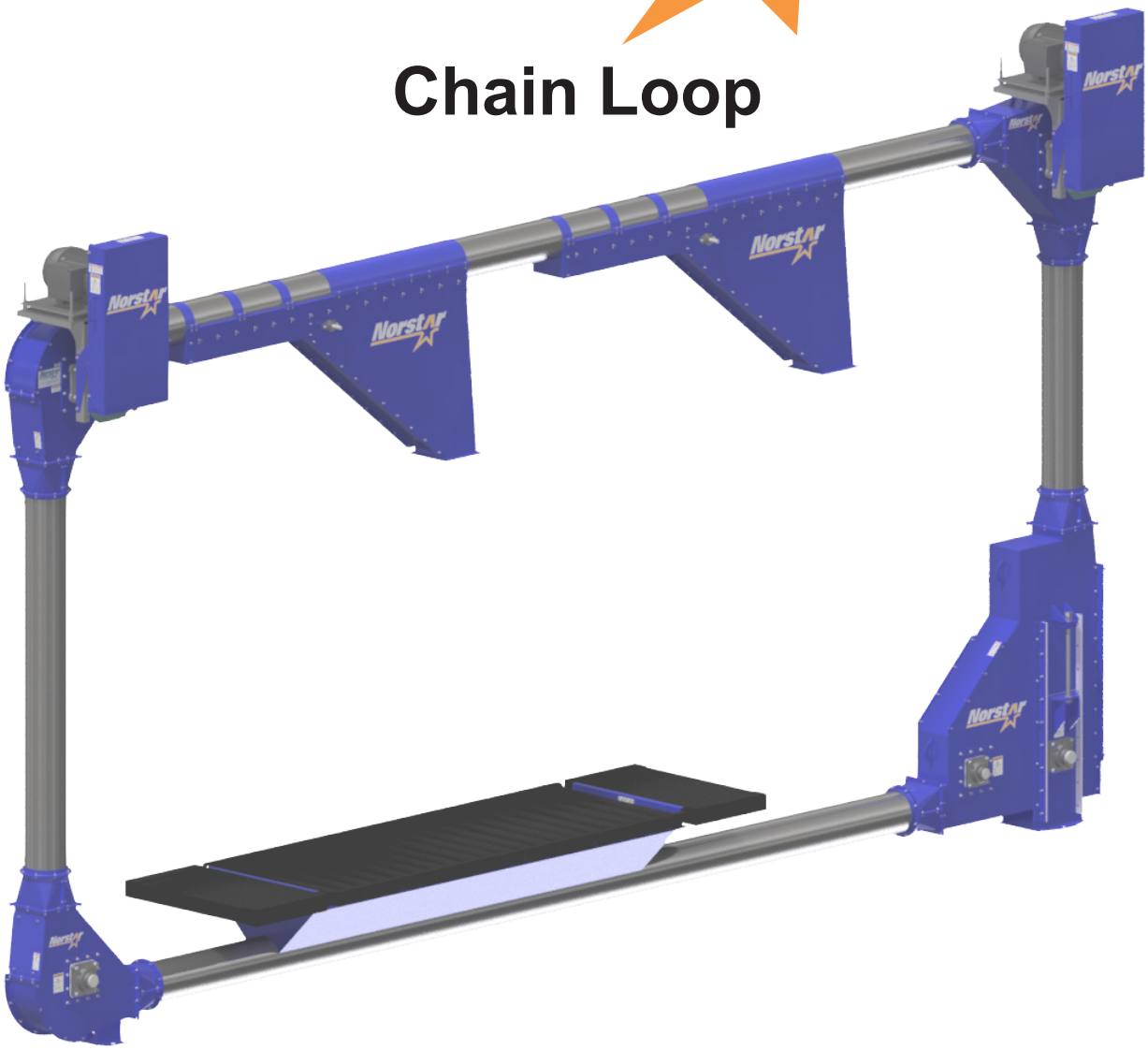
NorstAr INDUSTRIES

Chain Loop



Owner/Operator's Manual and Installation/Maintenance Guide

June 2021

MSD71948A

NORSTAR INDUSTRIES
LIMITED WARRANTY

Norstar Industries expressly warrants each new Chain Loop to be free from defects in material and workmanship under normal use and service for a period of one year after delivery to the original retail purchaser or first user of the product.

Norstar Industries Chain Loop are designed for free flowing materials and are not warranted for other distribution or substances. Other use will void the warranty.

Our obligation under this warranty is limited to repairing and/or replacing, at our option, any part or parts within the applicable one year period, as set out above, which shall be returned by the owner to any authorized dealer or to the factory and which upon examination shall prove to be defective. Labour costs associated with the replacement or repair of the Chain Loop is not covered by the Manufacturer.

We may, as an option, elect to grant adjustments in the field through an authorized representative and may thereby elect to waive the requirement that parts be returned to our factory.

A new warranty period is not established for replacements. Replacements are warranted for the remaining portion of the one-year original warranty period.

The provisions of this warranty do not apply to any product or parts, which have been subject to misuse, negligence or accident, or which have been repaired or altered outside of the manufacturer. Neither does this warranty apply to normal maintenance service and parts, or to normal deterioration due to wear and exposure.

The Manufacturer shall not be liable for any consequential or special damage which any purchaser may suffer or claim to suffer as a result of any defect in the product. “Consequential” or “special damages” as used herein include, but are not limited to, lost or damaged products or goods, costs of transportation, lost sales, lost orders, lost income, increased overhead, labour and incidental costs and operational inefficiencies.

The foregoing is in lieu of all other warranties, expressed or implied, including any warranty of merchantability is expressly excluded.

WARRANTY VOID IF NOT REGISTERED
WITHIN 30 DAYS OF PURCHASE DATE

NORSTAR INDUSTRIES LTD.
PO Box 119 RR1 • Morris, Manitoba R0G 1K0 • Canada
Toll Free: (855) 746-8200 • Phone: (204) 746-8200 • Fax: (204) 746-8074
e-mail: info@norstarindustries.ca • Internet: http://www.norstarindustries.ca

Support Information

Norstar Industries products are designed for **free flowing** materials. **Using this equipment for any other purpose or in a way not within the operating recommendations specified in this Manual will void the Warranty and may cause injury or death.** This Manual is designed to provide comprehensive planning and construction information for the Norstar Industries product. The Table of Contents provides a convenient overview of the information in this Manual.

Please keep this Manual in a clean, dry place for future reference.

NORSTAR INDUSTRIES
CHAIN LOOP

WARRANTY REGISTRATION FORM & INSPECTION REPORT

WARRANTY REGISTRATION

This form must be filled out by the dealer and signed by, both, the dealer and the customer at the time of delivery.

Customer's Name_____ Dealer's Name_____

Address_____ Address_____

City, Prov/State, Code_____ City, Prov/State, Code_____

_____ _____

Phone Number (_____) _____

Chain Conveyor Model_____

Delivery Date_____

DEALER INSPECTION REPORT

- ☐ All Sections/Fasteners Tightened
- ☐ Oil in Gearbox(s)
- ☐ Lubricate Machine
- ☐ Belts Tight and Secure

SAFETY REPORT

- ☐ Belt Guard Installed
- ☐ All Decals Installed
- ☐ Review Operating and Safety Instructions

Form must be completed with dealer inspection and signature as well as owner's signature. By not completing the form, you may be voiding the warranty.

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date_____ Dealer's Rep. Signature_____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date_____ Owner's Signature_____

Table of Contents

Introduction

Congratulations on your purchase of a Norstar Industries Chain Loop to complement your grain handling and storage system. This equipment has been designed and manufactured to meet the needs of the farm and commercial users for the efficient handling of material.

Safe, efficient and trouble free operation of your Chain Loop requires that you and anyone else who will be operating or maintaining the Chain Loop, read and understand the Safety, Operation, Maintenance and Troubleshooting information contained within the Operator's Manual.

This manual covers the Chain Loop distributed by Norstar Industries. Use the Table of Contents to find specific information.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Norstar dealer or distributor if you need assistance, information or additional copies of the manual.

OPERATOR ORIENTATION - The directions left and right, as mentioned throughout the manual, are as seen when standing facing the Chain Loop on the Up-Tube side.

About This Manual and Your Shipment

The purpose of this manual is to help in the following areas regarding your Norstar Industries Chain Loop.

- Instructions for safe installation, operation and maintenance
- Step-by-step installation procedures
- Easy reference if you have questions in a particular area
- Parts identification

It is important to read all instructions in this Manual, carefully,* BEFORE *starting the installation. Particularly, pay attention to all safety information on pages 10-19 of this Manual

Unsafe practices could result in equipment damage and serious injury or death. Failure to read this Manual is considered a misuse of the equipment.

Warranty information is included on the inside front cover of this Manual.

Definition of Terms and Pictures

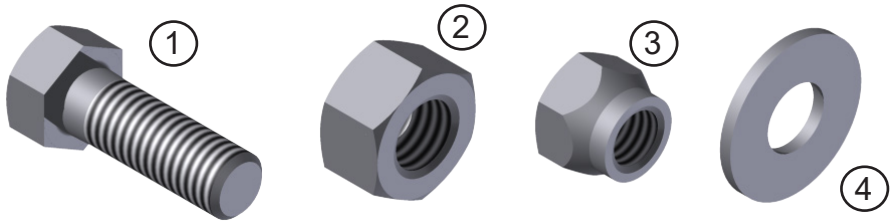
- "Front," "rear/back," and "top" refer to the Chain Loop as it is standing.
- The directions left and right, as mentioned throughout the manual, are as seen when standing facing the Chain Loop on the Up-Tube side.
- Names of components and parts have been capitalized throughout the Manual (i.e. Paddle, 1/2" Nylon Locknut) to call attention to them in the installation.
- Some Guards have been removed from the pictures for illustrative purposes only. Figures/Illustrations may vary slightly from actual models.
- An asterisk (*) and arrow/line may be used in an image to reference a particular hole or position mentioned in the accompanying text.

Identification of Parts and Hardware

IMPORTANT! ***No hardware substitutions are permitted unless noted.***

Diagrams are provided throughout the Manual to identify Parts and Hardware used in that application. Parts and basic components are identified in Figures and their accompanying Tables as "Items" with a black number in a white circle. A Description field will accompany the item number to aid in identifying a component. When necessary, quantities of items may be listed in the instructions. When this occurs, quantity will be listed as a word followed by a bracketed letter or number (i.e. A, B, two (2), three (3)).

IMPORTANT! ***ALL NUTS & BOLTS USED ARE GRADE 5 UNLESS OTHERWISE STATED!***



Item	Description
1	1/2" x 1 1/2" Bolt
2	5/8" Hex Nut
3	1/2" Nylon Locknut
4	1/2" Flatwasher

Figure 1
Hardware Identification

Measurements

The symbol (") equals inches and (') equals feet in English measurements. Metric measurements, in millimeters, may be shown in italics and square brackets following.
For example: 15' *[4 572]* 90' *[27 542]*
Metric equivalents are not always repeated throughout the Manual.

Inspect Your Chain Conveyor Shipment

Be sure to check all components and assemblies to your packing slip, ensuring that all components are present. Any discrepancies should be taken care of immediately. If any components are missing or damaged in transit, a claim should be filed or the issue reported to the carrier as soon as possible. Norstar Industries' responsibility for damaged equipment ends with your acceptance of the delivery. It is recommended to save all paperwork and documentation with any of the Chain Loop components.

Your Chain Loop shipment should include assemblies in **Figure 2**:

1. Drive Corner(s)
2. Standard Corner(s)
3. Inspection Corner
4. Inlet Section *(if required)*
5. Grating and Inlet Cover *(if required)*
6. Discharge Gate *(if required)*
7. Chain *(may come in more than one box)*
8. Parts Box *(may come in more than one box)*
9. Tube Sections
10. Additional Accessories *(optional, may come in more than one box)*

***IMPORTANT! The Serial Number Sticker is located on a the Gearbox Side of the Drive Section Unit may have multiple Serial Number Stickers if there is more than one Drive. See* Figure 3.**

Figure 2
Shipment Parts Identification

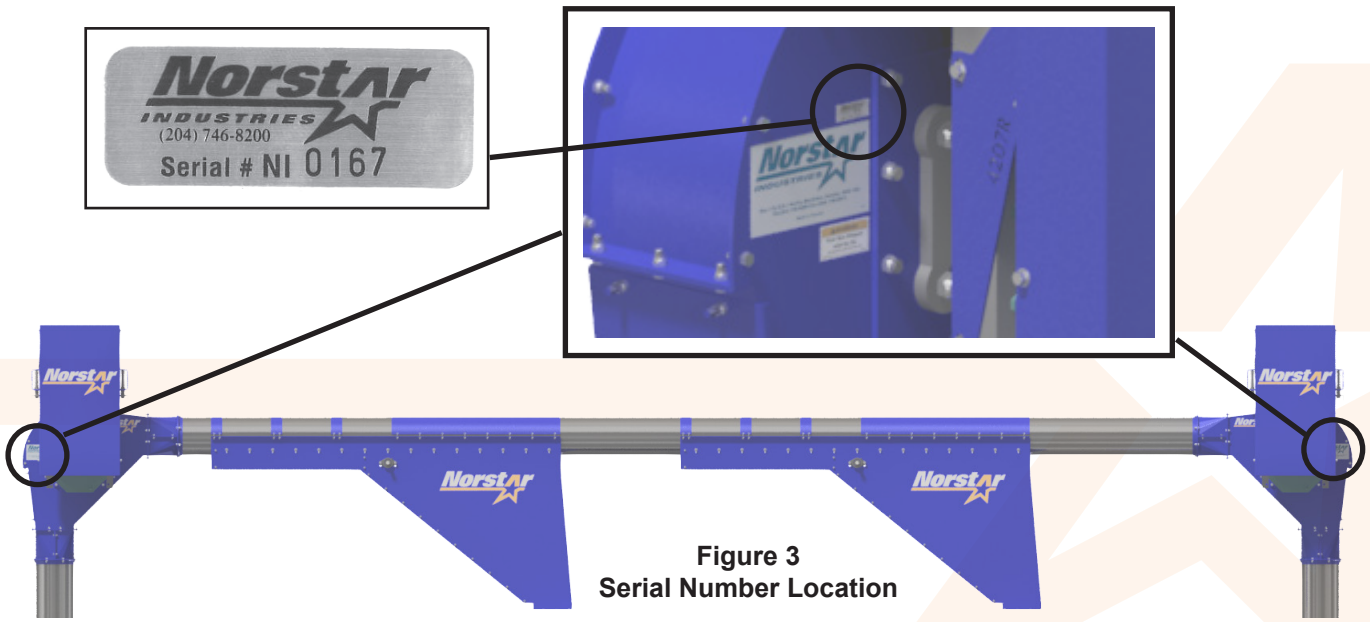


Figure 3
Serial Number Location

Tools and Equipment Needed for Installation

- Safety Glasses
- Steel-toe safety shoes
- Gloves
- Hard Hat
- Forklift truck (to lift components)
- Crane/Hoist (to lift/raise components)
- Floor Jack
- Wrench Set
- Ratchet Set
- Air Ratchet
- Impact Wrench
- Deepwell Sockets
- Shallow-well Sockets
- Punch

CAUTION! ***Inventory all tools and pieces of hardware near the Construction Site during installation or servicing. Tools lost in the Chain Loop may cause damage or injury at a later time. Use the proper tools to prevent injury.***

Safety

Recognize SAFETY Information

This is the Safety-Alert Symbol. When you see this symbol on your equipment or in this Manual, be alert to the potential for personal injury.

Signal words **DANGER**, **WARNING**, or **CAUTION**, are used with the Safety-Alert Symbol.

Be sure to follow **all** National and Local SAFETY Standards governing each installation site.

This is the Attention-Alert Symbol. When you see this symbol in this Manual, be alert to information that could be pertinent to the Safety of personnel or the Operation of the Equipment.

Signal words **IMPORTANT** or **ATTENTION** are used with the Attention-Alert Symbol.

Be sure to follow all notices during the installation and operation of your equipment.

Understand Signal Words

DANGER indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

CAUTION indicates a general hazardous situation which, if not avoided, **MAY** result in minor or moderate injury.

ATTENTION or **IMPORTANT** indicates vital information or instructions, highly recommended and/or pertinent, for the safe installation or operation of your equipment.

ATTENTION! Work Site Contractor, Installer, Owners, Operators: Read and Follow This Manual - Especially This SAFETY Section!

Do* NOT *operate this equipment before reading and understanding this Operations Manual. For operation, maintenance and servicing of your Chain Loop, read and understand this Manual. Untrained operators subject themselves and others to serious risks. Read and follow all precautions and recommended* SAFETY *practices. Failure to read this Manual by owners, operators and supervisors is a misuse of the equipment and could result in death, serious injury, and/or equipment damage.

Read this Manual carefully before servicing or repairing! This Manual is supplementary to any law or code covering fire or health regulations.

It is the **responsibility** of the Contractors, Installers, Operators, Owners and Supervisors to:

- **Read** this Manual, SAFETY Instructions, and SAFETY Decals herein
- **Know** proper operating precautions, practices and requirements to comply with all federal, state/provincial and local laws and ordinances and applicable safety codes
- **Make the above known** to all who may work with the equipment or be in the working area.

