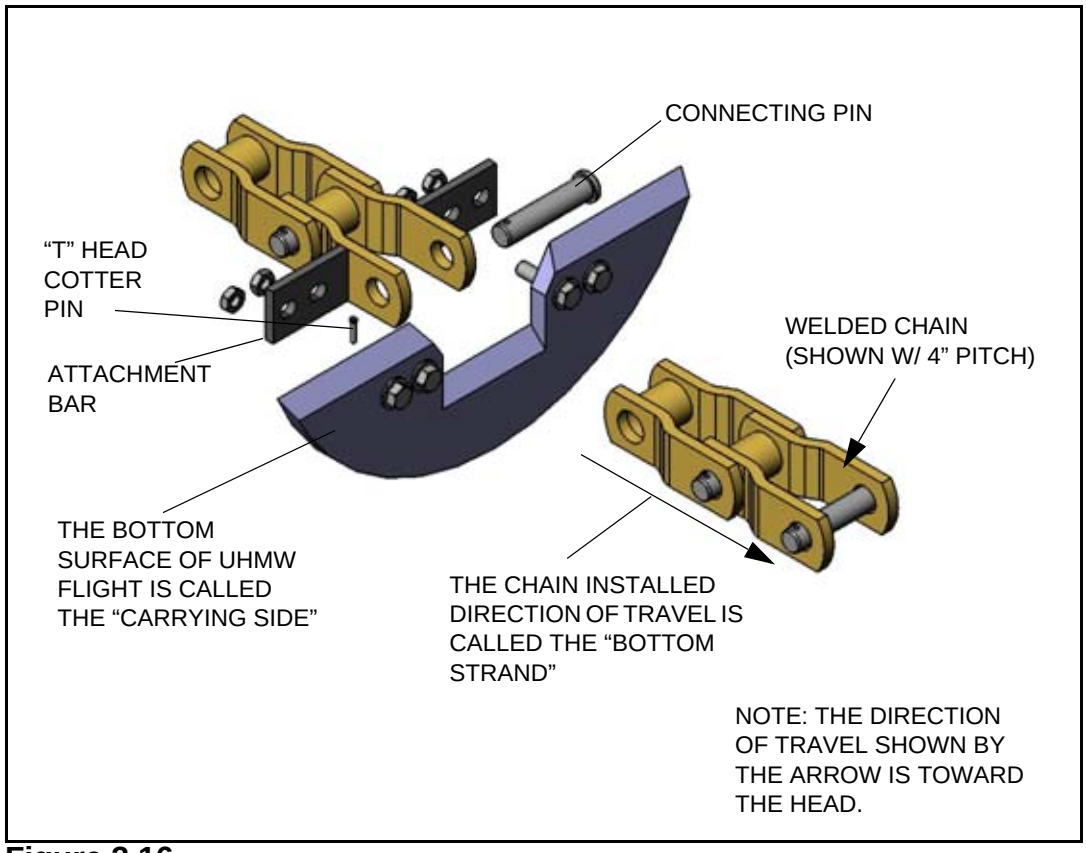


Figure 3.16

ASSEMBLY BOLTS AND ALIGNMENT PINS

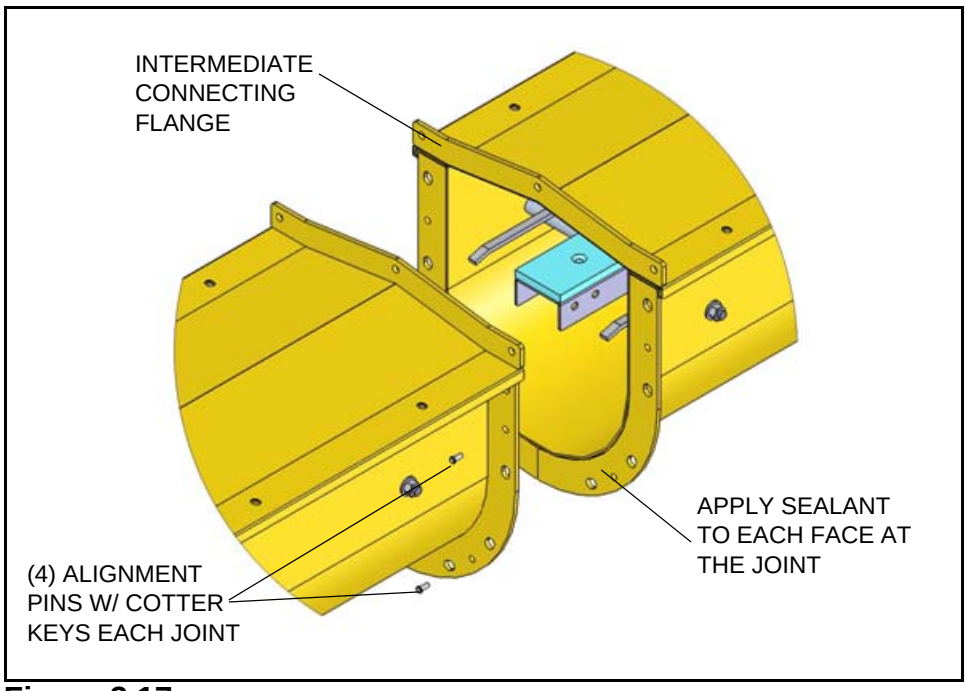


Figure 3.17

Note: *Care should be exercised when joining sections of the conveyor to see that the "Carryback", "Return Rails" and/or "Splice Angles" are properly aligned. The top surface of the joints should be flush and smooth with no projecting lips to catch the flights or flight facings. If there is a misalignment, loosen the "trough" bolts and adjust as required.*

3.3.3. BULK-FLO™

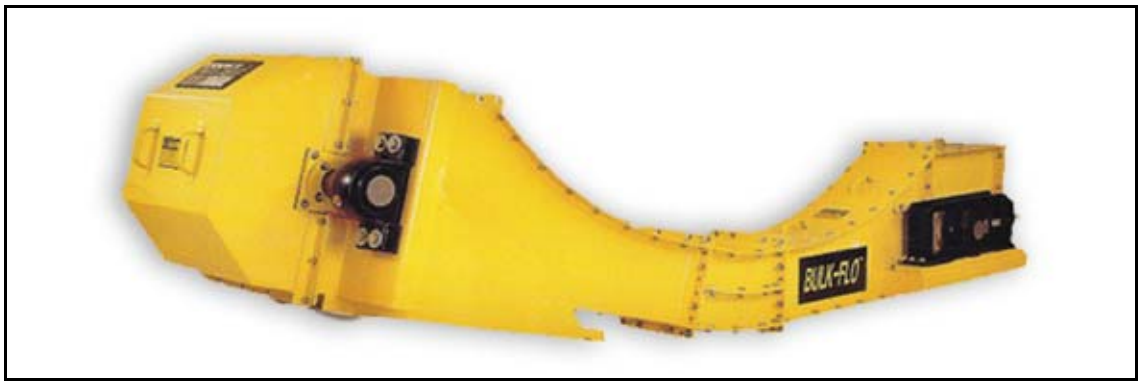


Figure 3.18

Each BULK-FLO™ chain conveyor consists of the following components:

- Head discharge section with drive shaft
- Tail section with take-up assembly
- Intermediate trough section
- Rino seals
- Conveyor chain & flights
- Assembly bolts & alignment pins

Refer to Figure 3.19 - 3.25for graphical representations of the components of the BULK-FLO™ chain conveyor.

Note: *The graphical representations of the components of the BULK-FLO™ chain conveyor are representative drawings only. It is the responsibility of the purchaser to consult contract drawings for specific items on each conveyor.*

HEAD DISCHARGE SECTION WITH DRIVE SHAFT

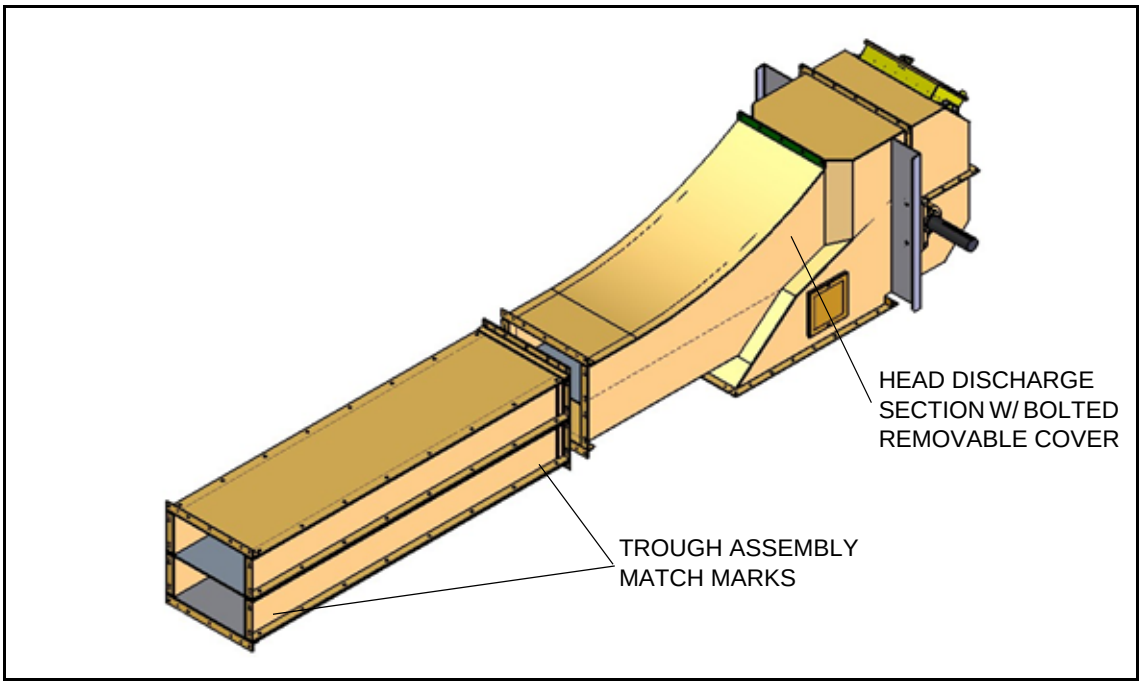


Figure 3.19

TAIL SECTION WITH TAKE-UP ASSEMBLY

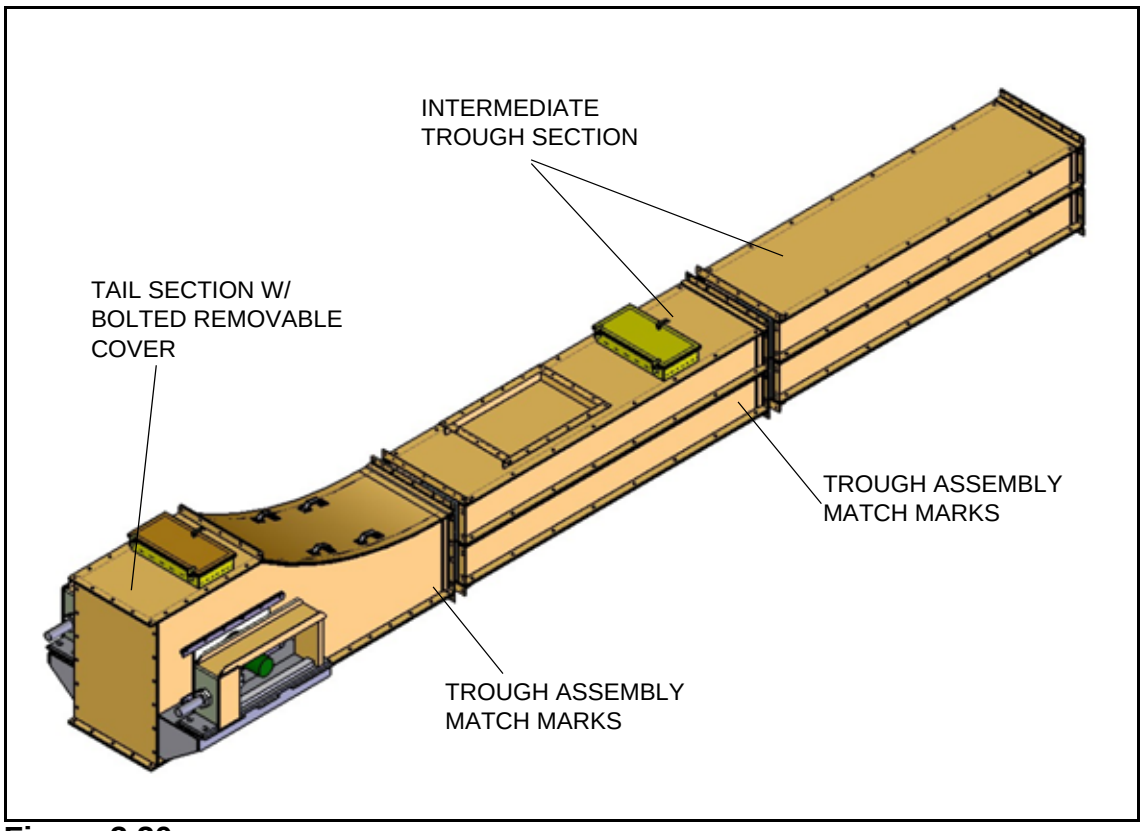


Figure 3.20

INTERMEDIATE SECTION

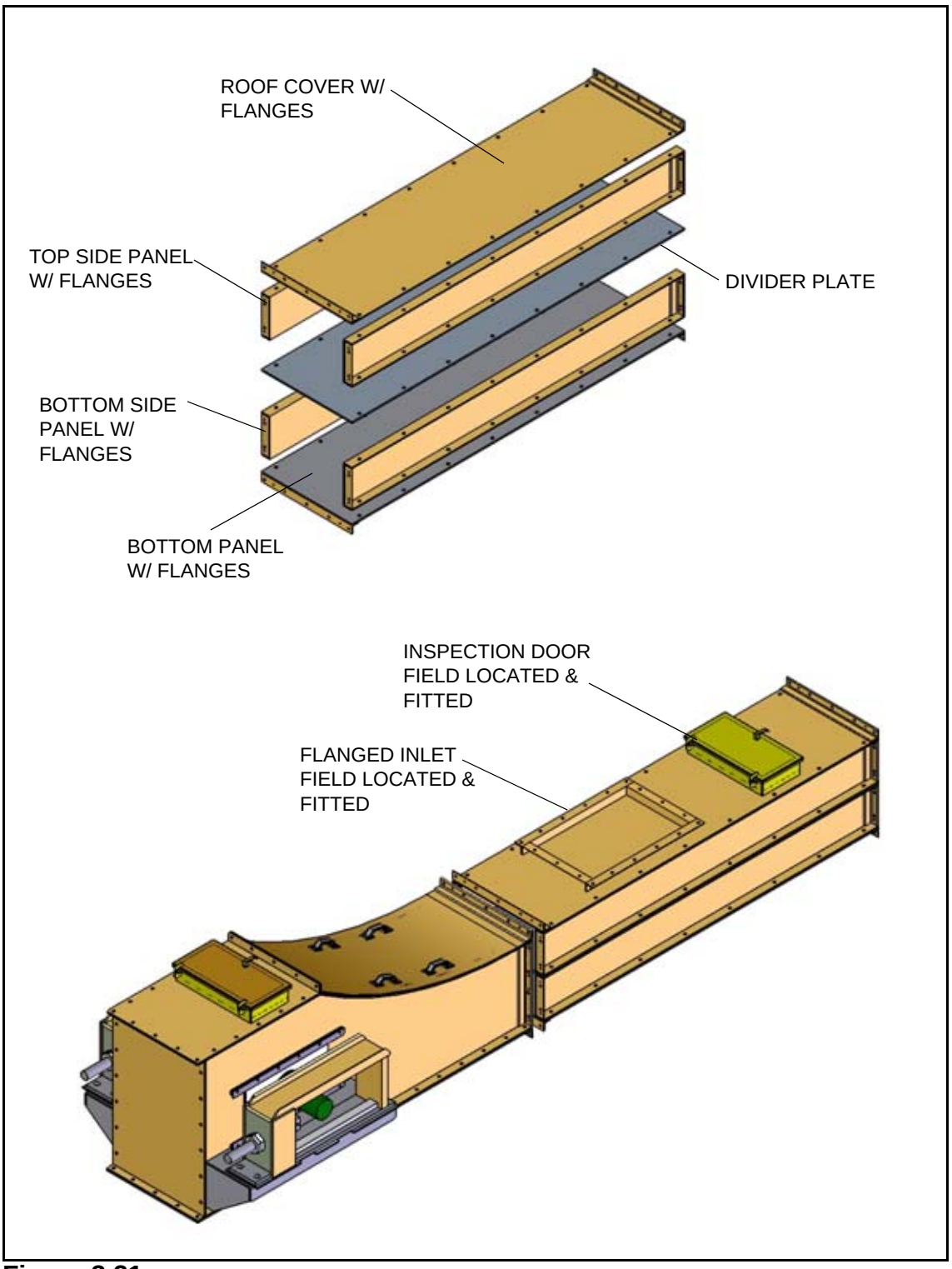


Figure 3.21

Rino Seals

a. Head Seal

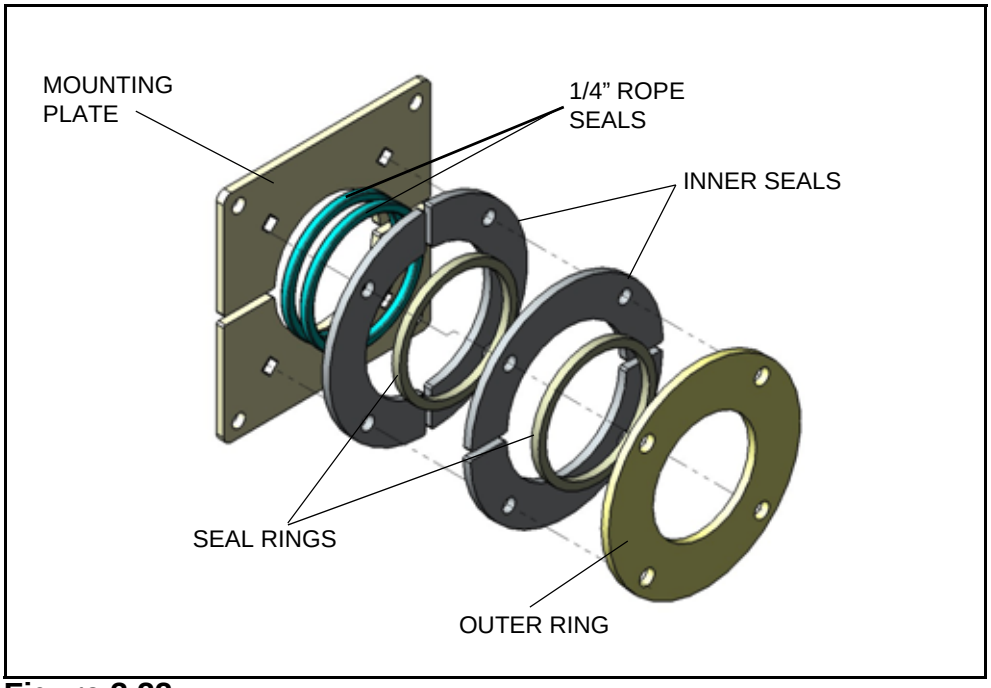


Figure 3.22

b. Tail Rino Seal

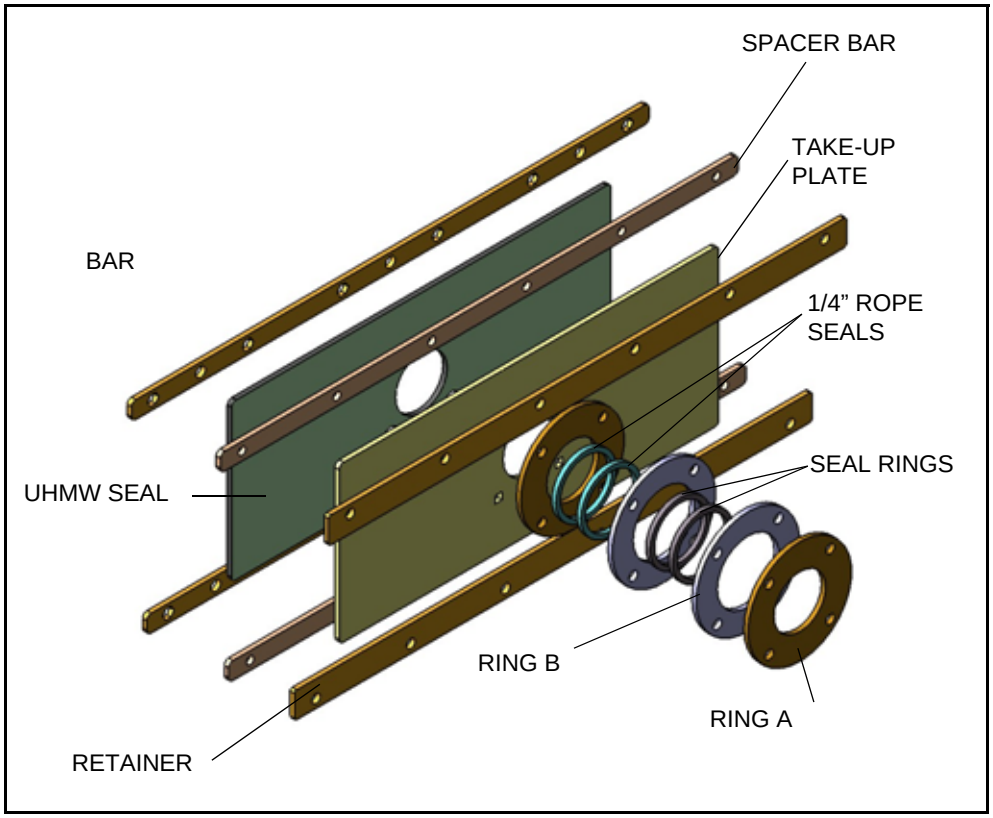


Figure 3.23

CONVEYOR CHAIN AND FLIGHTS