Keep this Manual in a safe, dry place where the Chain Loop Operator can easily obtain it. Contact your Norstar Industries Dealer or Norstar Industries to replace this Manual should it become lost or damaged.

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Safety

Introduction to Safety

YOU are responsible for the **SAFE** operation and maintenance of your Norstar Industries Chain Loop. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Chain Loop be familiar with the operation and maintenance procedures and related **SAFETY** information contained in this Manual. This Manual will take you step-by-step through your working day and alert you to good safety practices that should be adhered to while operating the Chain Loop.

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. Be certain that **EVERYONE** operating this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Chain Loop owners must give operating instructions to operators or employees before allowing them to operate the machine, and at least annually thereafter per OSHA (Occupational Safety and Health Administration) regulation 1928.57.
- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the Manual and to follow them. All accidents can be avoided.
- A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety, could affect the life of the equipment, and will void the warranty.
- Think **SAFETY!** Work **SAFELY!**

General Safety

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, adjusting or unplugging the Chain Loop.
2. Only trained, competent persons shall operate the Chain Loop. An untrained operator is not qualified to operate the machine.
3. Wear appropriate protective gear. This list includes but is not limited to:


Hard Hat


Protective Eye-wear


Protective Foot-wear


Hearing Protection


Work/Heavy Gloves


Respirator or Filter Mask

4. Have a first-aid kit available for use should the need arise and know how to use it.
5. Do not allow children, spectators or bystanders within the hazard area of the machine.
6. Stop the motor, turn off all controls and wait for all moving parts to stop before servicing, adjusting, repairing, or unplugging the machine.
7. Establish a **Lock-out Tag-out** policy for the work site. Be sure all personnel are trained in and follow all procedures.
8. Review safety related items annually with all personnel who will be operating or maintaining the Conveyor.

Safety

9. Feed/Grain openings for shovel, front loaders or other manual/mechanical equipment should be covered by a grating. In the case that a grating cannot be used, the exposed section of the Chain Loop should be guarded by a railing or fence with a warning sign posted.
10. Do not place hands, feet, or any part of your body into the Chain Loop while it is running. Long hair should be tied back and loose clothing should not be worn in close proximity to any moving components on the Chain Loop.
11. Do not walk on Chain Loop covers or guards.
12. Do not poke or prod material in the Chain Loop with a bar or stick inserted through the openings.

Operation Safety

Refer also to the Operation section on **Page XX** of this Manual

Norstar Industries Chain Loops are built with your Safety in mind. However, accidents can happen with improper installation or use.

Anyone who will be operating or working around this equipment should be trained in the proper operational and safety procedures required. It is recommended to read and understand the Operator's Manual and all safety signs before using the equipment. Only Operators completely familiar with both the Chain Loop and this Manual and its Safety/Operational practices should be permitted to operate this Chain Loop. Always operate the Chain Loop in accordance with the instructions in this Manual and Chain Conveyor Safety Decals.

Always ensure that all covers and guards are in place and secured on the Chain Loop before operation.

WARNING! ***Do*** **NOT** ***attempt to clear a Chain Loop jam until power has been*** **LOCKED OUT.**

DANGER! ***If the Chain Loop is to be inspected, cleaned, serviced, adjusted or observed, all Chain Loop motors are to be*** **LOCKED OUT** ***electrically in such a way that they*** **CANNOT** ***be re-started by anyone remote from the area. If applicable, eliminate all sources of stored power to ensure that no components will move while being without main power.***

Never operate the Chain Loop if intoxicated or under the influence of alcohol or drugs.

Any worker who is tired and/or under pressure is more apt to have an accident. Give extra breaks and/or varied jobs to all workers. If necessary, delay operation of this equipment until the Operator is adequately rested.

Never start the Chain Loop until all persons are clear of the equipment.

Make certain a **qualified operator** is in attendance at all time while the Chain Loop is operating. Never leave the Chain Loop running unattended.

CAUTION! ***Under no circumstances should horseplay be permitted near the Chain Loop. Do not run around or climb on the Chain Loop. To do so may cause injury.***

Schedule and maintain a Safety training and operations program for all Chain Loop Operators. All Operators should perform periodic reviews of those procedures. Initially, and periodically thereafter, insist that all operating personnel review the Safety sections of this Manual.

Do not adjust, service, lubricate, clean, unclog or move this equipment while in operation.

The Norstar Industries Chain Loop is not manufactured or designed to handle materials that are hazardous. Hazardous materials are those that are explosive, flammable, toxic or otherwise dangerous to personnel if they are not completely and thoroughly contained in the Chain Loop. Do not overload the Chain Loop or use it for anything except its intended use. The Chain Loop is designed for free flowing, dry materials. Using the machine for any other purpose may break or damage the Chain Loop.

Chain Loop equipment shall be used to convey only the specified commodities or materials within the rated capacity and the rated speed. Where special use is not indicated, or ratings are not available, good industry practice shall be used.

WARNING! ***Using this equipment for any other purpose or in a way not within the operating recommendations specified in this Manual will avoid the Warranty and could cause injury or death.***

Safety

Maintenance Safety

DANGER! ***Use extreme CAUTION around electrical components. Always shut off, disconnect and LOCK OUT and TAG OUT all power before adjusting, servicing, cleaning, repairing or doing any maintenance on the Chain Loop. If applicable, eliminate all sources of stored power. Failure to follow these instructions will result in death or serious injury.***

Review the Operator's Manual and all safety items before working with, maintaining or operating the Conveyor.

Follow good shop practices. Keep the service area clean and dry. Be sure electrical outlets and tools are properly grounded. Use adequate light for the job at hand.

Visually inspect the Conveyor prior to operation. Correct any hazardous situation. Repair any faulty equipment.

Use suitable precautionary measures when repairing or replacing equipment parts to prevent injury.

Ensure that motors are operating at the proper speed.

Mount controls for any electric motor at a convenient place, at a safe distance from the machine. Make sure controls are readily accessible in the event of an emergency.

Schedule and keep a Maintenance Checklist to ensure optimum Chain Loop operation.

Before resuming work, install and secure all guards when maintenance work is completed.

IMPORTANT! ***Refer to the more detailed Maintenance section in Pages XX-XX of this Manual.***

Chain Loop Area Safety

Entrance to **enclosed areas** may expose persons to operational or environmental hazards and should only be entered by authorized personnel with proper safety equipment. Provide adequate fencing and security of restricted areas. Prohibit untrained personnel, visitors, and children from entering the Chain Loop area. Designate a **SAFETY Zone** for unauthorized personnel or visitors.

Keep children and other unqualified personnel out of the working area at **all times**.

Post signs, clearly, in areas where there are points of **access**.

Be sure the designated area is clear before turning power on to the Chain Loop.

Proper Wiring by Qualified Electricians

DANGER! ***All electrical wiring should be done by a* Qualified Electrician.**

Use extreme* Caution *around electrical components. Your Installer should have your electric company check the transformer and lead wires. Be sure the wires are an adequate gauge to carry the load of your Chain Loop's Motor, including starting and full load operating conditions. Failure to follow these instructions will result in death or serious injury.

Norstar Industries assumes no responsibility for the electrical wiring used with this Chain Loop. Norstar Industries will not be liable for failure of the Chain Loop because of improper electrical installation or use.

Motor overload protection, electrical disconnects and over-current protection are not supplied with the equipment.

IMPORTANT! ***In selecting Electrical Control Equipment to be used with any installation, the purchaser must use equipment conforming to applicable Local and National codes or regulations.***

A* LOCK-OUT/TAG-OUT DEVICE *must be installed on Control enclosures containing hazardous voltage. This should be done at the time of the Chain Loop installation to prevent the machine from starting during a Safety check, maintenance, etc.

All electrical equipment must be **grounded**.

Safety

Install Emergency Start and Shut-off Devices

All Safety devices, including wiring of electrical devices, shall be arranged to operate such that a power failure or failure of the device itself will not result in a hazardous condition.

An **emergency shut-off** switch with power **LOCK OUT / TAG OUT provisions** must be provided at the Chain Loop Head Corner(s) and Inspection Corner.

WARNING! ***To prevent a hazardous condition, the machine MUST be prevented from restarting on its own after a power failure when power returns. Failure to follow this instruction could cause death or serious injury.***

Chain Loop controls shall be so arranged that, in case of Emergency Stop, manual reset or start at the location where the Emergency Stop initiated shall be required for the Chain Loop and associated equipment to resume operation.

IMPORTANT! ***It is the responsibility of the Contractor, Installer, Owner and Operator to supplement the Chain Loop furnished by Norstar Industries with any necessary electrical or structural items to make the Chain Loop installation comply with Local and Federal codes, laws and ordinances.***

Disconnect electrical power, LOCK OUT and TAG OUT power, BEFORE inspecting or servicing the Chain Loop.

Components supplied for the system but not manufactured by Norstar Industries, and added as a part of the Chain Loop system, are not the responsibility of Norstar Industries.

Determine the cause of stoppage before restarting the Chain Loop. The starting device shall be LOCKED OUT and TAGGED OUT before any attempt is made to remove the cause of the stoppage, unless operation is necessary to determine the cause or to safely remove the stoppage.

To ensure positive performance and minimum maintenance, it is the Manufacturer's recommendation that this equipment be observed by an operator during the complete unloading operation.

Under no circumstances shall the safety characteristics of the Chain Loop be altered if such alterations would endanger personnel.

Routine inspections and corrective maintenance measures shall be conducted to ensure that all Guards and safety features are retained and function properly.

Personnel should be alerted to the potential hazard of entanglement in the Chain Loop cause by items such as long hair, loose clothing, and jewelry.

The Chain Loop shall not be maintained or serviced while in operation unless proper maintenance or service requires the Chain Loop to be in motion. In which case, personnel shall be made aware of the hazards and how the task may be safely accomplished.

Safety

Sign-off Form

Norstar Industries follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the Chain Loop must read and clearly understand ALL Safety, Operating and Maintenance information presented in this Manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of Safety and Operation a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

DATE	EMPLOYER'S SIGNATURE	EMPLOYEE'S SIGNATURE

Safety

Safety Decals

IMPORTANT! ***Along with your shipment will be*** **DANGER, WARNING** ***and*** **CAUTION** ***Decals which will be placed on the Chain Loop. Read and follow all Safety Decal information in this Manual. Confirm that all Safety Decals are in place and secure before operating the Chain Loop. To replace lost or missing Decals, contact your local dealer or Norstar Industries.***

Safety information has been provided by the Manufacturer to help ensure the safe and proper use of this product. This Safety information has been placed on components throughout the structure to provide proper access and instruction to the user.

Ensure that Safety Decals are clean and legible at all times. Replace damaged or missing Decals immediately.

The following Safety Decals are located on the Chain Loop as shown in the Manual drawings.

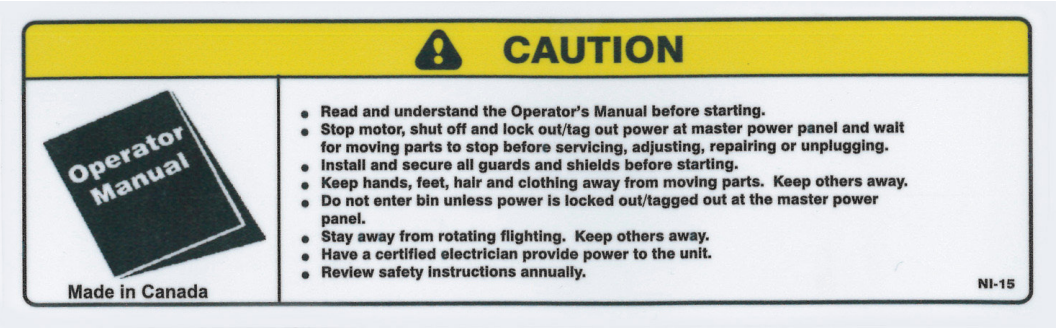


Figure 4
Operator's Manual Decal NI-15

Operator's Manual

The Operator's Manual Decal NI-15 in **Figure 4** is located on top of the Belt Guard(s). It states some information found within this Manual, but, otherwise recommends to read and understand the information and instructions within the Manual before operating the machine.

Electrocution Hazard

DANGER! ***Use extreme Caution around electrical components.*** **SHUT OFF, LOCK OUT** ***and*** **TAG OUT** ***electrical power*** **BEFORE** ***inspecting or servicing the Chain Loop. Failure to do so will result in death or serious injury.***

The Electrocution Hazard Decal NI-20 in **Figure 5** is located on the side of the Belt Guard(s). In addition, this decal should be placed at any and all locations where there is potential exposure to electric power for the Chain Loop.

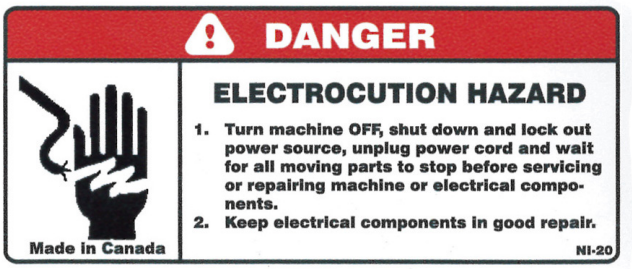


Figure 5
Electrocution Hazard Decal NI-20

Missing Guard Hazard

DANGER! ***Before starting or operating the machine, ensure that all guards or covers are in place and secure.***

The Missing Guard Hazard Decal NI-17 in **Figure 6** is located inside the Belt Guard(s). Operation of the Chain Loop with Guards off exposes parts that could cause severe personal injury. DO NOT operate the equipment without these Guards properly secured.

Figure 6
Missing Guard Hazard Decal NI-17

IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Safety

Moving Chain and Rotating Part Hazard

WARNING! ***DO NOT allow the Chain Loop to run while adjustments are being made. SHUT OFF, LOCK OUT and TAG OUT all electrical power BEFORE working on our near the Chain Loop. Keep hands, feet, hair and clothing away from chain and other moving parts. Failure to shut off, LOCK OUT and TAG OUT power to the Chain Loop could lead to personal injury or death.***

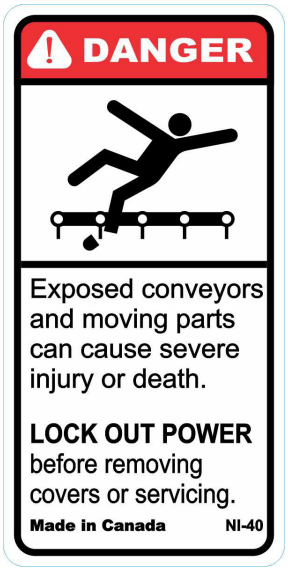


Figure 7
Moving Chain Hazard NI-40

The Moving Chain Hazard Decal NI-40 in **Figure 7** is located on the removable Covers on the Chain Loop Corners and the Inspection Corner Door. This Decal should be placed at any location where the Chain Loop Chain is exposed. Avoid contact with moving parts while the Chain Loop is in operation. Never wear loose fitting clothing or flowing scarves or jewelry around moving parts or equipment.

The Rotating Part Hazard Decal NI-16 in **Figure 8** is located on the Belt Guard(s) and the sides of the Corner Sections by the bearings. This decal should, additionally, be placed at any location where there is a rotating or moving part that could cause injury or death.

Avoid contact with moving parts while the Chain Loop is in operation.

Never wear loose-fitting clothing or flowing scarves/jewelry around moving parts or equipment.

Figure 8
Rotating Part Hazard
Decal NI-16

Gearbox Oil

Figure 9
Gearbox Oil Decal NI-31

WARNING! ***DO NOT operate the Chain Conveyor without gear oil. Gearboxes are shipped dry or without gear oil. Refer to page XX for proper filling and maintenance. Failure to add the proper type/ amount of lubricant BEFORE STARTING the Chain Loop will cause permanent damage to the Gearbox and will void the Warranty.***

The Gearbox Oil Decal NI-31 in **Figure 9** is located on the Gearbox side of the Drive Corner(s). Always ensure the Gearbox has oil in it before operating the Chain Loop. Failure to do so could result in damage to the machine.

IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Safety

Figure 10
Norstar Info NI-30

Serial Number

The Norstar Serial Number Sticker in **Figure 11** is located on side of the Drive Corner, on the Gearbox Side. It contains the Serial Number of the Chain Loop. If the Chain Loop has more than one (1) Drive, there will be two (2) seperate Serial Numbers.

Norstar Info

The Norstar Info Decal NI-30 in **Figure 10** is located on Gearbox side of the Drive Corner (s). It contains contact information for Norstar Industries.

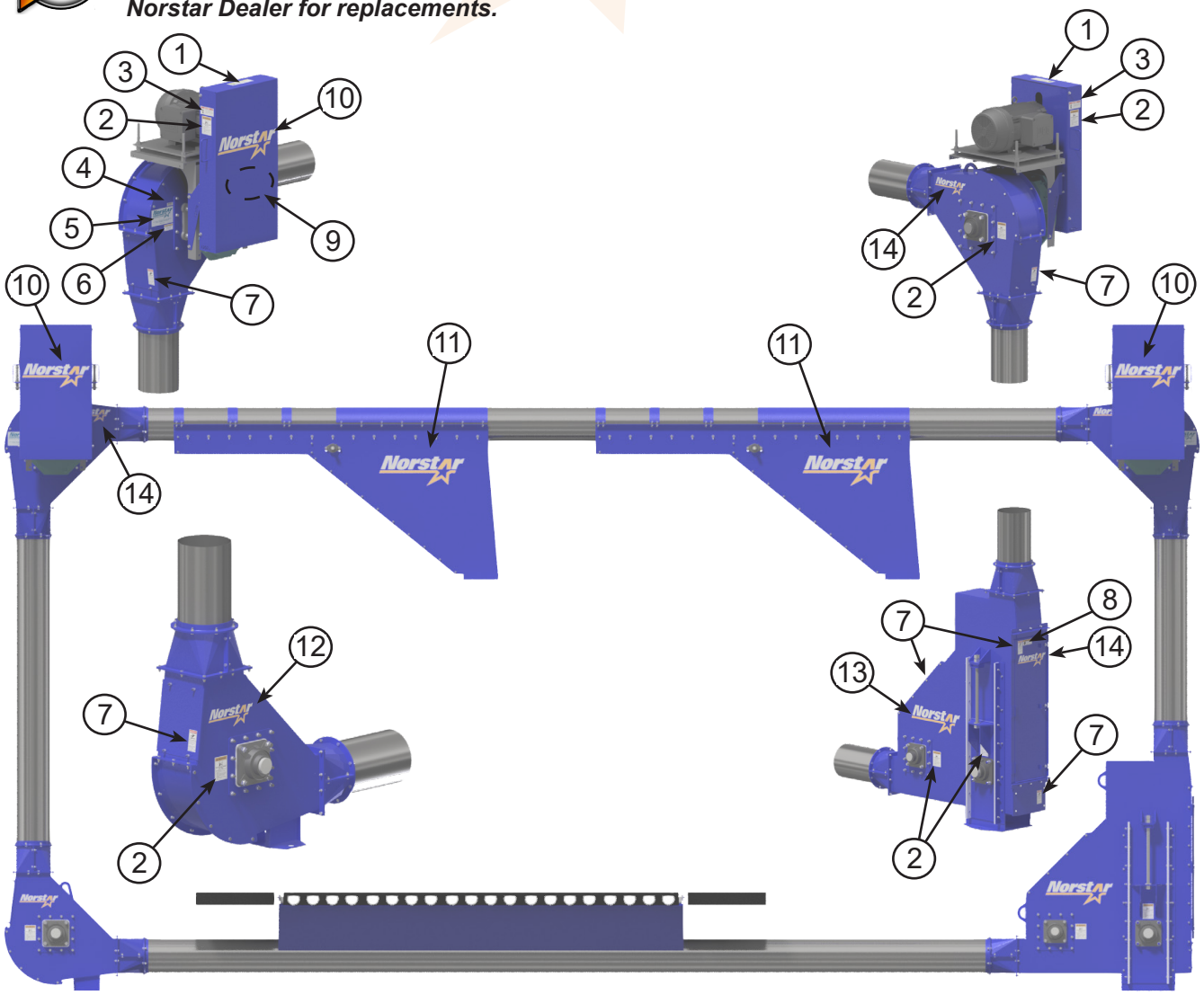
Figure 11
Serial Number

IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Safety

Safety Decal Placement

IMPORTANT! ***Check equipment for*** **WARNING, DANGER** ***and*** **CAUTION** ***decals and their proper placement,*** **BEFORE** ***equipment is operated.*** **NEVER** ***use equipment if signs are missing, hidden, improperly placed, damaged or altered. Keep them clean and grease-free. Contact your Norstar Dealer for replacements.***



Item	Decal Description
1	**CAUTION** Read Operator's Manual **NI-15**
2	**WARNING** Rotating Part Hazard **NI-16**
3	**DANGER** Electrocution Hazard **NI-20**
4	**Serial # Sticker NIXXXX**
5	Norstar Information Decal **NI-30**
6	**WARNING** Gearbox No Oil **NI-31**
7	**DANGER** Chain Hazard **NI-40**
8	**WARNING** Flying Material Hazard **NI-28**

Item	Decal Description
9	**DANGER** Missing Guard **NI-17**
10	Norstar Decal *4" x 11 1/2"* **NI-10** *(varies per* Norstar Decal *7" x 19 3/4"* **NI-12** *gearbox size)*
11	Norstar Decal *9" x 25 1/4"* **NI-13**
12	Norstar Decal *4" x 11 1/2"* **NI-10**
13	Norstar Decal *7" x 19 3/4"* **NI-12**
14	Norstar Decal *2 1/2" x 7"* **NI-11** *(6"-8")* Norstar Decal *4" x 11 1/2"* **NI-10** *(10"-12")*

Figure 12
Chain Loop Decal Locations

IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Chain Loop Overview

Chain Loop Features

- 81X, 81XHH and WH124 Chain
- Either side Drive Mounting
- Shaft-mounted gearbox
- AR Plate Corner Transitions
- ACME Thread Chain Tensioning
- Drive-Over Pit Hoppers
- Reinforced Paddles
- (option) UHMW, AR200 and AR400 Liners

Standard Specifications

Items	6”	8”	10”	10”	12”	12”
Chain Style	81X	81XHH	81XHH	WH124	81XHH	WH124
Head Section Drive	Belt Drive or Direct Drive					
Paddle Size	Ø 5”	Ø 7”	Ø 9”	Ø 9”	Ø 11”	Ø 11”
Paddle Thickness	3/8”		1/2”			
Capacity (bu/h)	1,500	4,000	6,000	6,000	10,000	10,000
Chain Speed (FPM)	325	325	325	325	400	400
Shaft RPM	125	107	94	98	84	86

Item	Description
1	Drive Corner
2	Standard Corner
3	Inspection Corner
4	Inlet Section

Item	Description
5	Discharge Gate
6	Motor
7	Belt Guard
8	Gearbox

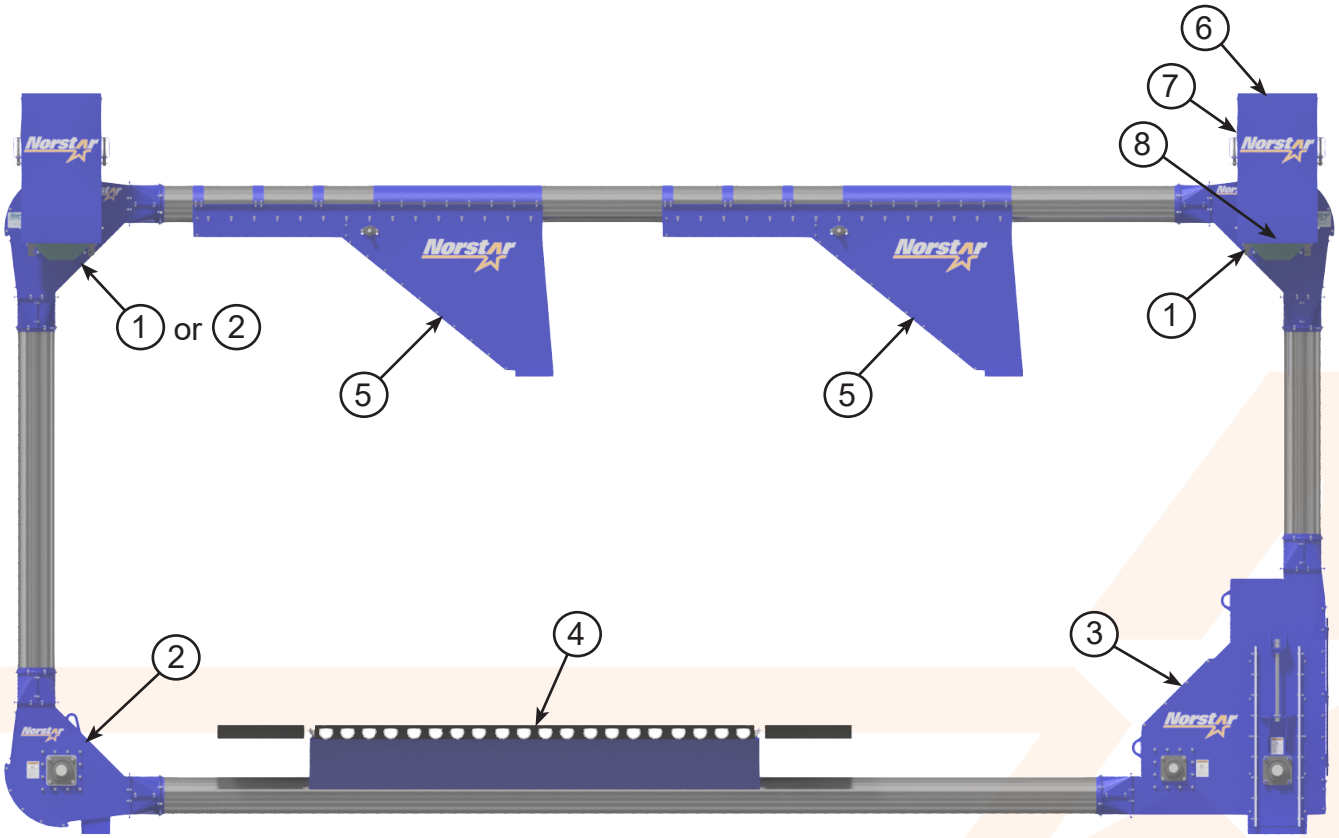


Figure 13
Chain Loop Components

Chain Loop Planning

IMPORTANT! ***Norstar Industries Chain Loops are designed to be supported for additional loads such as wind, etc. Separate structures or adequate support must be provided for any accessory equipment.***

Norstar Industries does not assume responsibility for installation by any other vendor than ours. The installation recommendations within this manual are for consideration only. The owner should consult a qualified civil or structural engineer regarding the design, construction and supervision of the installation, including the foundation and bracing systems. The most important part of the installation is retaining qualified personnel to plan, and erect the Chain Loop as well as its accompanying equipment.

Consult a qualified engineer or contractor for recommendations on concrete reinforcing for the Chain Loop foundation.

The design must take consideration into dead loads, live loads, wind loads, and soil bearing capacity. The Corners and End Towers should be installed on a foundation that provides for adequate drainage to ensure that it stays dry.

Vertical Chain Loop Foundation - Flat Bottom Bin

Pictured, below (**Figure 14**), is a Chain Loop system foundation mock-up for use with Hopper Bottom Bins.

Due to various situations, this drawing should *NOT* be used without further insight to your specific application by a qualified engineer.

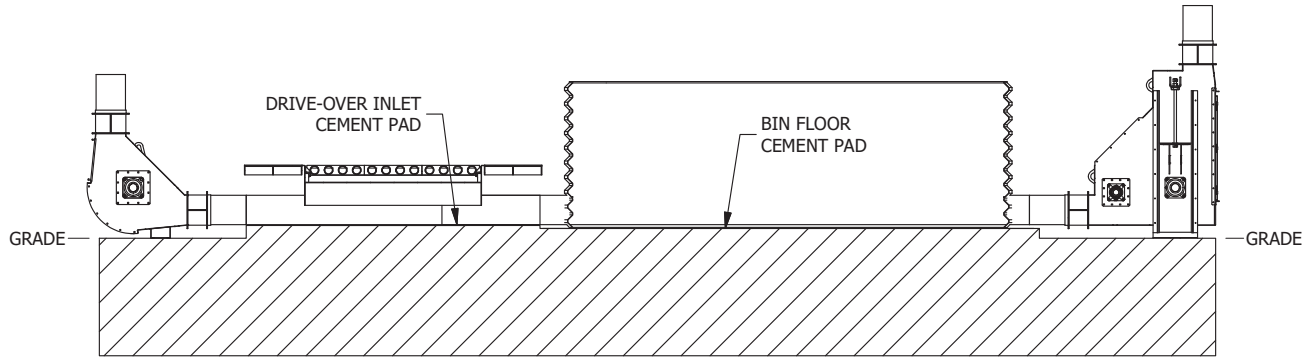


Figure 14
Chain Loop Flat Bottom Bin Concrete Levels

For illustrative purposes, the level at which the Chain Loop corners and End Towers are installed will be Grade.

Depending on the size of Chain Loop and the height of the Bin Floor, different elevations will be required for installation of the Chain Loop. See **Figure 15** for dimensions above Grade for the Drive-Over Inlet Cement Pad and the Bin Cement Pad.

Size	Drive-Over Inlet Pad above Grade	Bin Pad above Grade
6” x 13” Bin Floor	5.250”	4.000”
8” x 13” Bin Floor	5.1875”	4.000”
10” x 13” Bin Floor	5.250”	5.1875”
10” x 15” Bin Floor	5.250”	4.000”
12” x 15” Bin Floor	5.1875”	5.1875”
12” x 17” Bin Floor	5.1875”	4.000”

Figure 15
Chain Loop Above Grade Dimensions

VERTICAL CHAIN LOOP FOUNDATION - HOPPER BOTTOM BIN

Pictured, below (**Figure 16**), is a Chain Loop system foundation mock-up for use with Hopper Bottom Bins.

Due to various situations, this drawing should *NOT* be used without further insight to your specific application by a qualified engineer.

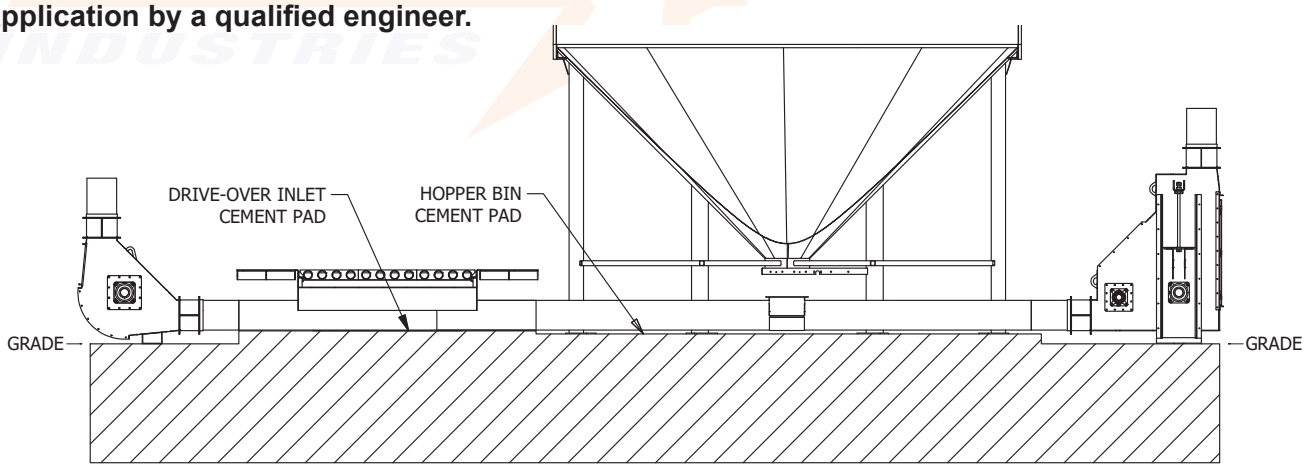


Figure 16
Chain Loop Hopper Bin Concrete Levels

For illustrative purposes, the level at which the Chain Loop corners and End Towers are installed will be Grade.

Depending on the size of Chain Loop, different elevations will be required for installation of the Chain Loop. See **Figure 17** for dimensions above Grade for the Drive-Over Inlet Cement Pad and the Hopper Bin Cement Pad.

Size	Drive-Over Inlet Pad above Grade	Bin Pad above Grade
6”	5.250”	4.000”
8”	5.1875”	4.000”
10”	5.250”	4.000”
12”	5.1875”	4.000”

Figure 17
Chain Loop Above Grade Dimensions

Side Lean Chain Loop Foundation

Pictured, below (**Figure 16**), is a Side Lean Chain Loop system foundation mock-up.

Due to various situations, this drawing should *NOT* be used without further insight to your specific application by a qualified engineer.

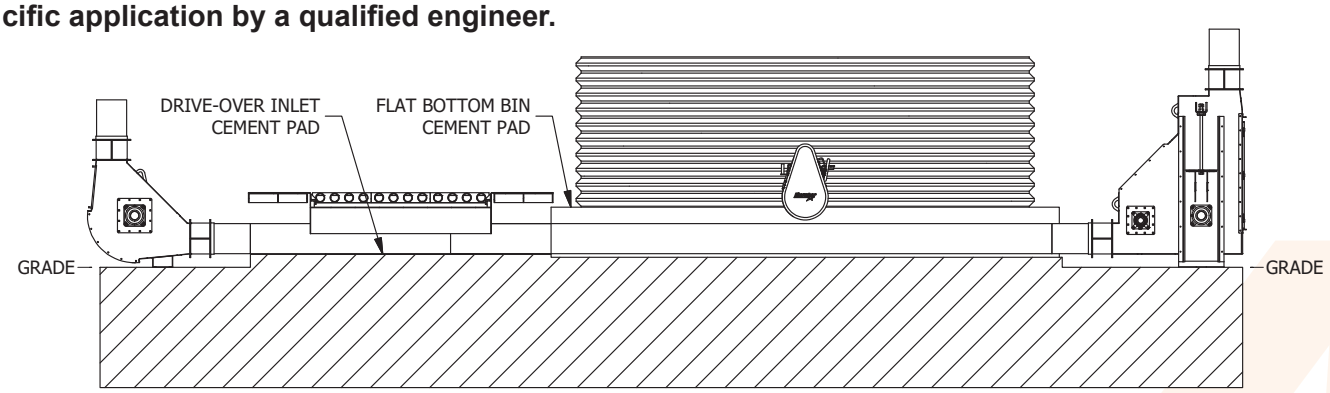


Figure 18
Chain Loop Hopper Bin Concrete Levels

For illustrative purposes, the level at which the Chain Loop corners and End Towers are installed will be Grade.