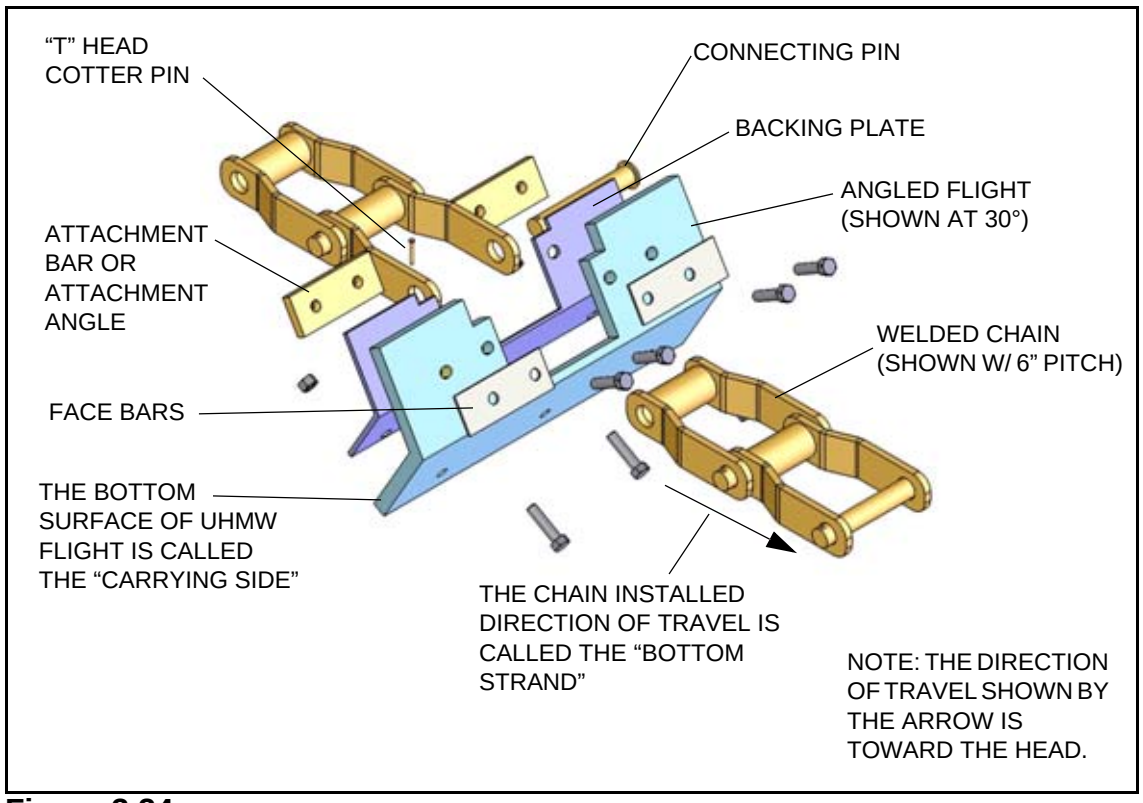


Figure 3.24

Note: *Flight assembly configurations with straight flights and 15° angled flights are available.*

ASSEMBLY BOLTS AND ALIGNMENT PINS

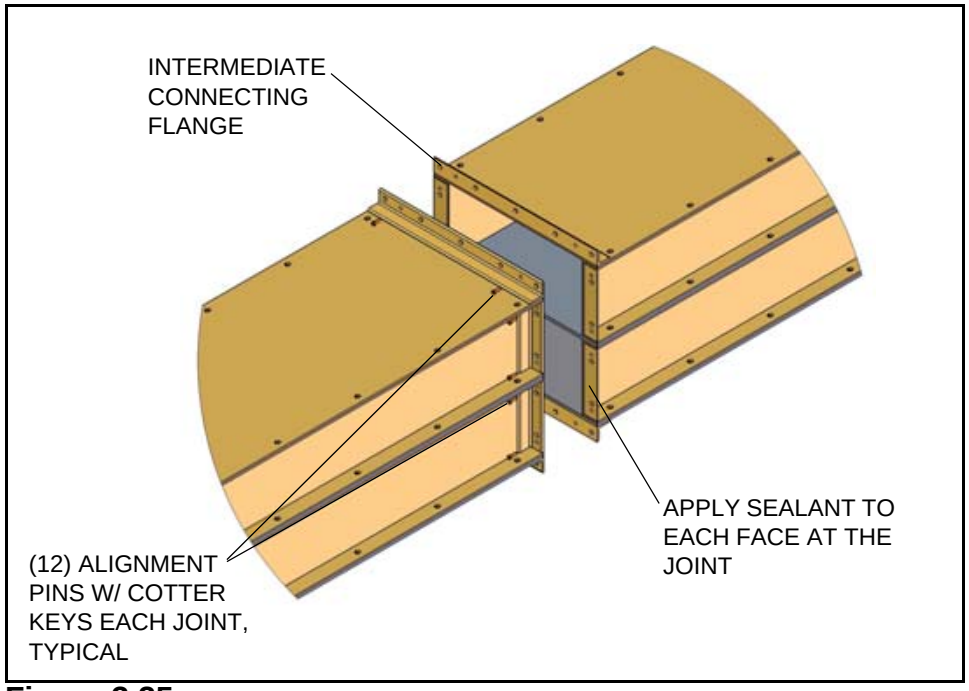
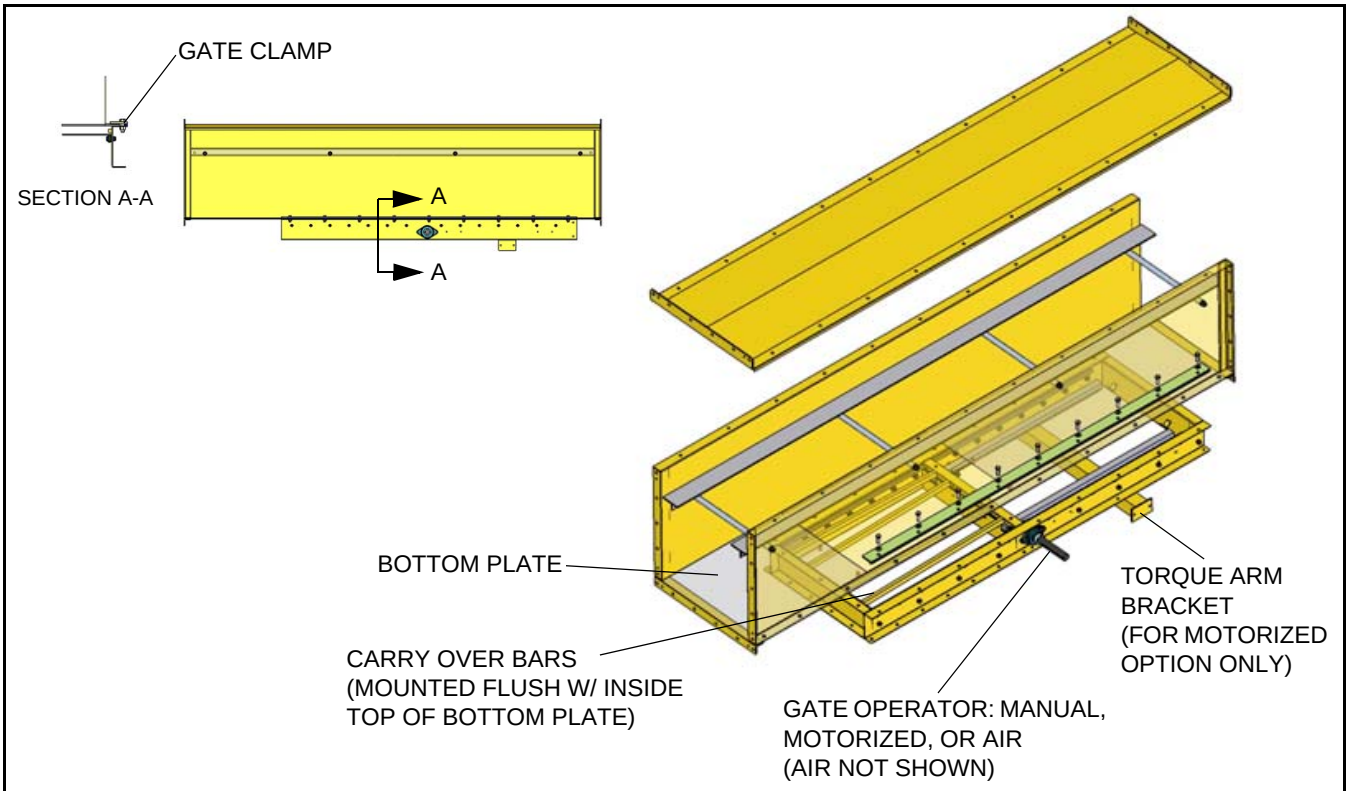


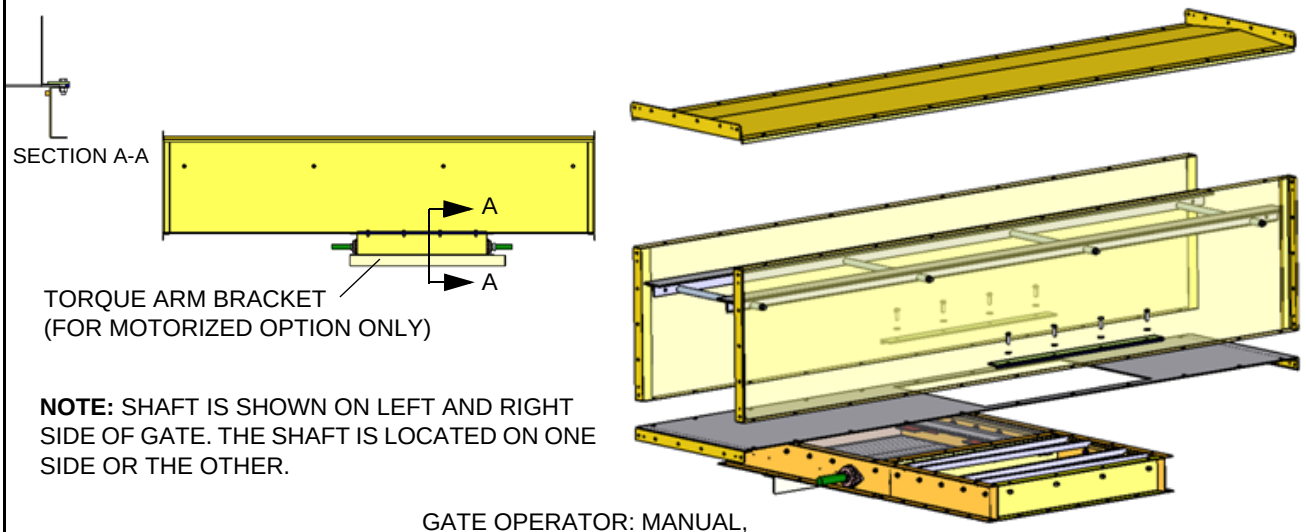
Figure 3.25

3.4. GENERAL ARRANGEMENT DRAWINGS



A. "L" STYLE GATE

(SHOWN ON AN INTERMEDIATE SECTION OF MODEL G™)



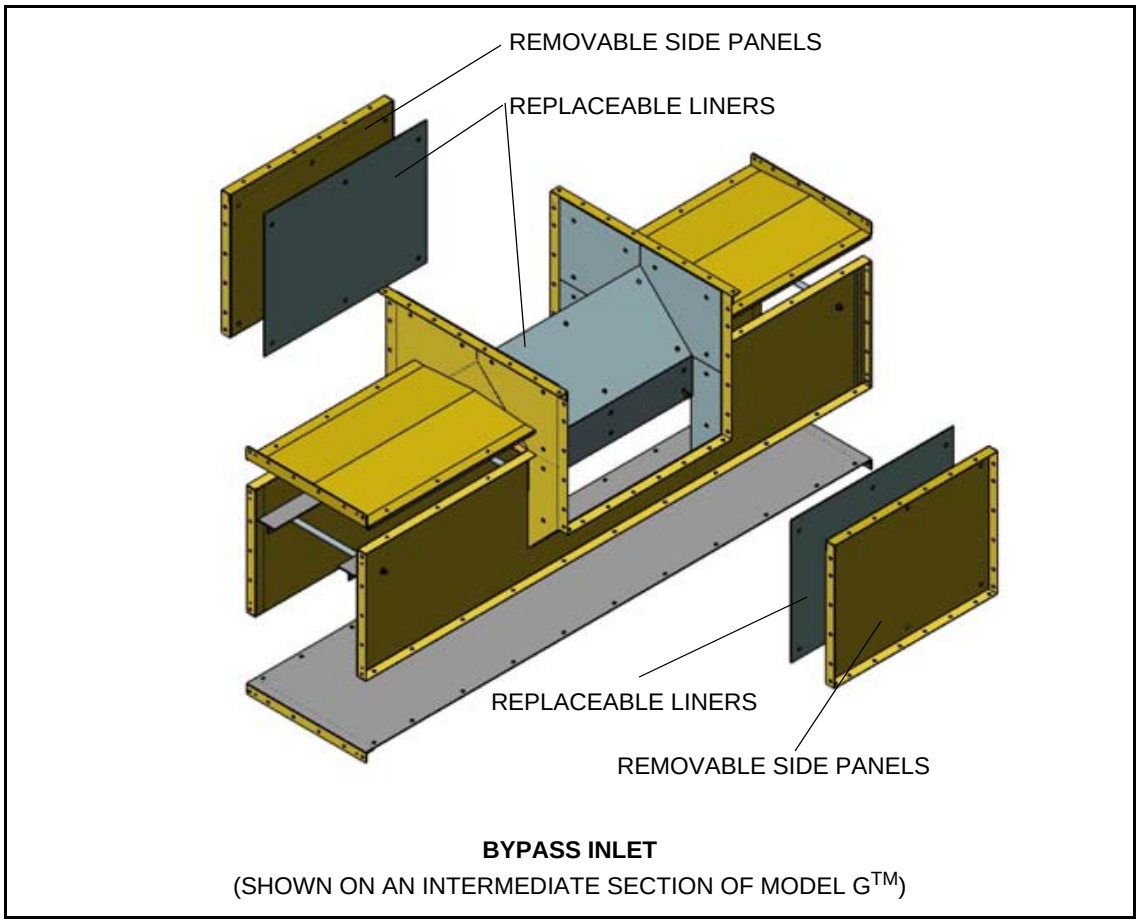
NOTE: SHAFT IS SHOWN ON LEFT AND RIGHT SIDE OF GATE. THE SHAFT IS LOCATED ON ONE SIDE OR THE OTHER.

NOTE: THE "L" AND "C" STYLE GATES CAN BE USED ON BOTH TRAMCO MODEL G™ AND BULK-FLO™.

B. "C" STYLE GATE

(SHOWN ON AN INTERMEDIATE SECTION OF MODEL G™)

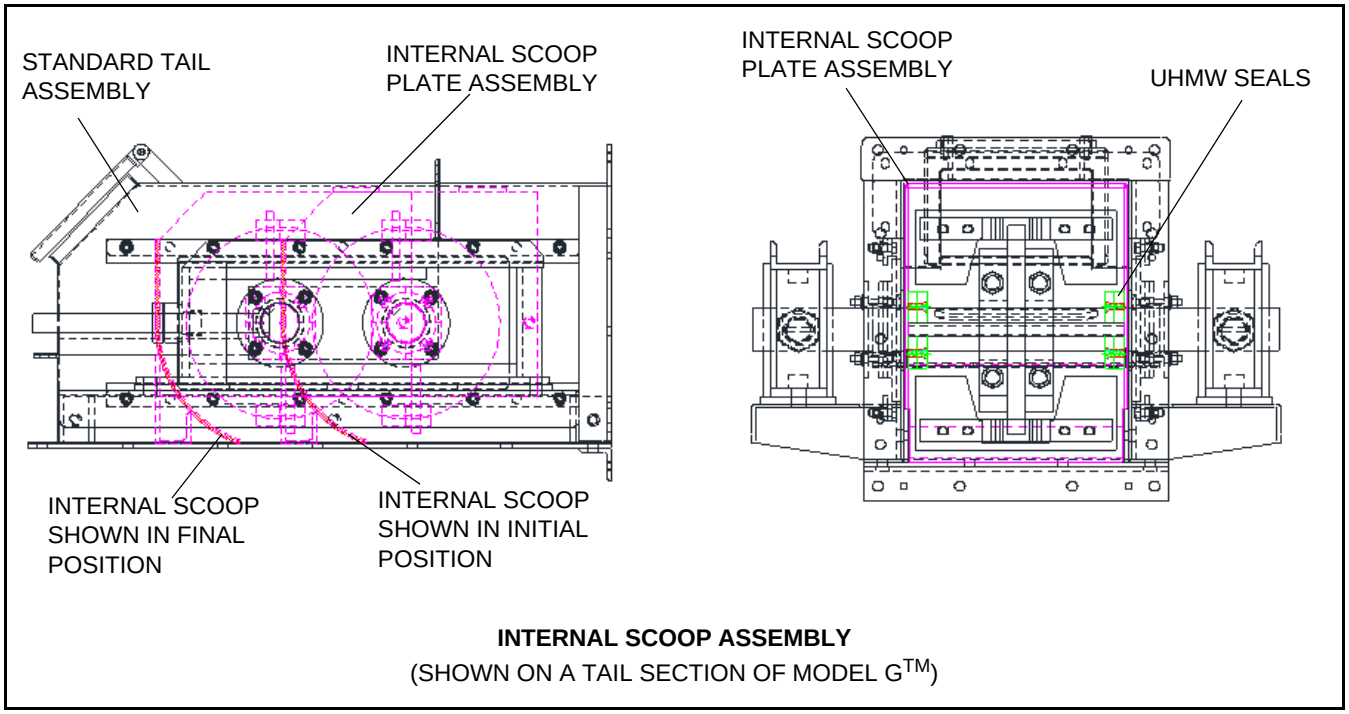
Figure 3.26



BYPASS INLET
(SHOWN ON AN INTERMEDIATE SECTION OF MODEL G™)

Figure 3.27

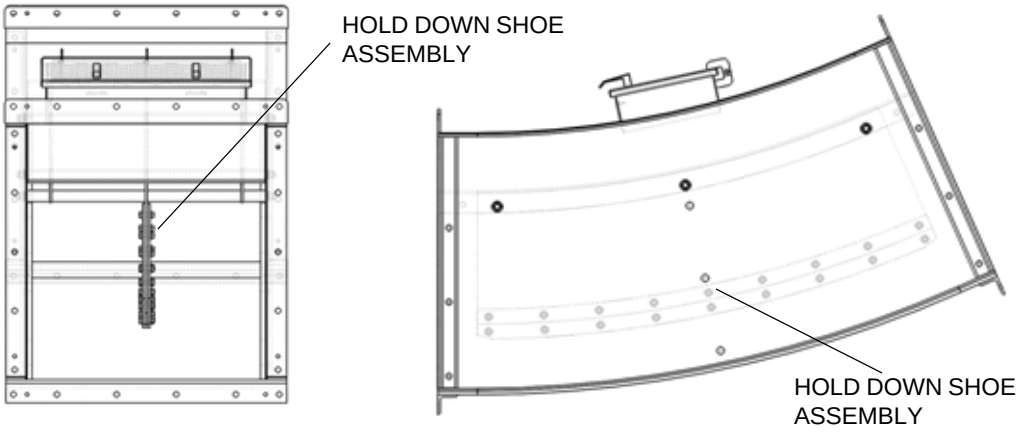
Note: *Bypass inlets are also available for both the MODEL RB™ and BULK-FLO™ chain conveyor models.*

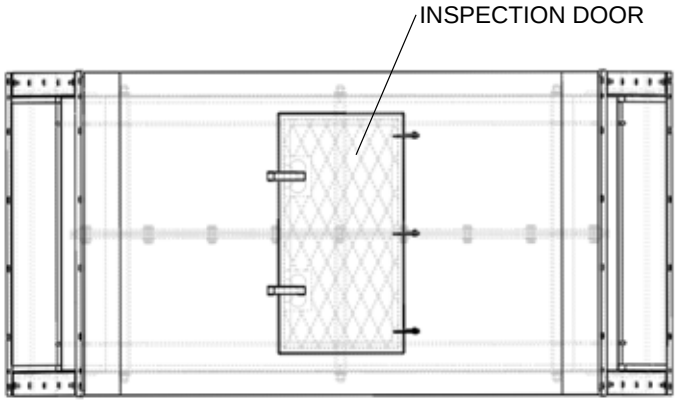


INTERNAL SCOOP ASSEMBLY
(SHOWN ON A TAIL SECTION OF MODEL G™)

Figure 3.28

Note: *The internal scoop assembly is also available on a BULK-FLO™ tail assembly.*

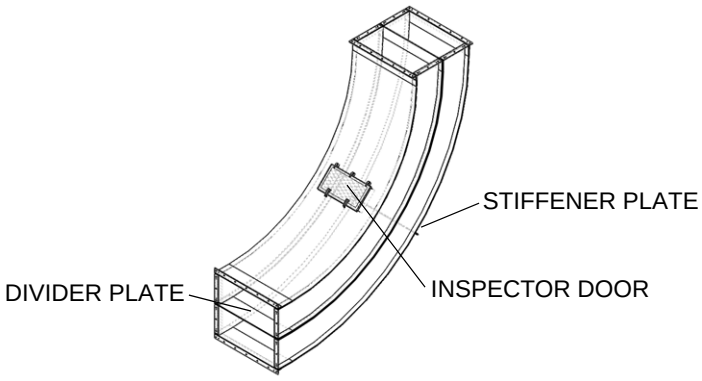




INTERMEDIATE CURVE-UP
(SHOWN FOR A MODEL G™)

Figure 3.29

Note: *This style of intermediate curve-up is as available on the MODEL RB™ chain conveyor. The intermediate curve-up's come in a variety of angles. The MODEL G™ chain conveyor has a range from 0 to 25 degrees and the MODEL RB™ chain conveyor has a range from 0 to 45 degrees.*



INTERMEDIATE CURVE-UP
(SHOWN FOR A BULK-FLO™)