Depending on the size of Chain Loop, different elevations will be required for installation of the Chain Loop. See **Figure 19** for dimensions above Grade for the Drive-Over Inlet Cement Pad and the Flat Bottom Bin Cement Pad.

Size	Drive-Over Inlet Pad above Grade	Bin Pad above Grade
6”	5.250”	18.000”
8”	5.1875”	20.000”
10”	5.250”	22.000”
12”	5.1875”	24.000”

Figure 19
Chain Loop Above Grade Dimensions

End Tower Foundation

Pictured, right (**Figure 20**), is a Chain Loop system foundation mock-up for End Support Towers.

Due to various situations, this drawing should *NOT* be used without further insight to your specific application by a qualified engineer.

The Chain Loop End Tower will share the cement pad of the Chain Loop Corners. The design must take consideration into dead loads, live loads, wind loads, and soil bearing capacity. The Corners and End Towers should be installed on a foundation that provides for adequate drainage to ensure that it stays dry.

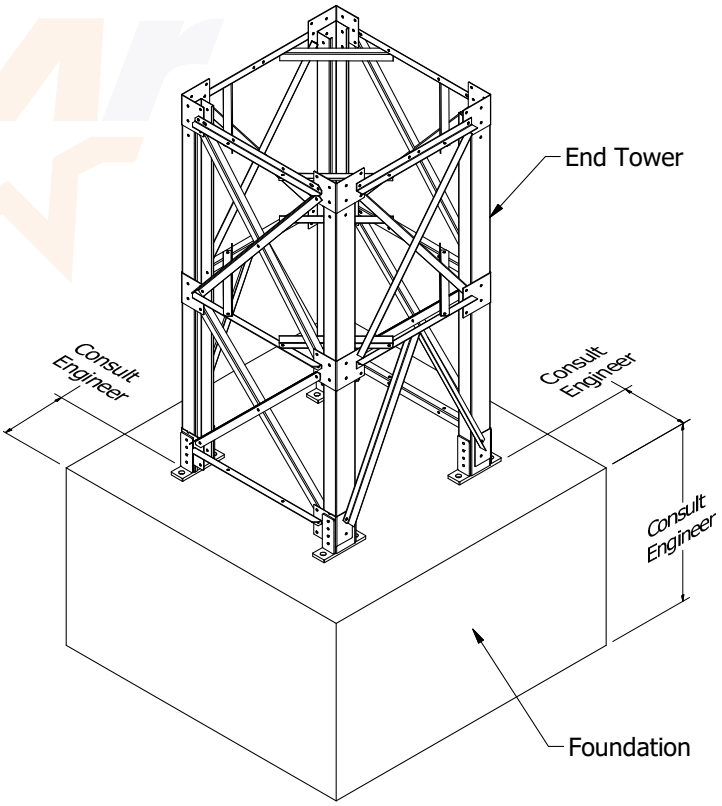


Figure 20
End Tower Foundation

Drive-Over Foundation

Pictured, below (**Figure 21**), is a Chain Loop Drive-Over foundation mock-up.

Due to various situations, this drawing should *NOT* be used without further insight to your specific application by a qualified engineer.

The Chain Loop Drive-Over Inlet requires a specifically sized channel to be cast in concrete to allow installation of the Inlet and Gratings. See **Figure 21** for general Channel dimensions and **Figure 22** for dimensions for the Channel Depth. **Figure 22** also shows the elevation, above grade, for the Drive-Over Inlet Cement Pad.

IMPORTANT! Figure 22 Drive-Over Inlet Cement Pad dimensions are to the bottom of the Drive-Over Inlet Channel. The Cement Channel will further extend above grade by 19.250” to 20.500”, depending on Chain Loop Size.

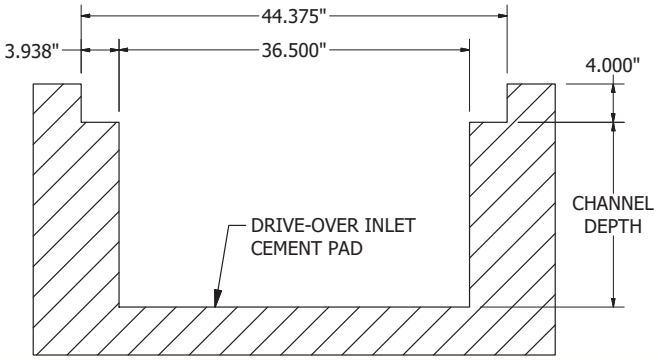


Figure 21
Drive-Over Inlet Cement Channel

Size	Channel Depth	Drive-Over Inlet Pad above Grade
6”	19.250”	5.250”
8”	19.750”	5.1875”
10”	20.000”	5.250”
12”	20.500”	5.1875”

Figure 22
Channel Depth Dimensions

INSTALLATION INFORMATION

The purpose of this section is to advise and instruct owners on how the equipment can be installed. A millwright or other experienced contractor should perform the installation. The installer should read this manual and understand the complete operation of the equipment.

LAYOUT

The Chain Loop conveyor can be used in many different ways and operation can vary from installation to installation.

Thought given to proper grain system layout prior to conveyor installation can prevent later problems in the grain flow plan and avoid possible “bottle-necks”.

A layout should be made to determine the exact location of conveyor, inlets, outlets, power source, support and mounting locations.

Dimensional information of components is found on pages 26-46.

LAYOUT CONSIDERATIONS

Following are major items that should be considered when laying out the system:

A. Type of material to be conveyed.

B. Volume of material to be conveyed (BPH).

C. Location and amount of material fed into system.

D. Location and number of outlets.

E. How will the conveyor be supported?

F. Further expansion. Will more bins be added and if

so, where?

G. The direction of grain flow.

Use these general guidelines to help layout your conveyor system:

- Chain Loops are designed to move grain in one direction only.
- Leave adequate room to perform periodic maintenance.
- The conveyor will handle a wide range of free flowing grains. It should not be used with highly corrosive material, such as fertilizer.
- The life of the conveyor chain will be shortened when the chain is allowed to sit in water or is operated in acidic conditions, so avoid these situations.
- Be sure not to overfeed the conveyor. This will cause plugging. Intake rate should not exceed the particular capacity of the conveyor.
- It is important that a firm, level foundation or support structure be provided on which the conveyor can be mounted. This support should be ample to carry the load of the conveyor when fully loaded.
- Locate outlets where connecting bands will not interfere with outlets or control. Do Not cut or modify tube connecting bands.
- Chain Loop Systems are usually installed around rows of storage structures, access for vehicle or rail traffic and other devices. Grain bins may be conventional or elevated on a supporting structure with hopper bottoms.
- Grain dryers, cleaners or other devices may have access to the system.
- Systems have been used to transfer between trucks and rail cars with several temporary storage tanks included.
- All systems require the joining of four or more sections of tubular conveyor housing.
- All systems will include four 90° corners.
- The 90° discharge with gate includes an 8 ft. long section of tubular conveyor housing that must be fit within other tubular conveyor so the discharge is located properly.
- The inlet dump hoppers include a length of tubular conveyor housing that must be fit within other tubular conveyor so the hopper is located properly.
- Wells used in grain bin floors fasten onto standard tubular conveyor housing. Access openings must be cut in the tubing to install wells.

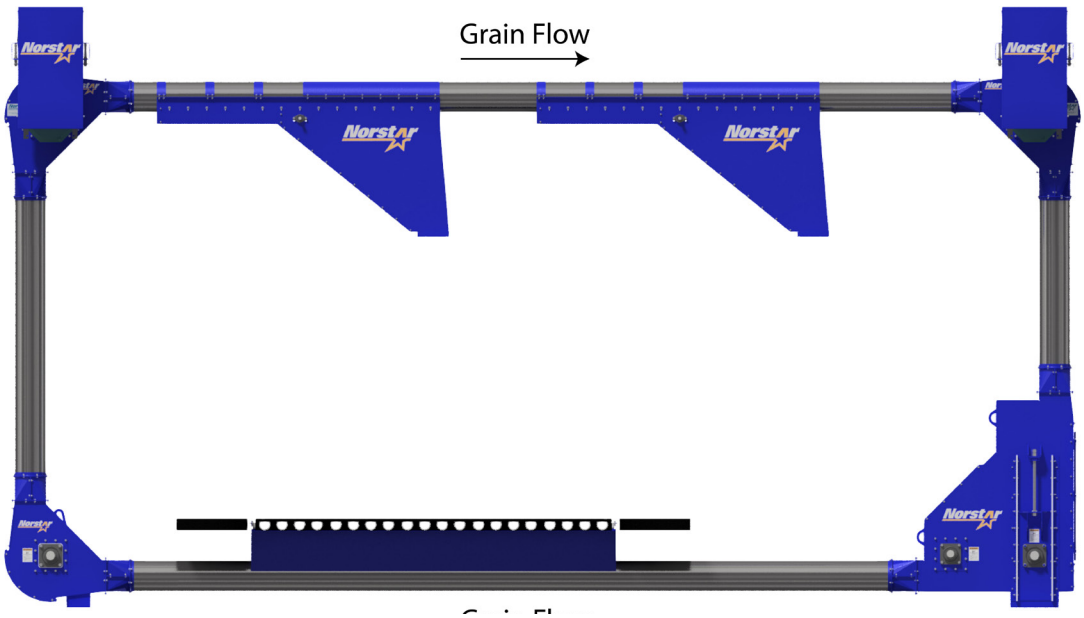
GRAIN FLOW AND DRIVE CORNER LOCATION

Chain Loop Systems will include one or two drive corners. The drive corner, on systems with one, must be located at the overhead point toward which the overhead chain will travel. On systems with two drive corners locate them at the two overhead positions.

The inspection corner includes the adjustable slide that is used to tighten the conveyor chain. Locate the inspection corner on the bottom at the end where the conveyor chain travels down from top to bottom. The inspection corner also provides access to the conveyor chain and paddles for periodic maintenance.

There will be one or two standard corners, depending on the number of drive corners. They will be located at the end where the conveyor chain moves up carrying grain from the bottom to the top. When there are two drives, there is only one standard corner located at the bottom.

The system should be laid out to minimize the distance grain must be moved to perform the necessary loading and unloading operation. In the example, the dump hopper is located next to the end where the grain will be carried up to the overhead part of the system. If the dump hopper were located at the other end of the system the grain must travel a greater distance in the system to reach a bin. Grain would also travel a greater distance to the load out point when unloading bins.



SYSTEM SUPPORT INFORMATION

Towers or other adequate supports are needed to hold the vertical ends of the Chain Loop System in position. Consider the weight per foot of fully loaded tubular conveyor. The individual corners and other components, particularly the ones with drives weigh considerably more. The horizontal tubular conveyor should be supported at 20 ft. to 30 ft. intervals. This can be done with vertical supports from the ground, from the bin side walls or from the bin roof at the peak. Consult the bin manufacturer concerning their recommendations for loads their bin will support in these areas.

Size	LBs Per Foot
6”	20 lbs
8”	29 lbs
10”	40 lbs
12”	XX lns

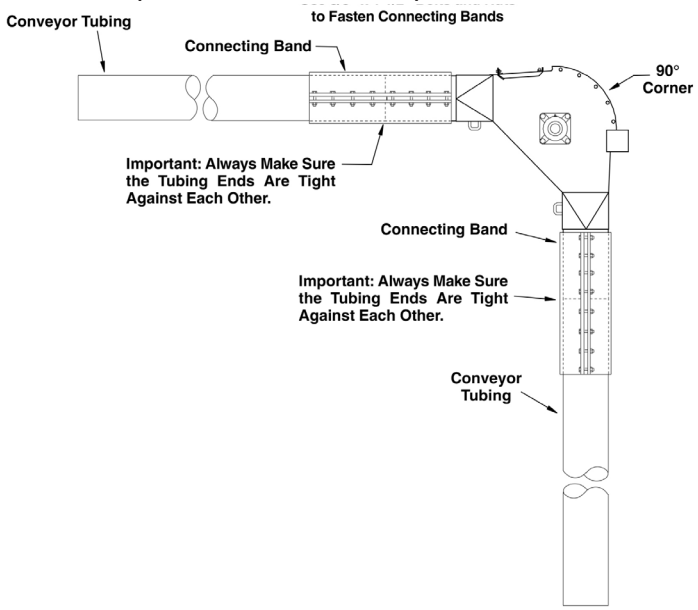
Figure 20

Weight per foot of fully loaded conveyor

TUBE AND CORNER ASSEMBLY

Lay the sections out in order so as to determine what portions to assemble prior to actual placement in the system.

When cutting tubes to exact length, the ends must be cut square and any burrs on the ends removed. Join tube and corner components together with connecting bands. Slide the tube sections tight together and space the connecting band in equal amounts on both parts of the connection. Tighten the bolts in the

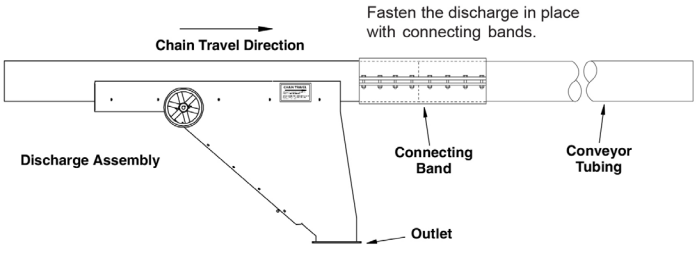


band (the connecting band uses 3/8” x 1 1/2” bolts and non-lock nuts).

DISCHARGE WITH GATE ASSEMBLY

The discharge unit includes an 8 ft. long section of conveyor. Locate the outlet of the discharge in the desired location (it may be necessary to cut exact lengths of other tube sections to locate the discharge unit in its proper place).

The discharge, with gate, is designed for chain travel in only one direction. Make sure it is oriented properly by comparing the appearance to the diagram, or referring to a label on the discharge unit. Operation in the wrong direction can cause paddle damage.



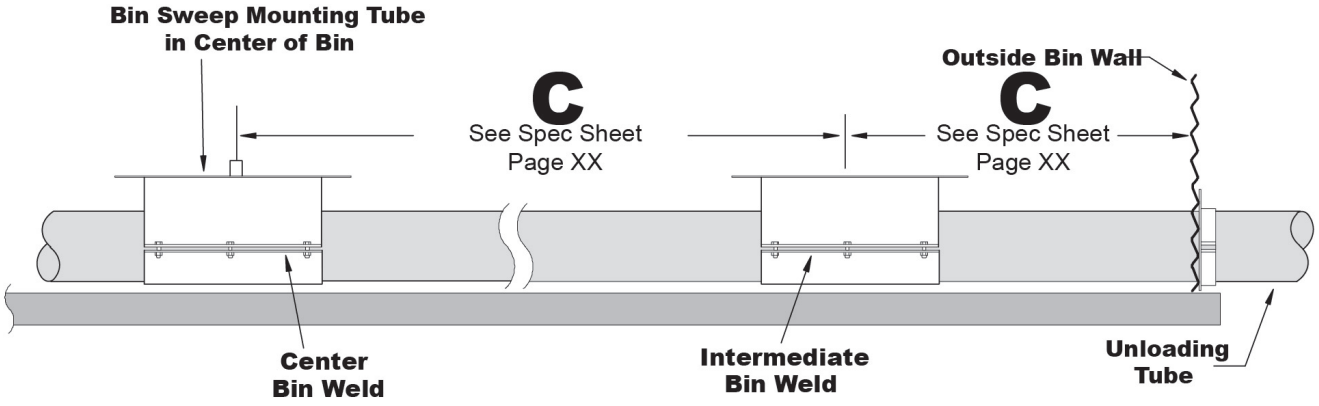
BIN WELL ASSEMBLY

Lay the sections of conveyor tubing in the bin according to your particular application (for example: will tubing be passing through the bin below a floor, or through a concrete trough under the bin). Whatever method is used, the tubing needs to pass exactly through the center of the bin, Use the connecting bands to attach tubing together.

Position the center bin well on top of the conveyor tube so the bin sweep mounting tube is in the exact center of the bin (See diagram below), make sure the control gate is in a direction taht can be pulled by the control rods.

The intermediate wells will be positioned between the center well and the bin wall. The illustration below shows the minimum spacing allowed between the wells and the bin wall (refer to the chart included with the Control Rod Kit for proper spacing of the intermediate wells as determined by the diameter of the bin). Use the chart as a guideline, but keep in mind if a sweep tractor is to be used, you do not want the tractor to travel over the top of a well, so it may be necessary to position an intermediate well in a location other than the recommended spacing (if a well should be moved, keep it as close to the intended measurement as possible). Also note that it may be necessary to reposition an intermediate well because of the location of the connecting band attaching the tubes together.