Figure 3.30

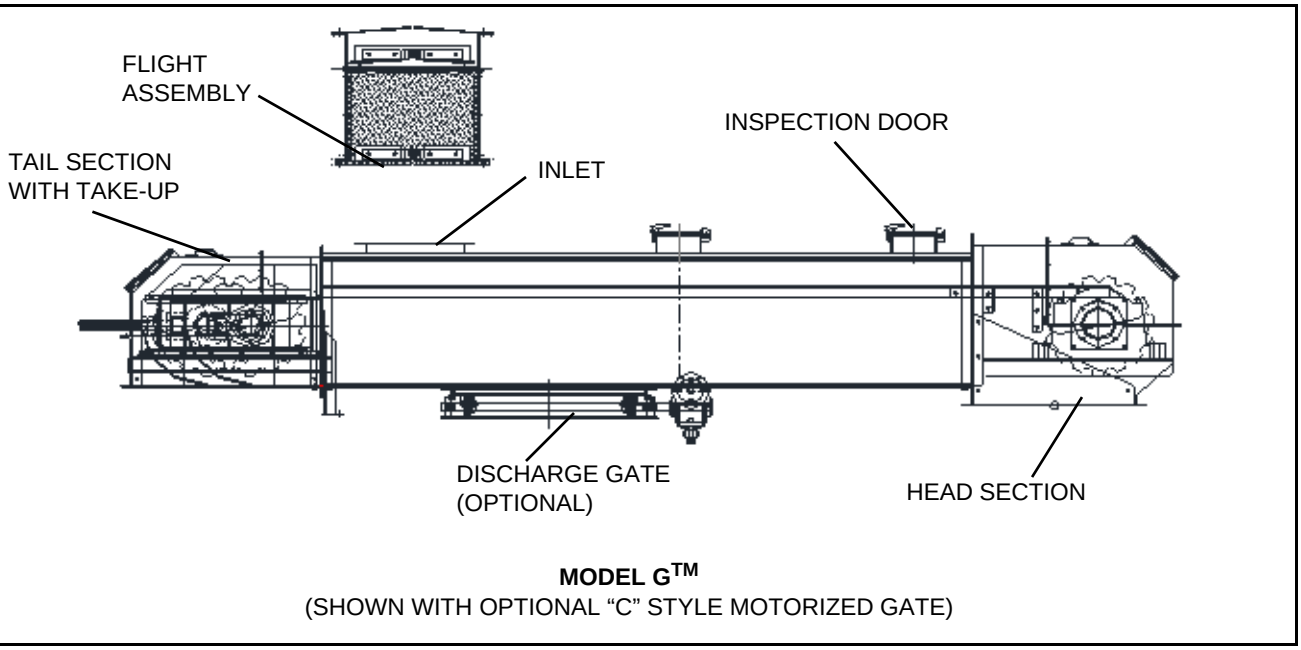
Note: *This style of intermediate curve-up is available for the BULK-FLO™ model only. The intermediate curve-up for the BULK-FLO™ model comes in a variety of angles. The BULK-FLO™ has a range from 0 to 90 degrees.*

3.5. GENERAL ASSEMBLY INSTRUCTIONS

Important: *All component pieces (or conveyor sections) should be placed in proper sequence before assembly is started.*

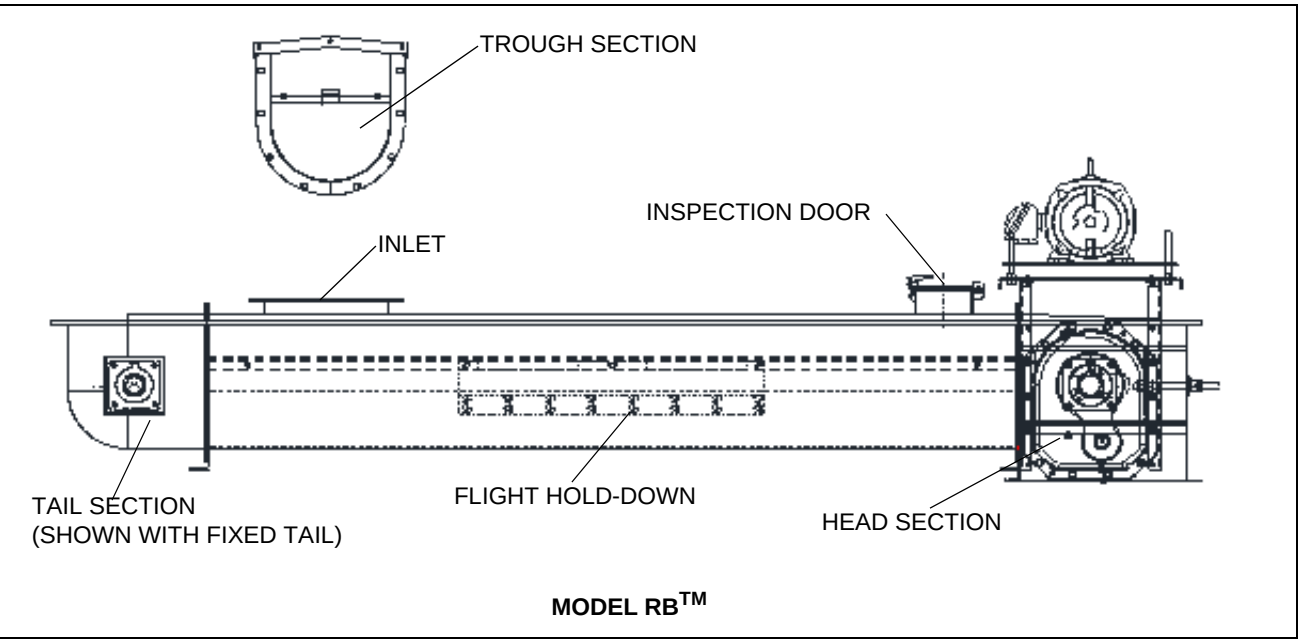
WARNING

To minimize risk of serious injury, death or property damage, follow the safety instructions in this manual concerning assembly.



MODEL G™
(SHOWN WITH OPTIONAL "C" STYLE MOTORIZED GATE)

Figure 3.31



MODEL RB™

Figure 3.32

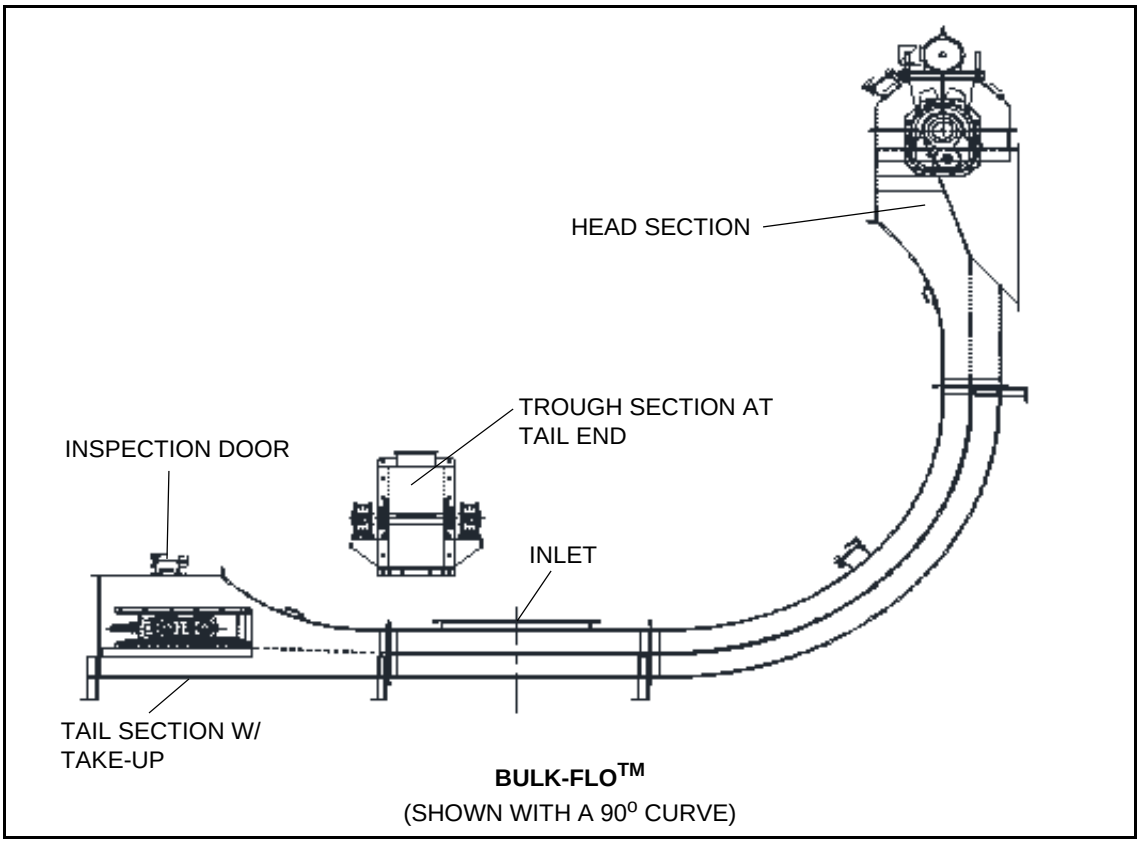


Figure 3.33

Note: *Figures 3.31, 3.32 and 3.33 are a representative drawing only. It is the responsibility of the purchaser to consult contract drawings for specific items on each conveyor.*

NOTICE

For safety and proper operation, chain conveyors must be assembled and erected straight and true. The purchaser is responsible for ensuring all support and mounting surfaces are straight and level so there is no distortion in the conveyor.

3.5.1. SHOP-ASSEMBLED CONVEYORS

1. Units are match marked and shipped in the longest sections practical for shipment. Field assembly can be accomplished by connecting marked joints in accordance with the packing list and/or drawing if applicable.
2. The mounting surfaces for supporting the conveyor must be level and true so there is no distortion in the conveyor. Shims or grout should be used when required. Frequently check for straightness during assembly.

3.5.2. CONVEYOR PURCHASED AS PARTS/MERCHANDISE

1. Use the trough assembly match marks to place the conveyor troughs in proper sequence with the tail section, the bypass inlet (if applicable), and the head section in their proper locations. Connect the trough flanges loosely. Do not tighten bolts.
2. Align the trough bottom centerlines perfectly using the alignment pins; apply appropriate sealant (caulking, silicon, Gortex, or neoprene); then tighten flange bolts to **manufacturer's torque specifications**.
3. Tighten all anchor bolts to **manufacturer's torque specifications**.
4. Before connecting the top section of the chain, loosen take-up as much as possible. Check sprocket alignment. Check set screws and bearing bolts for tightness.
5. Connect top section for the chain. Refer to the next section for chain assembly and installation.

Note: *On long conveyors, the use of a come-a-long may be necessary.*

NOTICE

When lifting conveyor casing, do not allow the casing to drag on the ground.

Flanges and casing sections may be damaged to the extent that assembly and plumbing will be extremely difficult.

Note: *When lifting any assembly of the chain conveyor parts i.e. the head and casing, or an assembly of casing, the line of the lifting force should be in line with the narrowest part of a casing section.*

3.5.3. CHAIN ASSEMBLY

The chain can be assembled manually (Figure 3.34) or with an air assist hydraulic clamp (Figure 3.35). The easiest and most effective way of connecting the 10 ft (3 meters) chain sections is using a portable air assist hydraulic clamp. Listed below are the instructions for both methods.

A. MANUAL INSTALLATION:

1. Oil pin thoroughly with 30 weight motor oil before you attempt to assemble. It is recommended to lubricate the pins with appropriate lubricant to assist installation.
2. It is important to use a heavy back up bar counter board to receive the pin.
3. Manually insert the pin through both sidebars to ensure a proper alignment.

Note: *The connecting pins have a shoulder diameter at the head end of the pin, there is a correspondingly larger hole at one side of the chain link, thus providing an interference fit between the links and pin. Therefore, care must be taken to assemble the pin from the correct side of the link.*

NOTICE
DO NOT grind or modify the chain connecting pin

4. Strike the head of the pin with a mighty force until the pin head is flush with the sidebar.
5. After the connecting pins are in place, fit and bend the clevis pin to lock in place. Finally, check that the joined links do not bind or kink the chain. If this happens, hit the tail end of the pin with a hammer to release the side load on the pin

B. HYDRAULIC CLAMP:

1. Oil pin thoroughly with 30 weight motor oil before you attempt to assemble. It is recommended to lubricate the pins with appropriate lubricant to assist installation.
2. Be sure to use the correct chain adapters for the chain being assembled. Adapters are labeled with the chain number.
3. Place pin in chain joint to be assembled by hand as far as possible. Line up pin locking flats where applicable; tap pin with hammer to “Snug-up” (Improper alignment could shear hole).

Note: *The connecting pins have a shoulder diameter at the head end of the pin, there is a correspondingly larger hole at one side of the chain link, thus providing an interference fit between the links and pin. Therefore, care must be taken to assemble the pin from the correct side of the link.*

4. Place chain joint securely in saddle with pin head facing toward ram.
5. Apply pressure by pumping hand pump. Be sure that ram is squarely on pin head.

WARNING	
	Use appropriate safety gear (eye protection, gloves, etc.). Use the correct tool for the job.

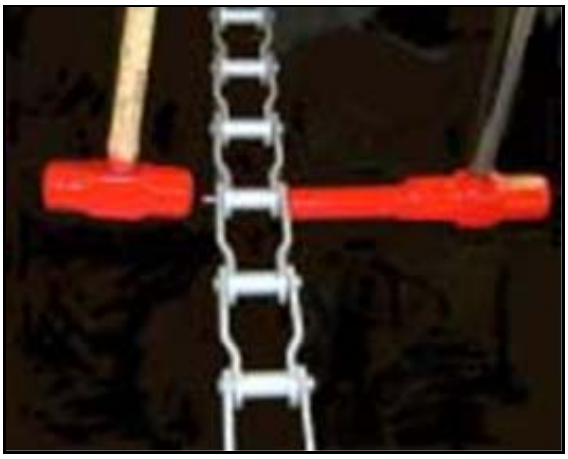


Figure 3.34

Figure 3.35

3.5.4. CHAIN INSTALLATION

The safest install position for the chain may depend upon the conveyor shape and its install position in the plant. It is therefore necessary for the supervisor to be consulted and the necessary Risk Assessments prepared prior to assembling the chain.

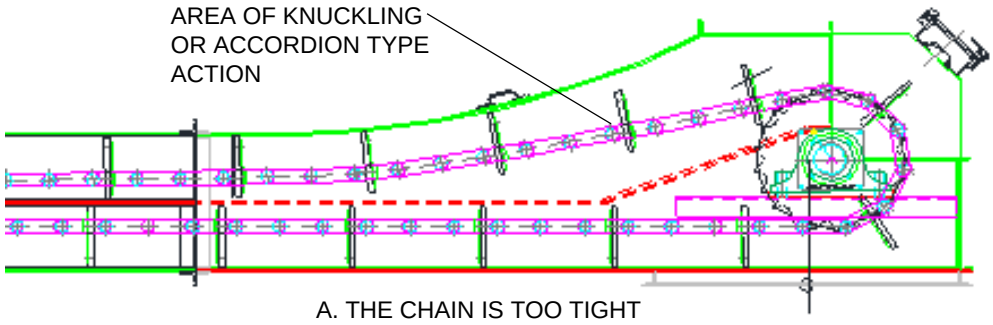
1. Ensure that any lifting, supporting, or any other method of securing the chain is suitable for the application.
2. Prior to splitting the chain at the head of an incline conveyor, the chain must be secured at both sides of the split position to prevent the chain from falling into the conveyor.
3. Begin assembling 10ft (3 meters) sections of chain together and pull it into the conveyor through the tail section or at an accessible position through the top of the conveyor
4. Continue adding sections of chain while feeding and pulling chain through the conveyor. The chain should be passed under the tail sprocket, through the bottom trough, towards the head end, then around the head sprocket and back to the tail section.
5. The final connecting pin may be installed at the tail sprocket with the tail quarter section cover removed.
6. Adjust take-up to remove excess slack from chain making sure that adjustment screws have been tightened equally to prevent misalignment

3.5.5. CHAIN TENSION

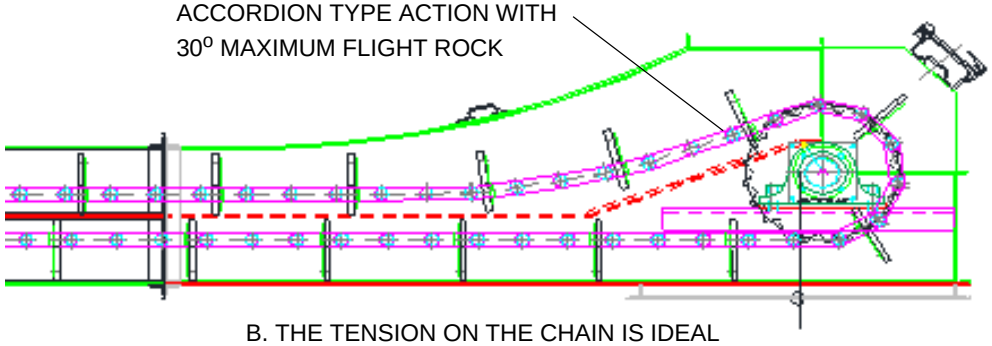
Chain tension is perhaps the single most important element for longevity of chain life. It is much better to have the chain too loose than too tight. When the chain is set too tight, it has negative effects on the sprockets, shaft, bearing and the chain itself.

When the tension on the chain is properly set, the chain will have some knuckling or accordion type action at the head chain stripper or carryback assembly. As a result, the chain flight should be **free to rock approximately 30° total**. For

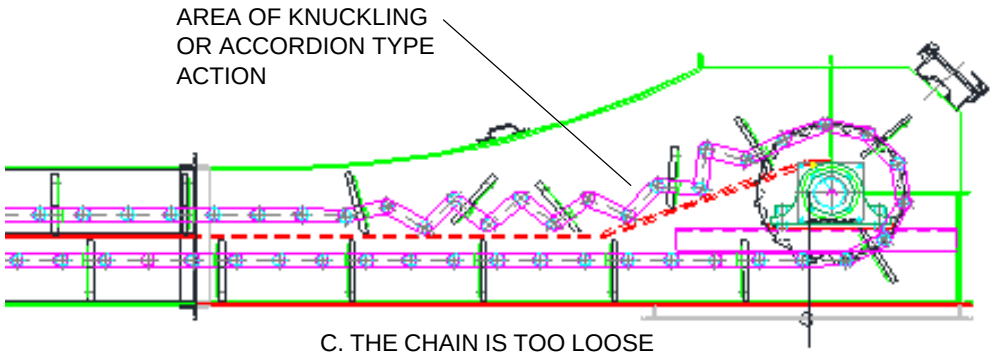
example, a 50’ long conveyor will have a shortened area of knuckling or accordion type action (approximately 2’ or less). However, a 300’ conveyor may see an area of knuckling or accordion type action of 10’ or more.



A. THE CHAIN IS TOO TIGHT



B. THE TENSION ON THE CHAIN IS IDEAL



C. THE CHAIN IS TOO LOOSE

NOTE: SHOWN AT THE HEAD OF THE BULK-FLO™

Figure 3.36

Note: *The chain tension conditions shown in the figures above are representative. The 30° maximum flight rock applies to all models of En Masse Chain Conveyors. There are many different locations, based on the layout of the conveyor, where the chain tension can be inspected.*

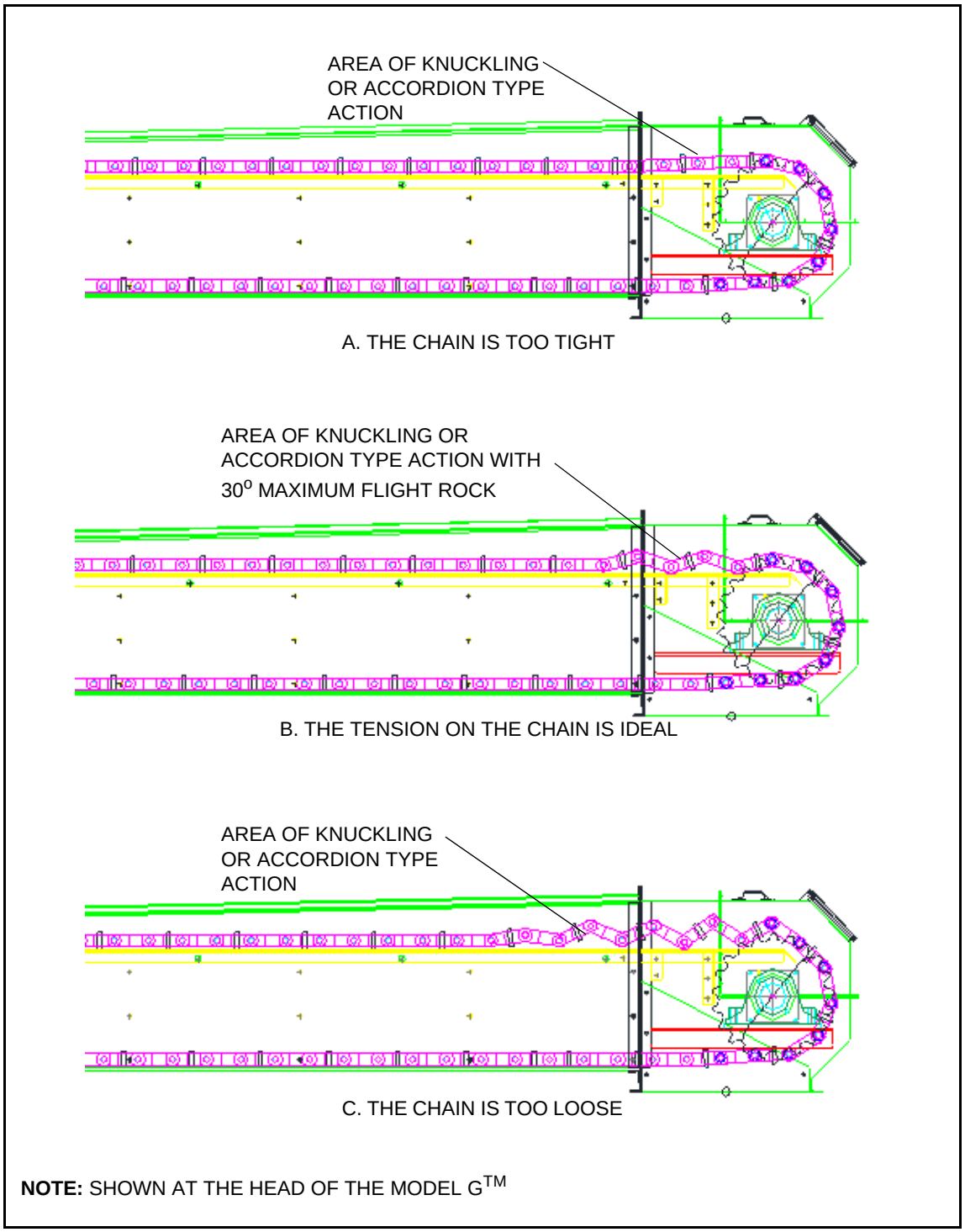


Figure 3.37

Note: *The chain tension conditions shown in the figures above are representative. The 30° maximum flight rock applies to all models of En Masse Chain Conveyors. There are many different locations, based on the layout of the conveyor, where the chain tension can be inspected.*

3.6. TROUGH COVER

1. Install trough covers in the proper sequence, refer to general arrangement drawing for proper cover installation locations. Handle covers with reasonable care to avoid warping or bending.
2. Ensure covers are centered on intermediate sections. Cover should not extend past the intermediate sections. Covers should be securely fastened with supplied hardware.