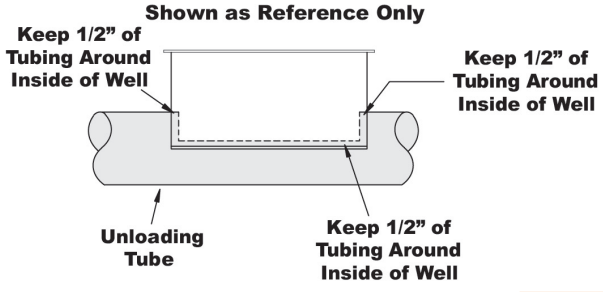
Intermediate wells should also be positioned on the conveyor tube so the gates open when control pipes are pulled.

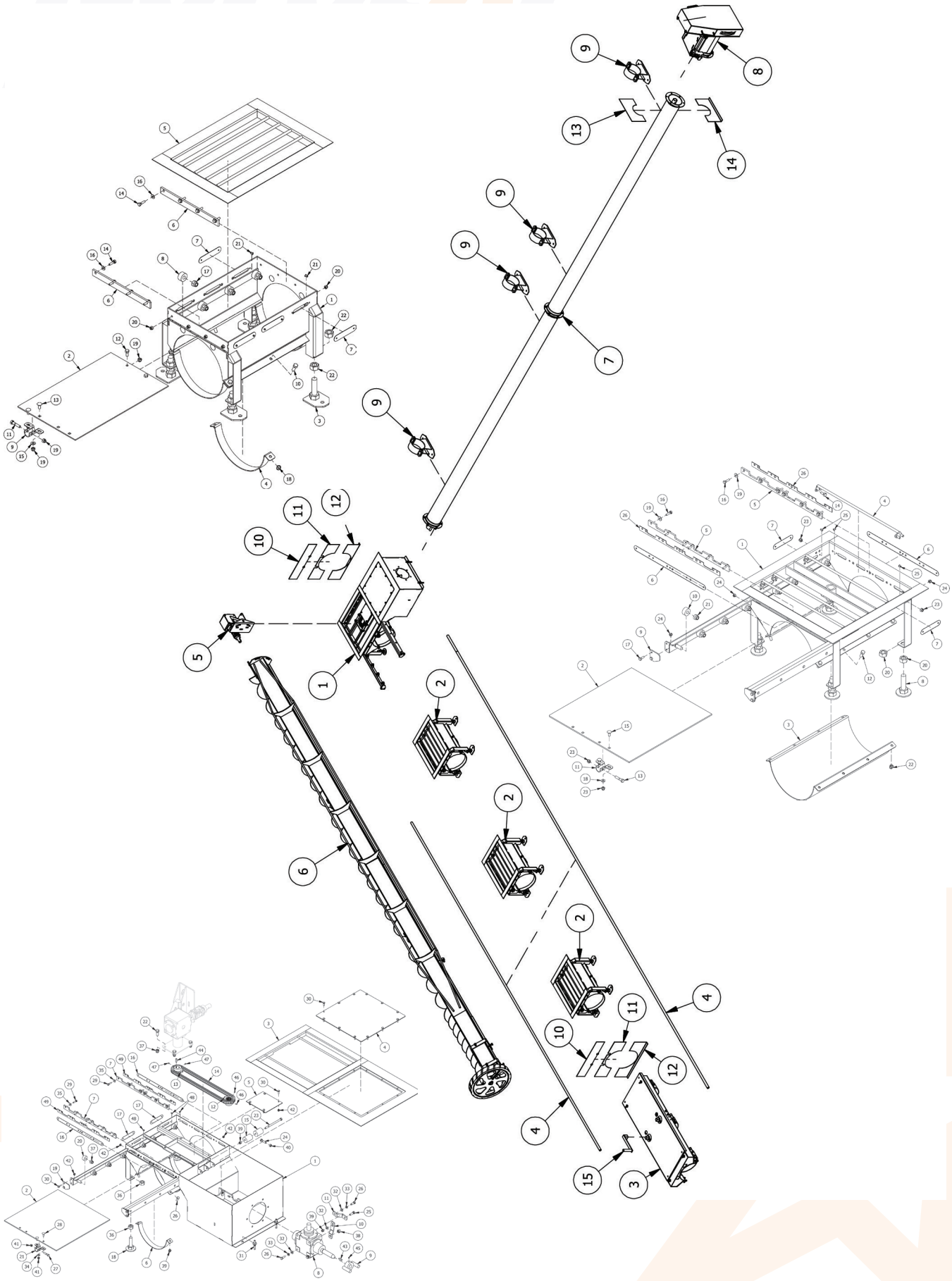


When well locations are determined on the conveyor tube, mark around the inside of the well leaving a lip of at least 1/2” around the inside of the well (grain will leak if the opening is cut too large). Cut the opening into the tube using the measurements for maximum openings as shown below.

IMPORTANT! Do Not cut the tube openings when the chain and paddles are inside the tube. Damage to the chain and/or paddles can occur.

Once the openings have been cut, attach the bin wells to the conveyor tube using the provided clamp bands and 5/16” x 1 1/2” bolts and non-lock nuts. Place suitable support under each well. The supports used should be of a material that will not deteriorate ie., brick, treated 2x4, etc. Make sure the tops of all bin wells are level.



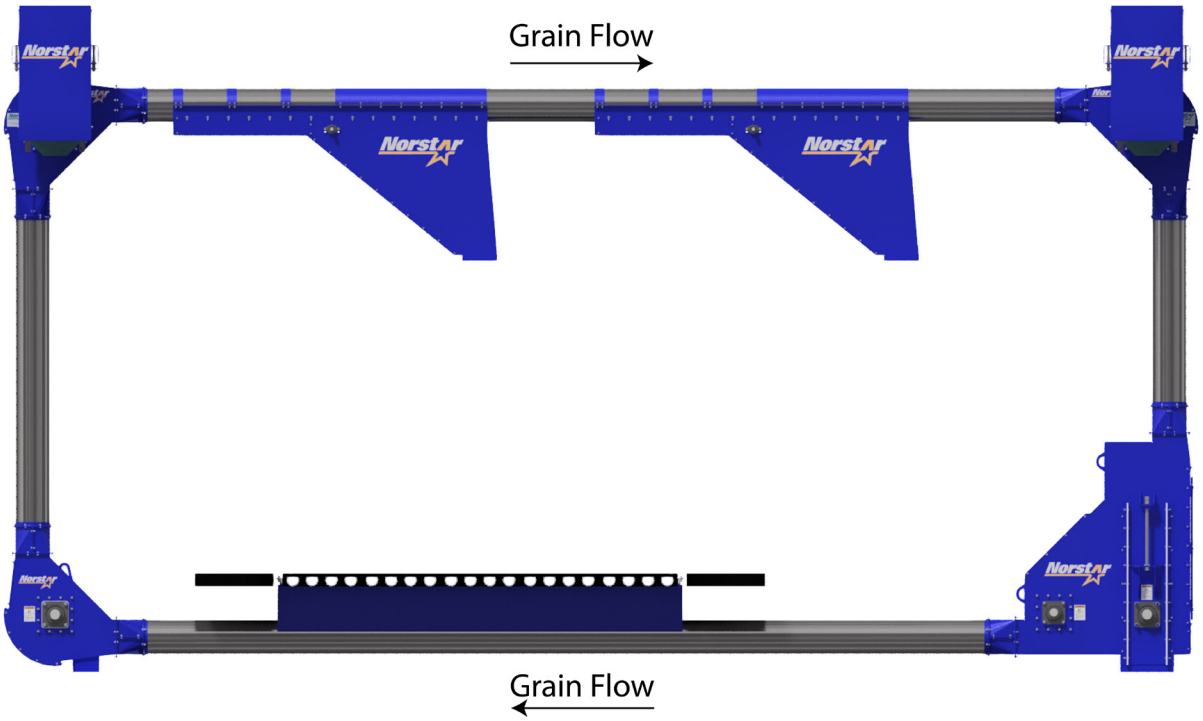


INLET DUMP HOPPER ASSEMBLY

The dump hopper will include a length of tubular conveyor from 6 ft. to 11 ft. depending on the length of dump hopper selected. It will also include a top safety screen or drive over grating.

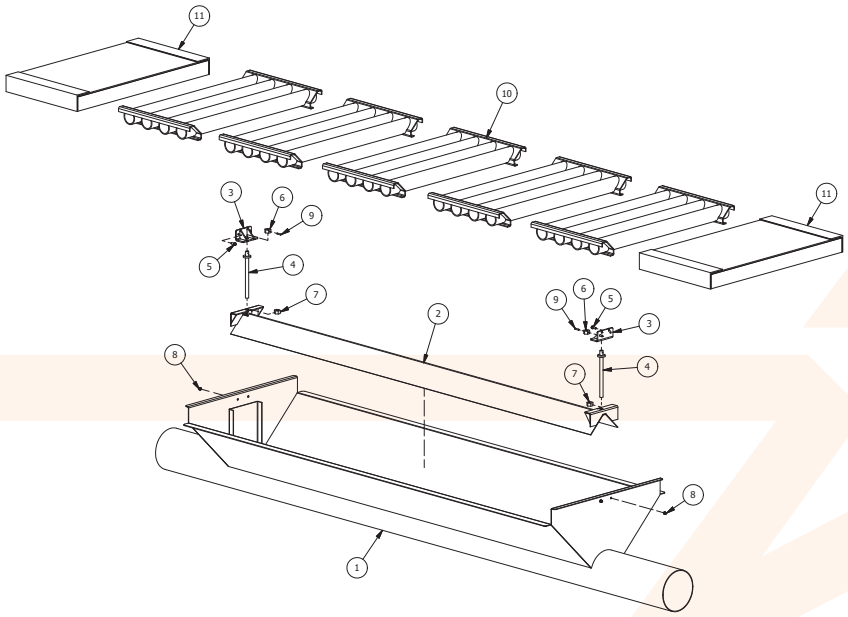
There is a grain flow control inside the hopper that is adjustable using chains mounted at each end. A dump hopper is to receive grain into the Chain Loop System and should be located at a point along the bottom conveyor portion. Usually dump hoppers are located near the standard corner where the chain and paddles turn to carry grain up.

For drive over systems the grate must be supported by a concrete structure, such as shown below



A hopper with top safety screen may be used in non-drive over situations. The top safety screen will not support vehicles. Make sure either the top safety screen or drive over grating is in place on the hopper.“

Fasten the Inlet Dump Hopper Assembly in place within the tubular conveyor with connecting bands.



CONVEYOR CHAIN AND PADDLE ASSEMBLY

The paddles may be bolted to the chain before installation of the chain into the system or after.

There are access doors on each corner that can be utilized for paddle assembly. See the assembly diagram for correct paddle to chain assembly.

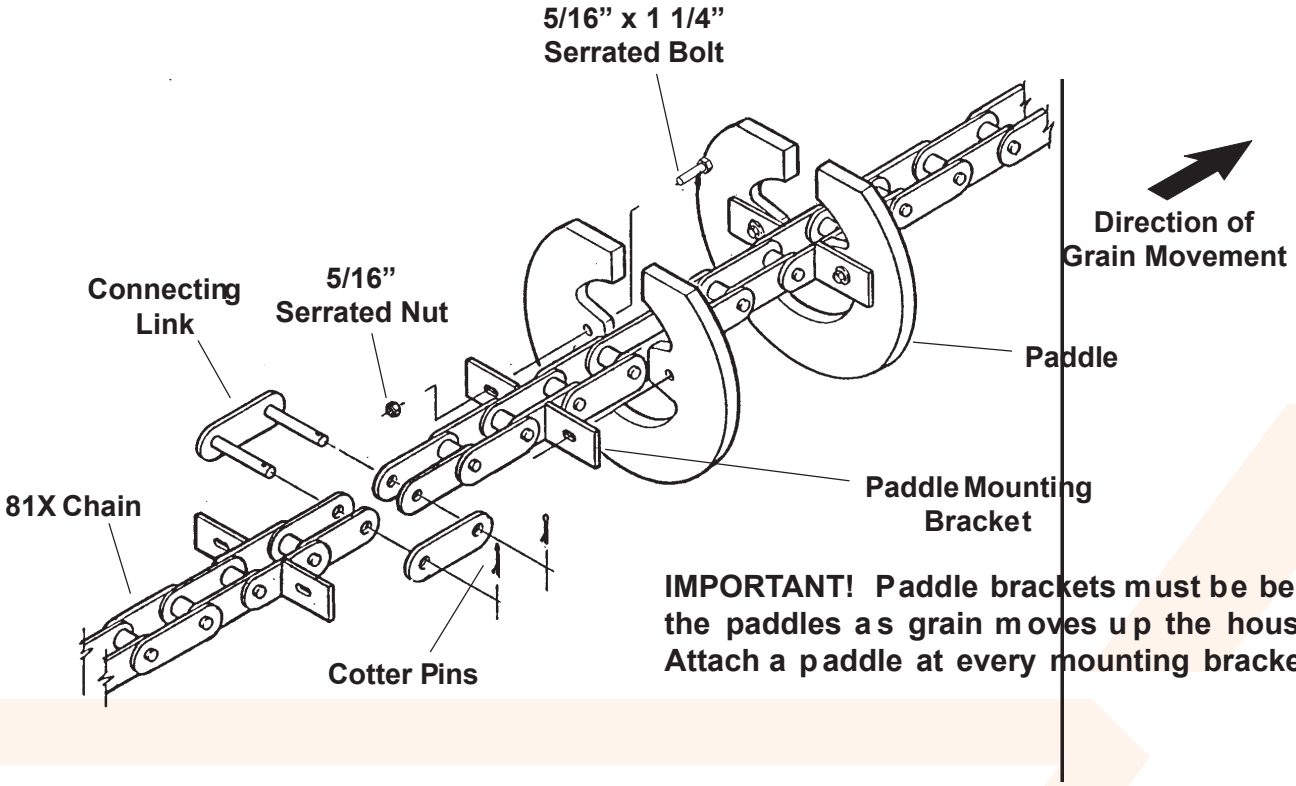
To string the chain in the conveyor tube sections it will be necessary to use an electrical fish tape, wire or rope to pull the chain through. Use access doors at each corner unit as necessary to accomplish this task.

IMPORTANT! Make certain the chain does not become twisted between corners. On long horizontal runs it is possible for the chain to rotate 360° during pull through between corners. Use inspection doors at discharge gates and openings into bin wells to observe the chain position along the length of conveyor.

After installing the chain through the tubular housing and around the corner sprockets connect the chain ends at the inspection corner. Make sure the inspection corner sprocket is adjusted all the way up.

Join chain ends with a connecting link. Pull as much slack from the chain as possible before making the connection.

Adjust the inspection corner sprocket down to increase conveyor chain tension. To adjust, loosen the jam nuts at the top connection of the adjusting screws and turn the screws so the bearing slide moves down. Turn the adjusting screws on each side in equal amounts so the shaft and sprocket will be square inside the inspection corner. Check by measuring the relative position of the bearing on each side to see they are the same.

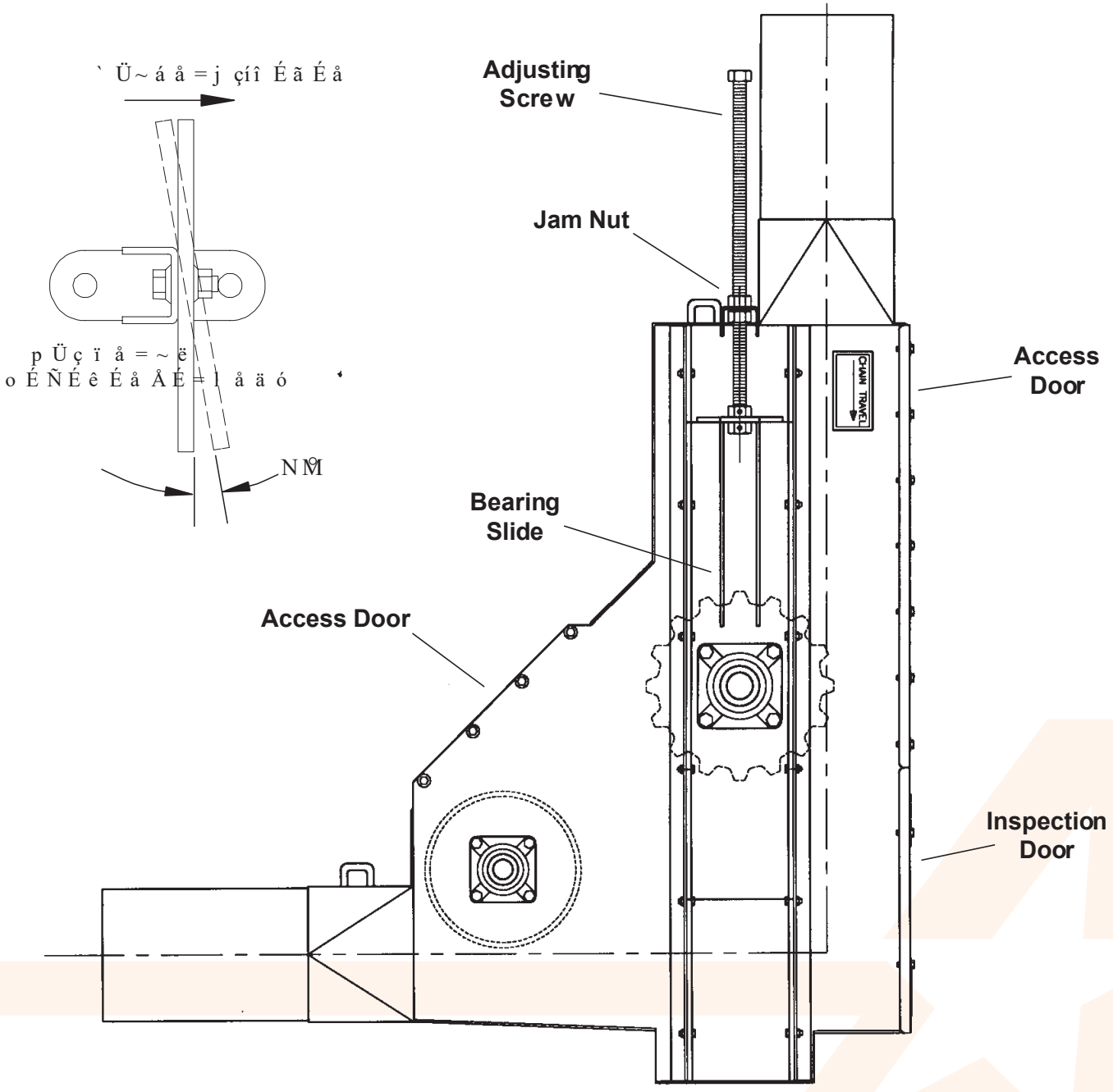


CAUTION! Do not operate conveyor when the inspection or access doors are open.