3.7. MOTOR MOUNT, SPEED REDUCER AND DRIVE GUARD INSTALLATIONS

Install drive at the proper location in accordance with the general arrangements drawing provided by Tramco and following the drive manufacturers instructions.

3.8. CHECK CONVEYOR ROTATION

1. Rotate conveyor manually to ensure that no binding occurs.
2. Check for proper direction of chain and flight travel after electrical connections have been made and before attempting to handle material.
3. If necessary, after lockout/ tagout, reconnect electrical leads to reverse direction of material flow. Material should be pushed by the flight and attachment.

3.9. OTHER COMPONENTS INSTALLATION

1. Attach all gates, feed chute, discharge chute, etc., and connect all safety devices and controls according to the assembly drawing of your conveyor. Carefully test each to ensure proper operation.
2. Refer to general arrangements drawing for specific location for each gate.

3.10. COMPONENT INFORMATION

3.10.1. DRIVE

INSTALLATION

Depending on the type and size of the drive, and the customer order, it may be necessary to site fabricate a support/ torque absorption point from a suitable structure. Fit the drive per the instructions in the ***drive manufacturer's manual***.

REPLACEMENT

Refer to the ***drive manufacturer's manual***. Consult contract drawings for specific drive details used on the conveyor. Note the weight for lifting purposes. Follow the Lockout/Tagout procedures in this manual.

3.10.2. BEARINGS

INSTALLATION

Install the bearings per the instructions in the ***bearing manufacturer's manual***.

REPLACEMENT

Refer to the ***bearing manufacturer's manual*** for replacement recommendations for bearings operating at low speed. Consult contract drawings for specific bearing details used on the conveyor.

Note: If the conveyor is a Vapor Tight model, the tail section will have phosphor bronze bushings in the steel housing in lieu of bearings. Use the following procedure to remove and/or replace the bushings.

1. Remove tail covers.
2. Disconnect the conveyor chain.
3. Remove both chain adjustment studs.
4. Push the tail shaft to one side of the tail. The opposite side bushing can now be removed.
5. Slide the bushing housing to the gap in the guide bars and remove.
6. Remove slotted locking screw.
7. Release locking ring from the bushing housing by drifting in an anti-clockwise direction with a hammer and suitable bar.
8. Completely remove locking ring.
9. The bushing can now be pressed from the bearing housing.

Note: *Tramco, Inc. recommends that bearings (or bushings) and seals be replaced every 2 years, or have vibration and/or temperature monitoring (done by others) carried out to ensure continued safe operation.*

3.10.3. SEALS

INSTALLATION

Refer to the appropriate section of this manual for an exploded isometric view of the head and tail seals. Install the Rino seals as shown in this manual. Refer to bolt suppliers for **bolt torque specifications**.

REPLACEMENT

The head section and tail section Rino seals can be replaced by sliding the inner and outer rings along the shaft, prying out the rope seal, and fitting a new rope seal.

Note: *Tramco, Inc. recommends that bearings (or bushings) and seals be replaced every 2 years, or have vibration and/or temperature monitoring (done by others) carried out to ensure continued safe operation.*

Important: *All manufacturer's manuals, product information, and data sheets will be shipped with each conveyor. It is the responsibility of the contractor, installer, owner, and user to read and follow the manufacturer's installation instructions and maintenance recommendations.*

4. Operation

WARNING *Before continuing, ensure you have read and understand the relevant information in the safety section. Safety information is provided to help prevent serious injury, death, or property damage.*

Important: *Do not operate chain conveyor unless the housing completely encloses the moving elements and power transmission guards are in place.*

4.1. PRE-OPERATION/CHECKLIST

Before operating the chain conveyor check to ensure:

1. Lubricate all bearings and drives.
2. Check the interior of the chain conveyor to ensure all tools, foreign materials, and other obstructions have been removed.
3. Check that all hardware is secure.
4. Check all set screws on pulleys, bearings, sprockets, sheaves, gear reducers, etc. Although some set screws may have been installed at the factory, shipment, handling, and installation could have loosened them. We cannot be responsible for damage caused by loose set screws.
5. Check that the head shaft is level.
6. Check for proper rotation of motor and gear reducer.
7. Adjust take-up screws so that there is no slack in the chain and so that the tail shaft is level.
8. Lubricate all bearings and drives according to service instructions. Bearings and gear reducers are normally shipped without lubricant. Refer to bearing and gear reducer manufacturer’s service instructions for recommended lubricant.
9. Install all covers, guards, safety devices or controls, and any interlock to other equipment and ensure they are operating properly.

4.2. START UP

Operate the empty conveyor for several hours as a break-in period. Look for bearing heat, unusual noises, or drive misalignment. Should any of these occur, check the following and take corrective steps.

1. When anti-friction bearings are used, check for proper lubrication. Insufficient or excessive lubricant will cause high operating temperatures.

NOTICE

Loose chains and misalignments of trough and sprockets can require excessive maintenance and cause poor life expectancy.

2. Check assembly and mounting bolts and set screws; tighten if necessary.

Important: *After running the conveyor, stop it, lock out all power, and check discharge to ensure it is clear and material flow through the discharge will not be impeded in any way.*

3. Restart the conveyor and gradually feed material. Gradually increase feed rate until the design capacity is reached.

Important: *Do not overload conveyor. Do not exceed conveyor speed, capacity, material density, or rate of flow for which the conveyor and drive were designed.*

4. Cut off feed and allow the conveyor to empty. Lock out power supply. Check all bolts and all alignments. Re-align as necessary, tighten all bolts, and check chain adjustment.
5. Check motor amperage frequently.
6. Check chain tension periodically. It may be necessary to re-adjust chain tension after running material in the conveyor.

4.3. GENERAL OPERATION

1. Run the conveyor empty for a few minutes periodically to check for excessive vibration, loose fasteners, security of covers and guards, noise, and bearing and drive temperature.
2. Always operate the conveyor with covers, guards, and safety labels in place.
3. Always practice good housekeeping and keep a clear view of the conveyor loading, discharges, and all safety devices.
4. If the conveyor won't be operated for a prolonged period of time, operate until cleared of all material. This is particularly important when the material conveyed tends to harden, becomes more viscous or sticky, or spoils if allowed to stand for a long period of time.

DANGER	
	**Rotating parts hazard!** To avoid serious injury or death, keep body, hair, and clothing away from rotating pulleys, belts, chains, and sprockets. Keep all guards in place and in good working order. Lockout/ Tagout power before removing guard.

4.4. SHUTDOWN/STORAGE

If the conveyor will be shutdown for more than one month, perform the following:

1. Remove all foreign material from the conveyor and check that the surface coatings are in good order.
2. Lubricate and protect all bearings and drives according to the manufacturer's instructions.
3. Rotate the gear reducer periodically according to the manufacturer's instructions.

4. Protect the conveyor from weather, moisture, and extreme temperatures as required. Do not use plastic or other coverings that promote condensation under the covering.
5. Coat all exposed metal surfaces with rust preventative oil. Follow all the manufacturer's instructions that come with the rust preventative oil.
6. Prior to a subsequent start-up, perform the installation and operation instructions in this manual.

5. Maintenance

Proper maintenance habits on the conveyor mean a longer life, better efficiency, and safer operation. Please follow the guidelines below.

WARNING	
	Before performing any internal inspections or maintenance, ensure that a mechanical lockout/ tagout is in place on the motor starter.

Establish routine periodic inspections of the entire conveyor to help provide continuous maximum operating performance.

5.1. TO REPLACE OR SHORTEN A CONVEYOR CHAIN SECTION

1. Lockout power.
2. Locate the cotter pin section of the chain and rotate the chain until it is on the top.
3. Loosen the take-up fully, remove the cotter pin, and remove the desired length.
4. To reassemble, follow the above steps in reverse order.
5. Replacement parts can be identified from a copy of the original packing list, invoice, or drawing.

5.2. PERIODIC INSPECTION

Trough	Check for wear and alignment.
	Tighten all bolts to **manufacturer's torque specifications**.
Shafts	Check for wear.
Flights	Check for wear or damage.
Nuts & Bolts	Check for wear and tightness.
Seals	Check for leakage, adjustment, and wear.
Bearings	Check for lubrication and noise.
Sprockets	Check for wear and alignment.
Chain	Check for worn pins and damaged side bars
Take-up	Check chain tension, (If take-up is fully adjusted, a link chain will need to be removed).
Gear Reducer(s)	Check for oil level and noise.
Chain Drive	Check chain tension and adjust as required.
Guards	Check for oil level (if applicable). Check nuts and bolts for tightness.
Motors	Check amperage frequently. Verify it is within operating parameters.

5.3. CHAIN AND FLIGHTS

5.3.1. EXAMINATION FOR WEAR

Periodically, the chain should be examined for wear. The period between examinations may vary based on the power used, abrasiveness of material, shape of the conveyor, planned maintenance stops, etc. At a minimum, the chain should be checked twice a year. In practice, maintenance records provide the best indication of chain deterioration, It's normal for chain and flights to '**bed in**' during the first month or so of constant running. Measuring, comparing, and recording the pin wear regularly is likely to show that the chain wear remains relatively stable after the chain has '**bedded in**'. If that's not the case, examine the pin to see if corrosion or abrasion is the main problem. Once the problem is determined, call Tramco, Inc. about the results.

With good Maintenance Records, it's easier to predict when to replace the chain in any particular conveyor.

5.3.2. REPLACEMENT

Here is a list of some indications that a chain is nearing its replacement point.

- If possible, remove a conveyor cover, measure the distance between pin centers over 20 links. Compare the length of 20 chain pitches with the measured length. If the chain has worn +5%, it should be changed.

- Remove a pin from the chain and examine the outside diameter. Normal bedding in will occur and is not a problem unless the pin has a significant step. Measure and record the pin diameter on the Maintenance Record.
- Examine the flights. If the UHMW (if used) has worn down to the supporting metal, the flights must be changed. If there are cracks in the flights, they must be changed.
- Remove the accessible old flights, replace with new flights. Clear all tools etc.from inside the conveyor. **Note:** If the conveyor flights have stainless steel locknuts fitted, they must be replaced.
- Examine the welds - attachment bar to link side bar. If cracks are evident, the chain link must be changed.

5.4. SPROCKETS

5.4.1. EXAMINATION FOR WEAR

Periodically, examine the sprockets for signs of wear. Normal bedding in will occur and is not a problem until the driving face flank of the tooth begins to wear into a ‘hook’ shape. A worn sprocket will cause premature chain wear through bad contact and a rubbing action on the chain barrels and should be replaced. In extreme cases, the hook will drive the chain down past its normal release point causing damage to the Carry-Backs, Intermediate plate or causing the chain to wrap around the sprocket and break.