To check conveyor chain tension, open the inspection door, grasp one of the paddles and attempt to rotate it toward the chain (see Fig. A). Proper chain tension should allow only minimum rotation of the paddle, approximately 10°.

If the chain is still too loose after adjusting the inspection corner sprocket full down, it may be necessary to remove one or more links from the chain.

When adjustment of chain tension is complete, tighten the jam nuts at the top of the adjusting screws.



DRIVE ASSEMBLY

The Chain Loop conveyor is powered by electric motor. Use 1750 RPM motor.

IMPORTANT: Use the proper size and speed motor to ensure satisfactory conveyor operation. Too small of a motor will not supply the horsepower required to achieve capacity and possible damage to the motor will occur.

Too large of a motor may cause high stress on conveyor components resulting in shorter life for those components. See page 9 for motor size specifications.

IMPORTANT: Use the motor sheave furnished. If other size sheave is used or substituted, improper chain speed and unsatisfactory conveyor operation will result.

Mount the sheaves as close to the belt guard back as possible. Align sheaves by using a straight edge, placed across the outer faces of both sheaves. Secure in place using taper lock bushing. Be sure drive keys are properly installed. Check sheave alignment again after sheaves are secured to shafts.

WARNING! Keep all safety shields and devices in place.

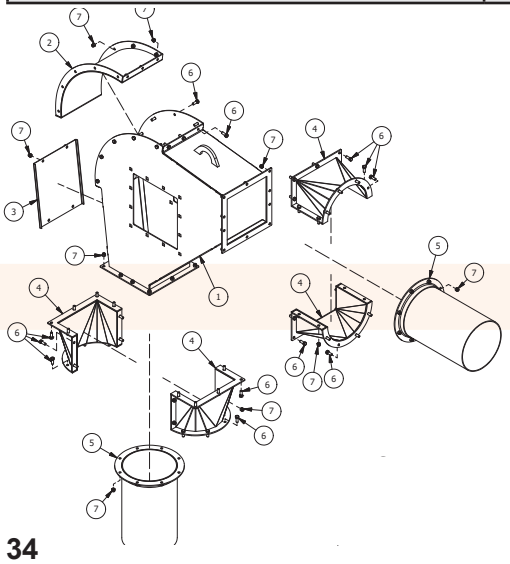
Install the belts onto the sheaves and set belt tension. To tighten belts, turn the 3/4” nuts on the motor mount rods to raise the motor mount assembly. Raise all the rods the same distance so the motor mount assembly is parallel with top of conveyor.

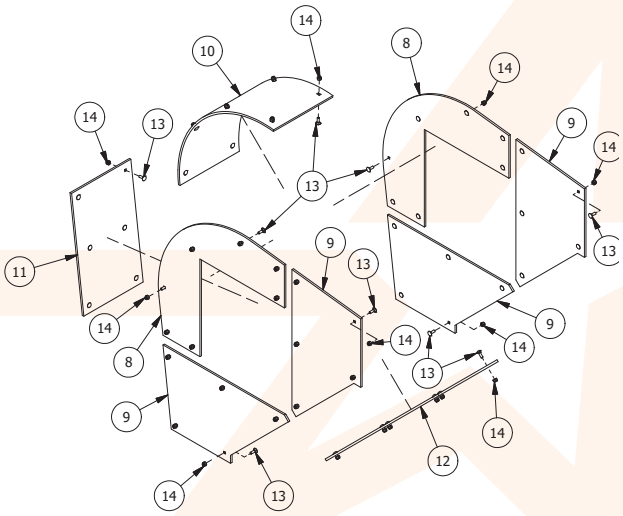
Check all fasteners to see that they are tight. Close and latch belt guard.

The gear reducer is shipped without oil. It is necessary to add the proper amount of oil before running. Use a high grade petroleum base, rust and oxidation inhibited R & O) gear oil. Follow the instructions on the reducer name plate, warning tags and in the installation manual attached to the reducer.

CAUTION! Too much oil will cause overheating. Too little oil will result in gear failure. Check oil regularly.

Unit Size	*6”*	*8”*	*10”*	*12”*
Recommended Chain speed				
Corner Shaft RMP				





DISCHARGE WITH GATE CONTROLS

Location of the discharge controls and routing on chain should have been determined before ordering.

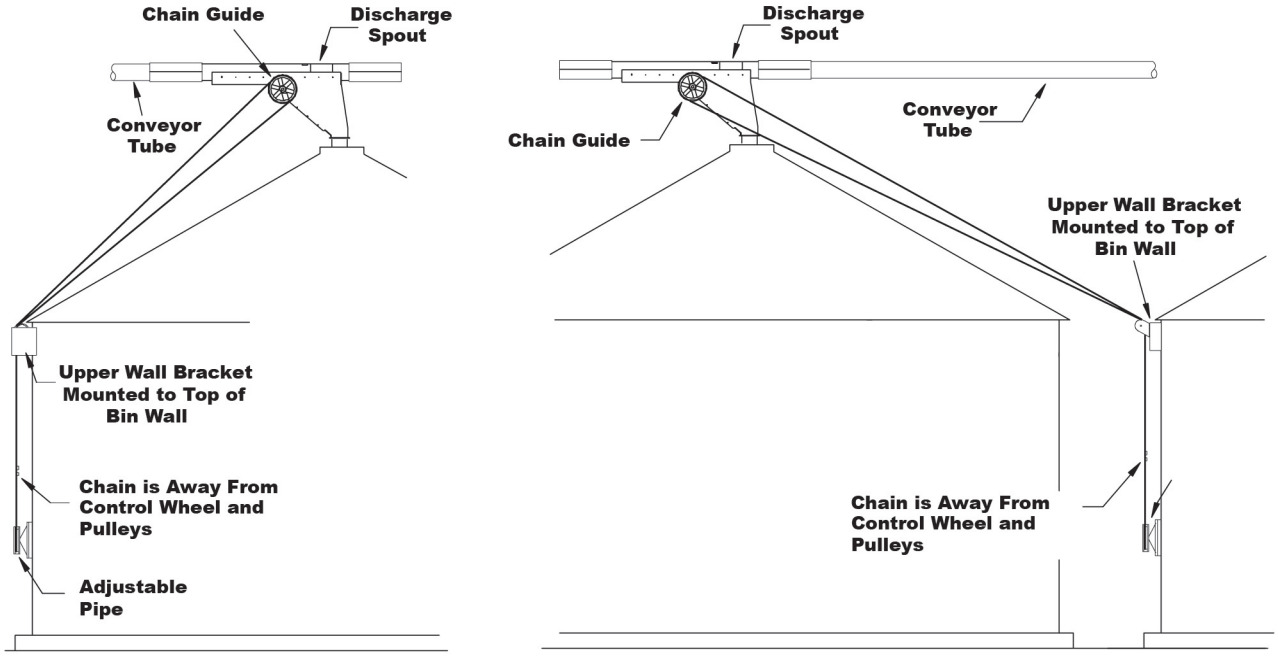
Controls must Be located in-line with conveyor tube so Control chain will track properly on the chain guides.

NOTE: Control chain must be anchored to both upper and lower wheels to provide positive control and prevent the Control chain from slipping on the chain guides.

The brackets are designed to be mounted directly to grain bin wall. Locate the ground chain guide about 5’ off the ground (or at a height that is easy and convenient to reach).

Locate the upper wall bracket at the top of the bin wall so the Control chain will clear the eave of roof or other over hanging structures.

The chain guide can be mounted on the same bin that the spout is attached to (Shown in Example 1) or, the ground chain guide can be mounted to an adjacent bin (Shown in Example 2).



Example 1
Controls Mounted on Bin Where Spout is Located
(pulley mounted on inside of bracket)

Example 2
Controls Mounted on Adjacent Bin
(pulley mounted on outside of bracket)

IE:Chain Loop Mounting Example.jpg

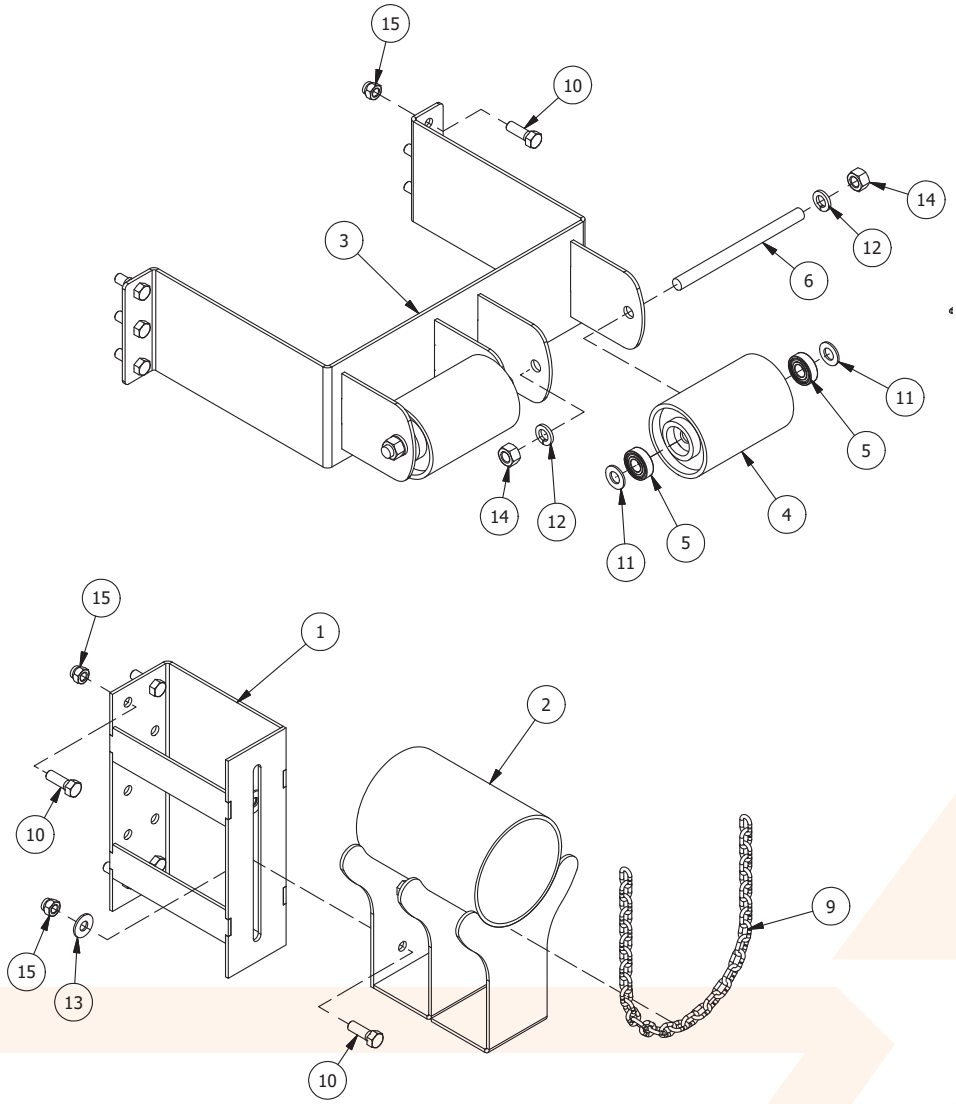
Step 1. Attach the two pulleys to upper wall bracket, using four 1/4” x 3/4” long (grade 5) hex head capscrews and nylon locknut per each pulley.

NOTE: Mount the pulleys so both of them are either on the inside or on the outside of upper wall bracket.
A. If the controls are mounted on the same bin that the spout is attached to (shown in Example 1 on Page 22), then mount the pulleys on the inside of the upper wall bracket.

B. If the controls are mounted to the adjacent bin (shown in Example 2 on Page 22), then mount the pulleys on the outside of upper wall bracket.

Step 2. Attach the upper wall bracket to top of bin wall so control chain are clear of the eave. Locate the wall bracket so it is in line with the spout chain guide, so control chain will properly track onto the spout Chain Guide.

NOTE: Mount the pulleys so both of them are either on the inside or on the outside of upper wall bracket.



Step 3. Fasten each wall plate to the wheel bracket with two 3/8” x 1” long (grade 5) hex head capscrews, four 3/8” flat washers and two 3/8” nylon locknuts. Be sure to use a flat washer over each slot.

Step 4. Securely anchor wall plates to bin wall so the wheel bracket can be adjusted vertically.

Step 5. Slide a 1” flat washer over wheel shaft of the wheel bracket, before sliding the chain guide on. Use another 1” flat washer and 3/16” x 1 3/ 4” cotter pin to secure the chain guide to the wheel shaft.

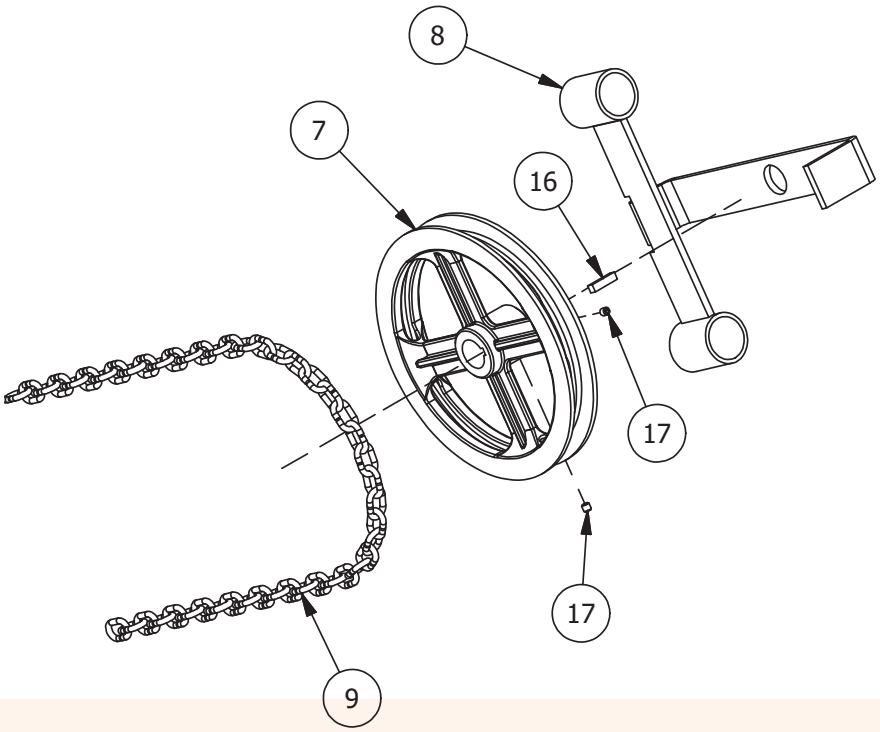
Step 6. Route Control chain through pulleys on wall bracket, then up to spout.

NOTE: The control chain must be routed through the pulley so it is captured and will not accidentally jump out of the pulley groove.

Examples 1 and 2 on Page 22 show how the control chain is routed between the pulley wheel and guide pin. This should prevent the Control chain from jumping out of the pulley groove. Plan where the splice(s) in the Control chain is to be located. Avoid splicing where the splice will be pulled onto a chain guide or through a pulley when the gate is being opened or shut.

Step 7. Anchor control chain to upper chain guide on the spout assembly. A 3/16” clamp is provided with the spout to secure the Control chain to the spout’s chain guide. You only need the u-bolt and nuts provided with clamp to hold the control cable in place (see illustration below). The cast base can be discarded.

NOTE: The gate moves 30” to fully open, which is 2 1/2 turns of the chain guide. Place at least 3 1/2 wraps of cable around the chain guide in a manner that will allow the gate to fully open and fully close with cable operation. Do not use more wraps than necessary, as cable build up on the wheel can slide off the edge.



Step 8. Loosen the bolts that hold the wheel bracket to the wall plates. Slide the wheel bracket all the way up in the slots, so when the Control chain is attached to the chain guide, the wheel bracket can be slid down tightening Control chain.

Step 9. Anchor the control chain to lower chain guide mount to side of the bin. A 3/16” clamp is provided to secure the Control chain to the chain guide. You only need to use the u-bolt and nuts provided with clamp to hold the control cable in place. (See Fig. 3.) The cast base portion of the cable clamp can be discarded.

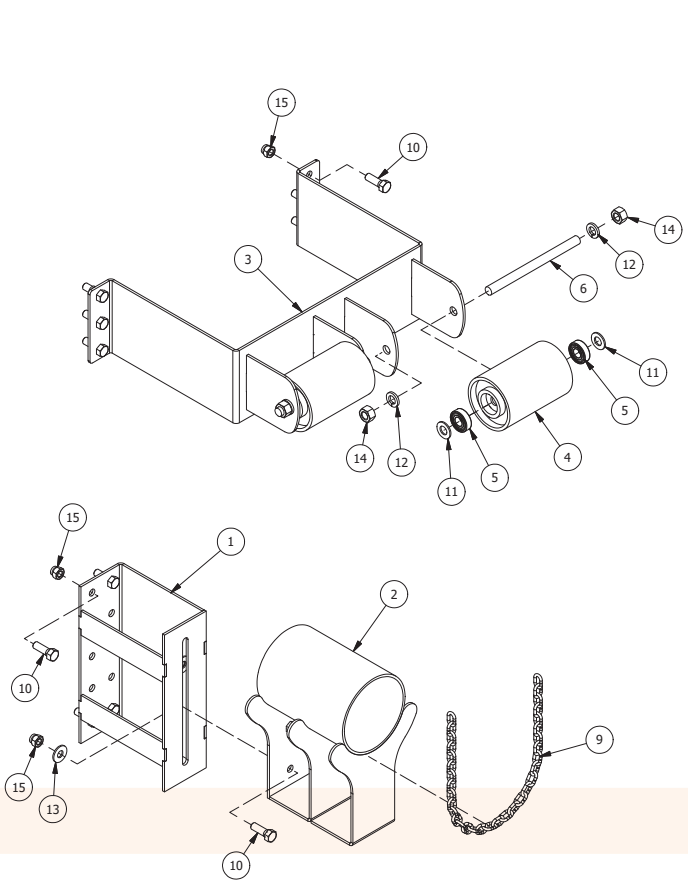
NOTE: The gate moves 30” to fully open, which is 2 1/2 turns of the chain guide. Place at least 3-1/2 wraps of cable around the control where in a manner that will allow the gate to fully open and fully close with cable operation. Do not use more wraps than necessary, as cable build up on the wheel can slide off the edge.

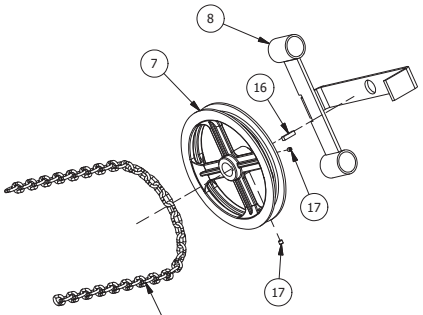
Step 10. Splice the Control chain together. Be sure that the splice will not wrap onto the chain guide when the wheel is turned to open the gate.

Step 11. Slide the wheel bracket to tighten the Control chain. (The Control chain should be tight enough to prevent it from unwrapping off the chain guide.) When the Control chain is tight, then secure the wheel bracket in place by tightening the bolts holding it to the wall plates.

OPERATION NOTES:

The controls should be clearly marked as to what spout they control to prevent accidently discharging grain into the wrong bin. Controls should be marked to indicate when a spout is open or closed. The lower chain guide has two setscrews in the hub that can be locked down to prevent the controls from accidentally vibrating open or shut.



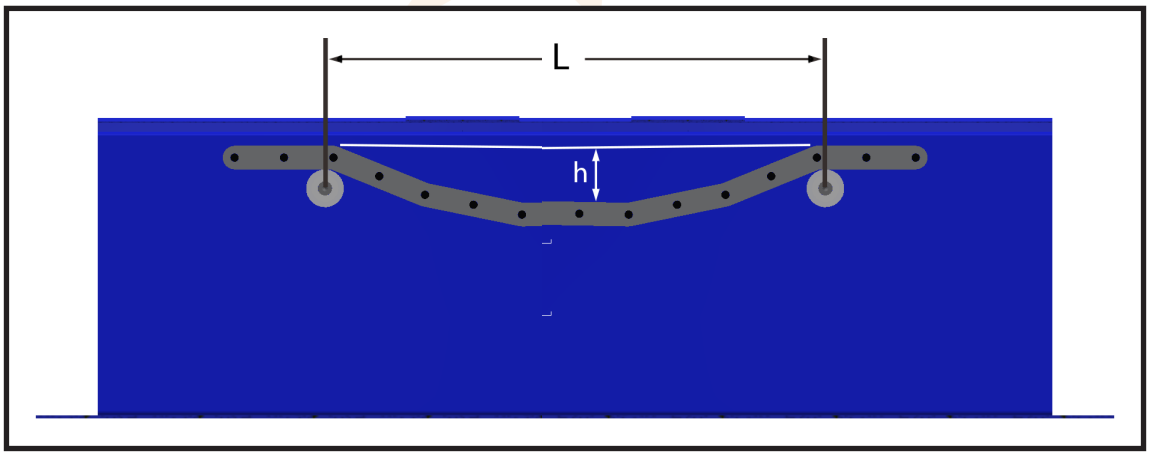


#s	DESCRIPTION	Part #	QTY
1	Anchor	60382	1
2	Adjustable Pipe	60386	1
3	Roller Base	60373	1
4	Roller	60376	2
5	Bearing	23119	4
6	Roller Rod	60380	2
7	Chain Wheel	14589	1
8	Chain Guide Bracket	35500	1
9	Chain Length	21983	n/a
10	1/2 x 1 1/2” Bolt	10294	12
11	5/8” Flatwasher	36090	4
12	5/8” Lockwasher	15027	4
13	1/2” Flatwasher	10324	2
14	5/8” Hex Nut	10322	4
15	1/2” Nylon Locknut	10318	12
16	1/4” x 1” Key	10281	1
17	1/4” Setscrew	10307	2

Chain Tensioning

IMPORTANT! It is important to properly tension the Chain. Improper adjusting could result in premature wear and/or damage to the Chain or Conveyor.

Straight Chain Conveyor



Check the tension of the Chain by measuring the Chain's sag in between two (2) of the Intermediate Section Return Rollers.

The distance between the Return Rollers is 40" (L). Apply 20 lbs of downward pressure, to the Chain, in between the Return Rollers. The Chain should sag, approximately, 1/2" (h) in order to be properly tensioned. Adjust the Chain, accordingly, to achieve the recommended sag.

Inclined Chain Conveyor

The Chain Conveyor Chain should, intially, be tensioned so that the Chain in between two (2) return rollers sags 1/2" when 20 lbs of downward pressure is applied.

Before starting the Chain Conveyor, ensure that the motor rotation is correct so that the material carrying portion of the Chain is travelling towards the Discharge.

Start the Chain Conveyor and observe the top Chain coming around the Head Sprocket into the top compartment of the Chain Conveyor. The Chain should not be so loose that it tries to wrap around the Sprocket and jam up the Chain Conveyor.

Remove the Elbow Section Cover to observe the Chain's movement. The running Chain's Paddles should be slightly above or just starting to touch the Divider Plate in the Elbow section.

When the Chain Conveyor is not in operation and the Paddles are not standing upright in the bottom compartment but, instead, look like they are starting to "lay down", then the Chain's tension is too loose.

The most common problems that occur with Chain Tension is that it is too tight. This will cause Chain Conveyors with Elbow Sections to be noisy from the sound of Paddles banging against the Divider Plate and the Elbow Section Cover. This causes the Chain Conveyor life to decrease from premature wear on the contacting components. If the Chain is too tight where it is making contact with the Elbow Section Cover, the chain needs to be loosened.

The Chain Conveyor Chain should never be so tight that it isn't flexible.

Electrical Installation

IMPORTANT! ***Inclusion of these electrical procedures is a precaution by the Manufacturer to help ensure that safety requirements are met both for the country of manufacture and the countries of usage. Inclusion of these procedures, outside the normal OPERATION of this equipment by a trained USER, does NOT in any way imply that these procedures are to be used BY unqualified personnel or in substitution FOR qualified electrical or service personnel.***

DANGER! ***Electricity can KILL! Use extreme CAUTION around electrical components. Have the providing electric company check the transformer and lead wires to be sure they are an adequate gauge to carry the starting requirements and full load of your Chain Conveyor Motor.***

Controls

The Owner must provide for appropriate electrical controls (ex. motor controller, etc.) that meet all specifications of the Norstar Industries Chain Loop. The Manufacturer does not provide or take any responsibility for electrical controls or safety devices.

Wiring

All electrical wiring must be installed by a qualified and/or certified electrician in accordance with all applicable local and national electrical codes.

IMPORTANT! ***To guard against electrical shock, all Chain Loop shall have a GROUND connection. Make sure electrical equipment and the Chain Loop are properly installed and grounded by a qualified and/or certified electrician according to the National Electrical Code and all other applicable codes and regulations. Parts should be purchased locally.***

IMPORTANT! ***Norstar Industries will not be liable for the electrical wiring used with this Chain Loop or failure of equipment due to improper electrical installation.***

All electrical devices used with this Chain Loop shall be arranged to operate in a "FAIL SAFE" manner; that is, if power failure or failure of device occurs, a hazardous condition must not result. The machine must not restart by itself after a power failure, etc., when power returns, or the jam is cleared.

Switch Box (not supplied by Norstar Industries)

This should be located with stop button and lock-out and/or tag-out features to supply power to the Motor that drives the Chain Loop. The Switch Box should be kept away from livestock, but placed at a location as convenient as possible for the operator. The operator should be able to view the entire Chain Loop from the Switch Box location. The Switch Box area must remain unobstructed. The Switch Box must be clearly marked as to its function.

Operation

Operator Instruction

Operator training must include:

- The reading of this Manual, with particular emphasis on the section "**Safety**" on pages 10-19 of this Manual.
- The reading and following of all SAFETY notices in this Manual and any other applicable local, regional or national regulations.
- Instruction in Chain Loop operation under normal conditions.
- Instruction in Chain Loop stopping / location in emergency situations.

Personnel should be alerted to the potential hazard of entanglement in the Chain Loop caused by items such as long hair, loose clothing and jewelry.

IMPORTANT! ***Make sure applicable SAFETY Signs are posted in all conspicuous areas. If SAFETY Signs become damaged or unreadable, contact the manufacturer immediately for replacements.***

Start-up

DANGER! ***Make certain power is OFF, LOCKED OUT and TAGGED OUT before working on or inside the Chain Loop. Failure to heed this warning will result in serious injury or death.***

It is advisable to have two (2) trained persons (one to operate the Chain Loop and one for Safety) present during each start-up of the Chain Loop.

Operation Requirements

To ensure positive performance and minimum maintenance, it is the Manufacturer's recommendation that this equipment be observed by one (1) Operator during the Chain Loop operation.

Use the Chain Loop only for loads it is designed to handle safely. Chain Loop equipment shall be used to convey only the specified commodities or materials within the rated capacity and the rated speed. Where special use is not indicated, or ratings are not available, consult the Manufacturer.

- Do **NOT** leave the Chain Loop running unattended.
- Should any damage to the Chain Loop occur, shut off, lock out and tag out power immediately.
- Do **NOT** restart the Chain Loop until necessary inspections and repairs have been made.
- Shut off, lock out and tag out all power after using the Chain Loop.

Break In Period

Before the Chain Loop is utilized for material transfer, it is recommended to break in the equipment by running it empty and partially loaded for a period of time. This will allow the Chain Loop to polish and will reduce risk of friction stalling. It is recommended that the following mechanical items be checked:

IMPORTANT! ***During the initial start-up, operators should take note of any unusual vibrations or noises. If necessary, make any adjustments or repairs to fix the problem.***

After operating for 1/2 hour:

- Re-torque fasteners and hardware.
- Check that all safety decals are installed and legible. Apply new decals if required.
- Check that no power lines are pinched or rubbing on moving parts. Re-align as required.
- Check that all guards are installed and working as intended.
- Check drive belt tension and alignment. Adjust as required.

Break In Period Cont'd

After operating for 5 hours and 10 hours:

- Re-torque all fasteners and hardware.
- Check power line routing.
- Check that all guards are installed and are working properly.
- Check safety decals. Install new ones if required.
- Check drive belt tension and alignment.

IMPORTANT! ***Do NOT start or stop the Chain Loop under load. Failure to follow this could cause permanent damage to the Chain Loop and could void the Warranty. Do NOT attempt to restart equipment until as much material has been emptied as possible.***

Operation Procedure

Filling Grain Bins

1. Open Discharge Gate above the target Grain Bin.
2. If possible, open Discharge Gate above a Grain Bin downstream to catch any overflow.
3. Start the Chain Loop. It is recommended to have someone monitoring the Amp Meter for the Drive Motor(s).
4. Start grain flow into the Chain Loop. It is recommended to slowly increase the flow to make sure that the amperage doesn't exceed the rated limit of the Drive Motor(s). Grain Deflector should be adjusted in the Inlet Hopper to help meter the grain flow.
5. Run the Chain Loop until the desired amount of grain/material has been moved.
6. Stop grain/material flow.
7. Allow all grain/material to run through the Chain Loop until no more grain/material exits through the discharge.
8. Stop the Chain Loop.
9. Close the Discharge Gate(s).

IMPORTANT! ***If the Chain Loop is to be inoperative for a prolonged period of time, before shutting down, operate the Chain Loop until material no longer discharges. This is very important as the conveyed material may become hard over a period of time.***

Transfering Grain/Material from Grain Bins

1. Open Discharge Gate above the withdrawaling Grain Bin.
2. Open Discharge Gate above the destination Grain Bin or Truck Loading Spout.
3. Start the Chain Loop. It is recommended to have someone monitoring the Amp Meter for the Drive Motor(s).
4. Start grain flow into the Chain Loop. It is recommended to slowly increase the flow to make sure that the amperage doesn't exceed the rated limit of the Drive Motor(s). Grain Deflector should be adjusted in the Inlet Hopper to help meter the grain flow.
5. Run the Chain Loop until the desired amount of grain/material has been moved.
6. Close Discharge Gate above the destination Grain Bin or Truck Loading Spout.
7. Stop grain/material flow.
8. Allow all grain/material to run through the Chain Loop until no more grain/material exits through the discharge.
9. Stop the Chain Loop.
10. Close the Discharge Gate(s).

IMPORTANT! ***If the Chain Loop is to be inoperative for a prolonged period of time, before shutting down, operate the Chain Loop until material no longer discharges. This is very important as the conveyed material may become hard over a period of time.***

Maintenance

Cleanliness is essential. Material build-up causes tracking problems and edge damage. Routine inspections and corrective maintenance measures shall be conducted to ensure that all Guards and safety features are retained and function properly.

Establish a MAINTENANCE SCHEDULE to prolong the life and SAFETY of your Chain Loop. Practice safe maintenance.

Check for dirt around the Drive Sections at least biweekly. Dirt/material build-up is one of the biggest reason that Chain Conveyor Belts become worn and need replacement.

Instruction of Personnel

Only qualified and trained personnel should service the Chain Loop. Maintenance training must include:

- The reading of the Manual, with particular emphasis on the section "**Safety**" on pages 10-19 of this Manual.
- The reading and following of all SAFETY notices in this Manual and any other applicable local, regional or national regulations.

It is a requirement to be properly trained and to have read and understand this Installation/Operator's Manual before operating, servicing, or otherwise handling this Chain Loop.

Chain Loops shall not be maintained or serviced while in operation unless proper maintenance or service requires the Chain Loop to be in motion. In either case, personnel shall be made aware of the hazards and how the task may be safely accomplished.

Basic Maintenance Rules

DANGER! ***Disconnect, LOCK OUT and TAG OUT electrical power before inspecting, adjusting, or servicing equipment unless maintenance instructions specifically state otherwise. Failure to heed this warning will result in serious injury or death.***

IMPORTANT! ***Comply with all applicable SAFETY WARNINGS discussed in this Manual.***

WARNING! ***The Motor and all moving parts must stop BEFORE any adjustments are made to the equipment or before it is left unattended. Failure to follow this warning may lead to personal injury or death.***

IMPORTANT! ***DO NOT attempt to remove adhering material manually unless the Chain Loop has been STOPPED and the power LOCKED OUT and TAGGED OUT. Wear safety glasses when cleaning or servicing the Chain Loop. Debris and dust associated with grain transport can damage sight or cause blindness.***

Electrical Wear

IMPORTANT! ***Make sure any electrical wiring is not frayed or cracked and meets proper codes and requirements. Check the Power Cord lead for any twisting. Replace it if any damage is apparent. Make sure to check wear at the Chain Loop Motors.***

DANGER! ***Electricity can kill.***

Material Build-up, Wear and Damage

Make sure to check for wear at these various points. Maintain proper adjustments on Chains or Belts. Replace the Chain/Belt Guards after adjustments or maintenance. Tighten hardware. Guards and Covers must be secured before the Chain Loop is restarted for normal operation (*see* **Figure 15**).

Before finishing, make sure all SAFETY signs are readable and tightly attached.