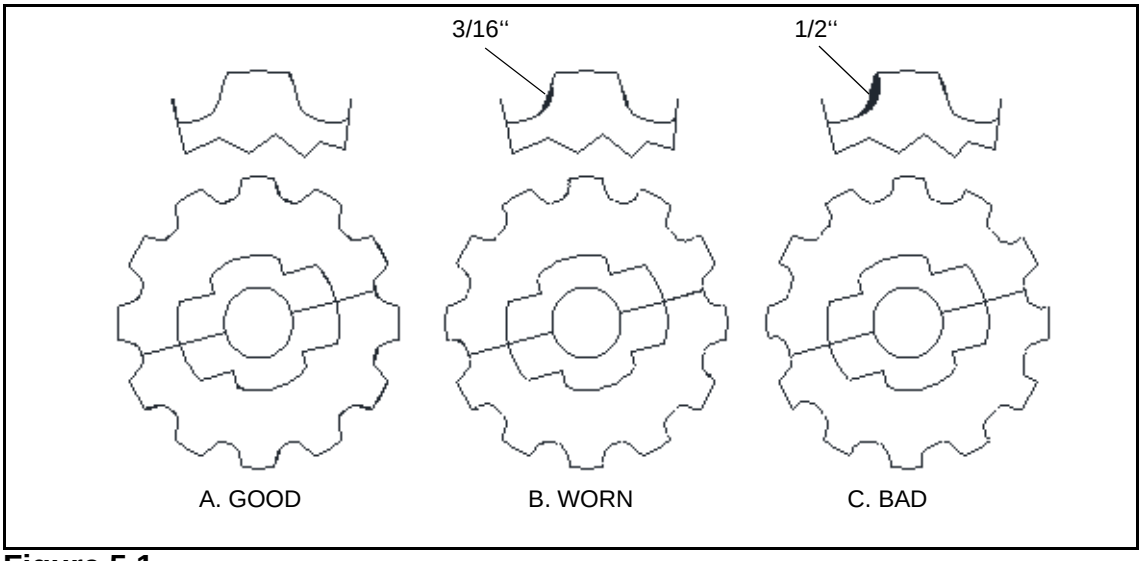


Figure 5.1

The figures above represent the wear conditions of the sprockets. After the sprocket is worn or hooked from 3/16” to 1/4" (As shown in Figure 5.1 A and B), it is very important to replace the sprockets in order to avoid irreversible harm to the barrel of the chain. If the wear condition of the sprocket meets or exceeds the condition shown in Figure 5.1 C, not only do the sprockets need to be replaced, but further examination of the individual chain components is required. Tramco, Inc. sprockets are split for easy removal.

Note: *Larger sprockets can come with lifting points for easy handling. This option must be requested by the customer at the time the order is placed.*

5.4.2. REPLACEMENT

- Remove the head or tail access covers.
- Split the chain. **See “Chain Installation” on page 40. and “Operational & Maintenance Safety” on page 9.**
- In the case of inclined conveyors, support both halves of the sprocket so they cannot fall into the conveyor.
- Remove fasteners and sprocket halves. Retain the shaft drive key. Clean up the shaft.
- Loose fit the two halves of the new sprocket onto the shaft using new fasteners coated with ‘Studlock VC302’ or equivalent.
- Position the Sprocket in the center of the head casing and fully tighten the fasteners. Check that the sprocket is on the conveyor centerline.

6. Troubleshooting

In the following section, we have listed some causes and solutions to some of the problems you may encounter in the field.

If you encounter a problem that is difficult to solve, even after having read through this troubleshooting section, please contact your local dealer or distributor. Before you contact them, please have this operation manual and the serial number from your machine ready.

WARNING

Fully disengage and lock out the power source before attempting any modifications or repairs.

PROBLEM	CAUSE	SOLUTION
Premature Trough Failure	Gauge too thin	Increase thickness. Consult Tramco, Inc. for recommendations
	Worn flights	Replace flights
	Excessive chain speed	Check chain speed
Accelerated Flight Wear	Excessive heat	Change flight material. UHMW is limited to 175° F
	Speed too high	Reduce speed. Consult Tramco, Inc. to determine proper chain speed.
	Foreign objects	Remove foreign objects
Chain Breakage	Worn chain	Replace chain if worn
	Take-up is loose	Adjust take-up
	Obstruction in conveyor	Remove obstruction
	Sprocket misalignment	Align sprockets
	Plugged discharge	Remove material from discharge
	Overloading conveyor	Regulate feed into conveyor
Drive Shaft Breakage	Excessive torque	Recalculate horsepower requirements
	Insufficient torque capacity	Increase shaft diameter
		Change shaft material
	Obstruction in conveyor	Remove obstruction
	Overloading conveyor	Regulate feed into conveyor
Bearing Failure	Material getting into bearing	Add or upgrade seal to keep material out of bearing
		Change outboard bearing
	Insufficient/Excessive lubrication	Lubricate properly

PROBLEM	CAUSE	SOLUTION
Motor/Heaters overload	Amp demand too excessive for motor Incorrect motor size	Recheck horsepower calculations
		Check material characteristics
		Check capacity
		Regulate feed
Drastic capacity loss	Missing flights	Replace flights

TERMS AND CONDITIONS OF SALE

LIMITED WARRANTY AND TERMS OF SALE WARRANTY:

TRAMCO, INC. products are sold with a warranty against defects in material and workmanship for a period of one year from the date of their delivery to the purchaser or their delivery to the carrier in the case of F.O.B. Shipments. TRAMCO, INC.'s warranty shall be limited at TRAMCO, INC.'s option to repair or replacement of any defective parts or components. Such repair or replacement shall be the purchaser's exclusive remedy hereunder and correction of defects shall constitute complete fulfillment of all obligations and liabilities of TRAMCO, INC. with respect to the product sold hereunder, whether based in contract, tort, or otherwise. The determination of a defective condition shall be made by TRAMCO, INC. in its sole discretion.

LIMITATION OF LIABILITY:

TRAMCO, INC. shall not be liable, in contract, tort, or otherwise, for any special indirect, incidental, or consequential damages, such as, but not limited to, loss of profits, loss of production, or for injury or damage, caused by reason of the installation, modification, use, repair, maintenance, or mechanical failure of any TRAMCO, INC. product. TRAMCO, INC.'s warranties hereunder extend only to the direct customer of TRAMCO, INC. TRAMCO, INC. makes no warranties of any kind with respect to improperly installed product or equipment unless the direct customer of TRAMCO, INC. (or first user, as the case may be) first fully discloses in writing to TRAMCO, INC. the method and details of the proposed installation and the intended use of the product or equipment and TRAMCO, INC. approves in writing of such method and details. TRAMCO, INC. makes no warranties when damage results from the failure to follow instructions in the manual or in safety labels attached to the TRAMCO, INC. system. The purchaser or user of any TRAMCO, INC. equipment shall be responsible for all ordinary maintenance, adjustments, and cleaning of the product. In the event that the TRAMCO, INC. product is not properly maintained, all warranties by TRAMCO, INC. are null and void. Certain of the component parts of the TRAMCO, INC. product are purchased from other vendors. TRAMCO, INC. warrants these component parts only to the extent of the vendor's warranties. TRAMCO, INC. shall repair or replace such component parts in accordance with the vendor's warranty policy only if TRAMCO, INC., in its sole discretion, determines such component parts to be defective.

LOSS, DAMAGE OR DELAY:

TRAMCO, INC. shall not be liable for any loss, damage, detention or delay resulting from any cause beyond its reasonable control, including, but not limited to, fire, strike or other concerted action of workmen, act or omission of any governmental authority or of the purchaser, insurrection, riot, embargo, transportation, shortage, delay or wreck, or inability to obtain labor or material from usual and customary sources.

WARRANTY DISCLAIMER:

TRAMCO, INC. MAKES NO WARRANTIES OTHER THAN THOSE STATED HEREIN, AND THESE WARRANTIES ARE EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING BY WAY OF EXAMPLE AND NOT BY WAY OF LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALSO IN LIEU OF ANY OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF TRAMCO, INC..

MODIFICATIONS:

The prices and terms of this offer are not subject to verbal changes or other agreements unless approved in writing by an authorized representative of TRAMCO, INC. management. No representation or warranty, express or implied, made by any sales representative or any agent or employee of TRAMCO, INC. which is not specifically set forth herein shall be binding on TRAMCO, INC. unless approved in writing by an authorized representative.

TAXES:

Unless otherwise noted, the price does not include any state or local property, sales, use, or privilege tax or license. If any such charge should be enforced by virtue of the transaction described herein, the purchaser agrees to pay the same or reimburse TRAMCO, INC., as the case may be.

LOSS OR DAMAGE IN TRANSIT:

Any claim for loss or damage to products in transit must be entered and prosecuted by the purchaser.

RISK OF LOSS:

Delivery shall occur and the risk of loss shall pass to the purchaser upon delivery of the material to the carrier at the point of shipment. Any claim of loss or damage in transit shall be against the carrier only.

GENERAL PROVISION:

The failure of TRAMCO, INC. to enforce any right will not be construed as a waiver of TRAMCO, INC.'s rights to performance in the future. The purchaser may not assign any rights or delegate any performance owed under this agreement without the express written consent of TRAMCO, INC. management.

CLAIM/NOTICE OF DEFECTS:

In the event the purchaser claims that a TRAMCO, INC. product is damaged upon receipt, TRAMCO, INC. shall be given an equal opportunity for inspection, or, upon request, shall be furnished a sample of such product. The purchaser shall set aside, protect and hold such products without further processing until TRAMCO, INC. has an opportunity to inspect and advise the purchaser as to the disposition, if any, to be made of such products. In no event shall any TRAMCO, INC. product be returned, re-worked, or scrapped by the purchaser without the express written authorization of TRAMCO, INC.

PATENT RIGHTS:

The purchaser agrees not to violate or infringe the patent rights relating to any TRAMCO, INC. product or any other patent rights under the control of TRAMCO, INC. or under which TRAMCO, INC. has the right to manufacture or sell. The purchaser also agrees not to contest TRAMCO, INC.'s title to any and all such patent rights, nor the validity or scope thereof. The purchaser assumes liability for patent or copyright infringement when goods or products are made to the purchaser's specifications.

NON-INCORPORATION:

Any terms inconsistent with those stated herein which may appear in the purchaser's formal order or in any proposal for additional or different terms, or any attempts by the purchaser to vary in any degree any of the terms of this offer, are hereby objected to and rejected, but such proposal shall not operate as a rejection of this offer unless such variances in the terms and the description, quantity, price or delivery schedule of the goods or products are deemed a material alteration thereof, in which event this offer shall be deemed accepted by the purchaser without said additional or different terms.

GOVERNING LAW:

All disputes arising out of this offer and purchase order shall be governed by the laws of the State of Kansas.

JURISDICTION AND VENUE:

The purchaser consents to the personal jurisdiction of the federal and state courts in the State of Kansas, waives any argument that such a forum is not convenient, and agrees that any litigation relating to this offer and purchase order shall be venue in either the Circuit Court of Sedgwick County, Kansas, or the Federal District Court, District of Kansas.

SEVERABILITY:

If for any reason any one or more of the provisions contained in this offer are held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, and unenforceability shall not affect any other provision hereof and this offer shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

ATTORNEYS' FEES:

The purchaser agrees that in the event there is a dispute between the parties including, but not limited to, arbitration or litigation, that the purchaser shall pay to TRAMCO, INC. all costs involved in such dispute and all other out-of-pocket expenses, including in each case reasonable attorneys' fees and the court costs incurred by TRAMCO, INC. in such dispute.

ERRORS:

Typographical and stenographic errors contained in this offer are subject to correction by TRAMCO, INC. without liability.

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Printed in USA