Remove Guards and Covers and check augers, wheels and belts for wear and damage. Clean out dust or particles that may have lodged inside.

DANGER! ***Electricity can kill! Disconnect, LOCK OUT and TAG OUT electrical power BEFORE inspecting, adjusting or servicing equipment unless maintenance instructions specifically state otherwise. Comply with all applicable SAFETY warning discussed in this Manual. Failure to heed this warning will result in serious injury or death.***

IMPORTANT! ***Replace all Guards and Covers. Do NOT run the Chain Loop with any Guards or Covers off.***

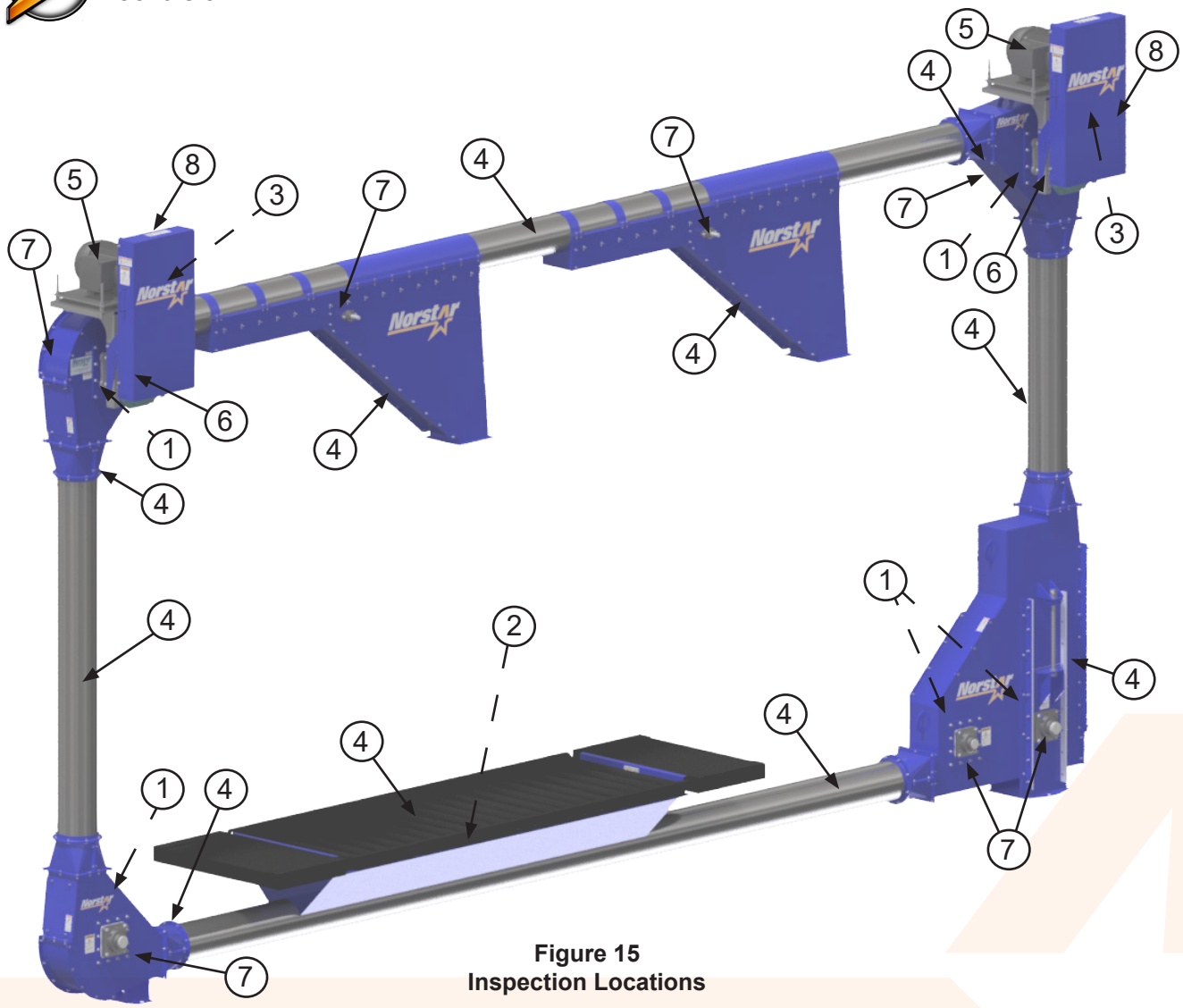


Figure 15
Inspection Locations

Item	Description	Inspect For:	Item	Description	Inspect For:
1	Sprockets	wear and damage	5	Head Motor	wiring good, tight bolts
2	Chain	wear and damage	6	Gearbox	wear and damage, tight bolts
3	Pulleys	wear and damage	7	Bearing	wear and damage, tight bolts
4	Tubes/Panels/Liners	wear and damage	8	Belt Guard	replace when finished

Lubricants

Check these points weekly or every fifty (50) hours of operation. Check oil levels in gearboxes and add oil as required (**USE ONLY 80/90 GEAR OIL**). To avoid equipment damage, lubricate all Bearings according to the instructions in this Manual. When anti-friction bearings are used, check for proper lubrication. Too much or too little lubricant will cause high operating temperatures that may damage the Chain Loop.

Figure 16
Gearbox Oil Decal

WARNING! ***DO NOT operate the Chain Loop without gear oil. GEARBOXES are shipped DRY or WITHOUT GEAR OIL. Refer to specifications above for proper filling and maintenance of the gearbox. Failure to add the proper amount of lubricant BEFORE STARTING the Chain Loop will cause permanent damage to the Gearbox and will void the Warranty.***

To fill the Chain Loop gearbox, remove the plug from the gearbox and fill up to the hole (*see* **Figure 16**).

- For a TA0107H Gearbox, fill the gearbox with **44.8oz** of oil.
- For a TA1107H Gearbox, fill the gearbox with **54.4oz** of oil.
- For a TA2115H Gearbox, fill the gearbox with **86.4oz** of oil.
- For a TA3203H Gearbox, fill the gearbox with **131.2oz** of oil.
- For a TA4207H Gearbox, fill the gearbox with **236.8oz** of oil.
- For a TA5215H Gearbox, fill the gearbox with **422.4oz** of oil.
- For a TA6307H Gearbox, fill the gearbox with **515.2oz** of oil.
- For a TA7315H Gearbox, fill the gearbox with **720.0oz** of oil.

Gearboxes are not shipped with oil, so immediate filling is required. After an initial operation of about 2 weeks, the oils should be changed. After the initial break in period, the lubricant should be drained, magnetic drain plug cleaned, gear case flushed and refilled ever 2500 hours under average industrial operating conditions.

Check these points weekly or every fifty (50) hours of operation.

Figure 16
Gearbox Oil Plug

IMPORTANT! ***For more information regarding Gearbox installation or maintenance, the manual can be downloaded at;***

https://www.baldor.com/mvc/DownloadCenter/Files/MN1601

Grease all bearings every 800 - 1000 hours (*see* **Figure 17**).

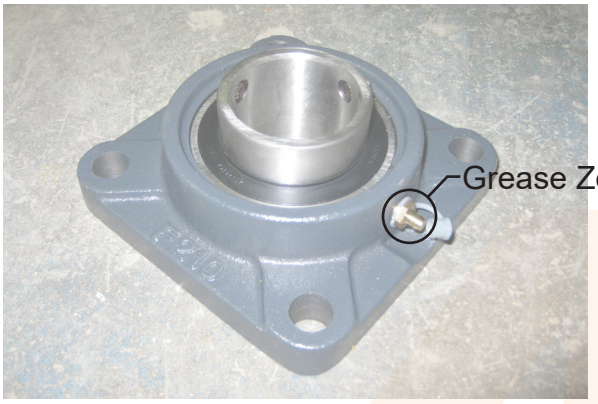


Figure 17
Bearing Grease Zerk

Additional Maintenance Tips

- Check for deterioration or looseness of any bolts or fasteners.
- Check the Pulley hub bolts and set screws after the first 8 - 10 hours of operation.
- Check, regularly, for wear and/or damage.
- Make sure no tools get left on or around the Chain Loop after maintenance.

Troubleshooting

General Troubleshooting

Trouble	Possible Cause	Solution
Conveyor is making noise	Body Misalignment	Ensure that the section joints align with each other to ensure the paddles dont make contact.
	Chain Misalignment	Check to make sure that the sprocket is centered in the Corner sections.
	Bent Paddles	Check to see if any paddles are bent. Straighten or replace as needed.
	Loose Paddles	Tighten or replace nuts and bolts securing the paddles.
	Worn Sprocket	Replace with a new Sprocket.
Product is moving past destination Discharge Gate	Flowability of product and particle size	There is ALWAYS the chance of some material carryover due to material balancing on the chain links and paddles. A ground of sticky product will have more carryover than a whole material. Open discharge gate downstream to capture excess.
	Chain speed is too fast	Slow the conveyor down or lengthen the discharge gate opening.
	Gate not opening all the way	Find reason for the problem. Remove blockages, re-adjust gate or repair gate as needed.
Product is returning to fill point	Discharge Gate is closed	Open discharge gate.
	Discharge Gate is obstructed	Clear the obstruction to allow product flow.
	Carry over from discharge gate	If possible, open a discharge gate down-flow to claim excess product.
Chain is slipping on drive sprocket	loose chain	adjust the chain tension in the inspection corner to tighten the chain.
	catching on obstruction	paddles may be catching at joints or some other obstruction. Remove to allow smooth chain travel.
	system starting under load	let system run until empty before shutting it down. If a shut down occurs while the system is loaded, remove as much grain as possible before turning power back on.

General Troubleshooting Cont'd

Trouble	Possible Cause	Solution
Conveyor is plugging	See if the problem is with the conveyor first.	Find out if the problem has always existed or if it is a new problem. Take off Inspection Covers and any Covers around Inlets to check if levels are correct.
	Product not flowing into discharge gate fast enough	Check to see if the discharge transition has too small of an opening and correct transition. If transition seems okay check to see if the conveyor is feeding something that cannot handle the capacity. Is the conveyor speed outputting too much material?
	Intermediate gates are left open and carrying product past after bins are full	Ensure bin fill is being monitored so that the conveyor doesn't overfeed the gate.
	Intermediate gates are closed	Open discharge gate.
Chain is breaking	Pins seem loose in side plates	Product being conveyed is abrasive or corrosive and is seizing in between the pin so that they rotate improperly. Replace with different style of chain.
	Chain side plates are splitting open or pulling apart	Verify parameters to see what may have changed. Possible the wrong chain is sized for the application. Chain may be catching somewhere.
	Rollers breaking on chain	Factory probably over hardened rollers. You should be able to hit the roller with a hammer without breaking. If it dows break, prelace with new chain.
Incorrect Capacity	Is it due to the Chain Loop	Find out if the problem has always existed or if it is a new problem. Take off Inspection Covers to check if levels are correct.
	Material is running past Discharge Gate	Make sure Discharge Gate is open all the way. If obstructed, clear the Gate to maximize product flow.
	Improper Chain Speed	Check the Head Shaft RPM. If not possible, check correct Pulley sizes, Gearbox ratio and Motor label RPM.
	Improper Inlet	Inlet is too small. Increase size.
	Inlet is obstructed	Clear the inlet to improve product flow.
	Loose Chain	Check Chain tension.
	Bent or missing Paddles	Straighten or replace.
	Wet product	High moisture product can cause a decrease in capacity. Be careful not to overfeed Loop when using high moisture product as this can cause plugging.

General Troubleshooting Cont'd

Trouble	Possible Cause	Solution
Drive belts slipping	Motor is overloaded	Check motor amperage when running Chain Loop. Make sure Motor is not overloaded. Unplug Loop if necessary.
	Belts are loose	Tension belts.
Uneven Paddle Wear	Conveyor misalignment	Check to make sure that the Loop is straight and that the tube joints aren't offset at all.
	Sprocket misalignment	Check to see if Sprockets are centered in the Corners. Center if necessary.

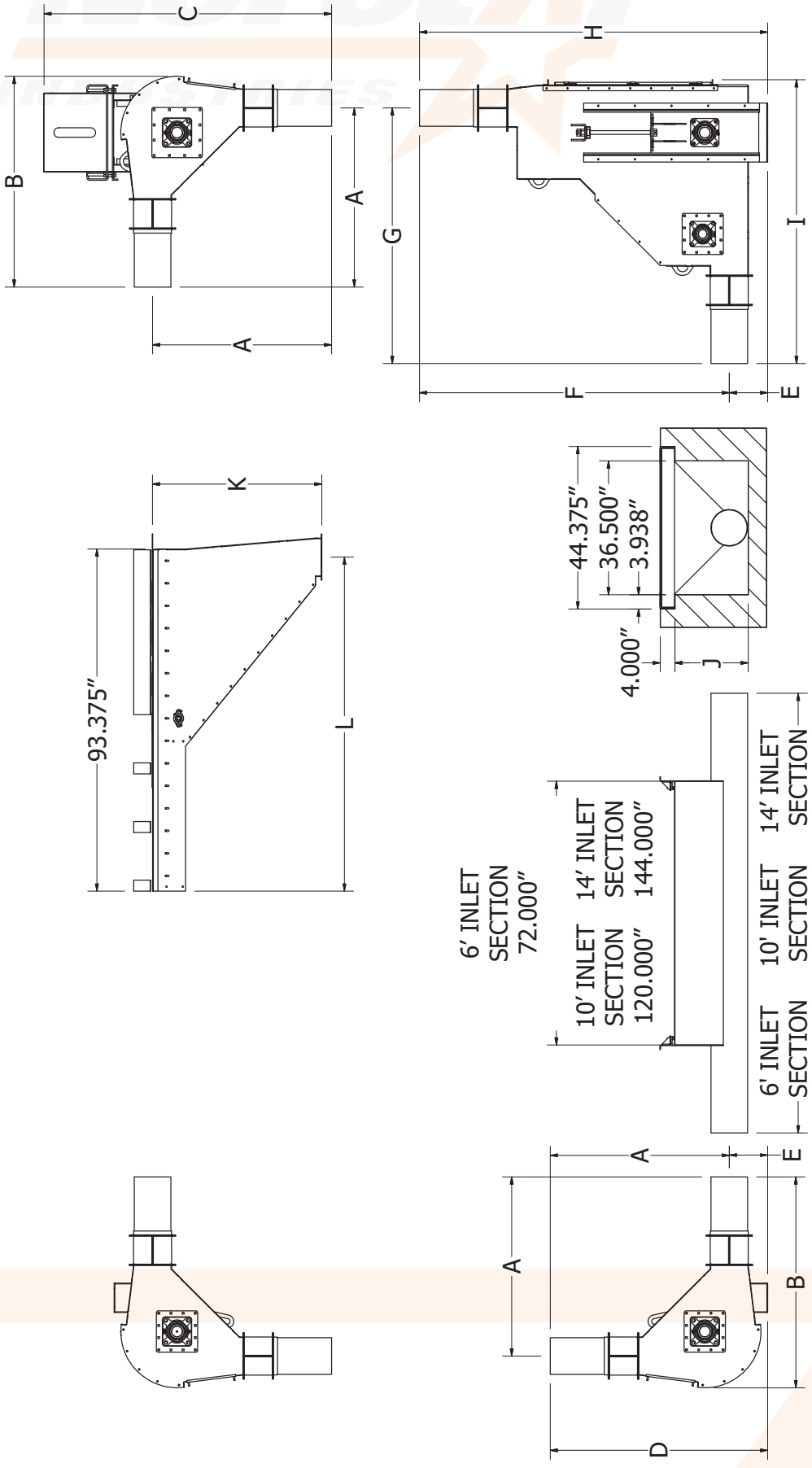
Electrical Troubleshooting

Trouble	Possible Cause	Solution
Low Capacity *Material not unloading at full capacity*	Low voltage in power source	Check voltage at the motor input. Voltage in power lines may be low. Consult an electrician and/or power company.
Slow Speed *Chain Loop operating below normal speed*	Blown fuse on three phase circuit	Check and replace fuses.
High Amperage	Defective motor	Check the motor for short or open circuited condition. Repair or replace motor.

Speed Reducer Troubleshooting

Trouble	Possible Cause	Solution
Overheating	Load exceeds drive capacity	Check the rated capacity of drive. Replace with drive of sufficient capacity or reduce load.
	Insufficient oil	Check the oil level and increase as needed.
	Too much oil in the drive caused churning and excessive heat is generated by the fluid friction of the churning oil	Check the oil level and remove as needed.
	Wrong grade of oil	Flush and refill to the indicated oil level with the grade specified.
Noise and Vibration	Improper torque arm installation	Check mounting bolts and tighten.
	Failing/worn out bearings	Replace worn bearings.
	Excessively worn gears	Determine if the load exceeds name plate rating. If overloaded, reduce load or replace with reducer of sufficient capacity. Replace gearbox.
	A low oil level reduces the muffling effect of the oil	Check the oil level and increase as needed.
	Loose parts	Inspect drive for broken parts, loose bolts, nuts and screws. Check all keys for proper size and fit. Replace parts as necessary.
Oil leakage	Excessive oil	Check oil level and drain to the indicated oil level
	Clogged breather	Clean or replace breather. Clean breather hole with pipe cleaner and a suitable non-flammable solvent.
	Worn seals	Replace seals.
Shaft Slippage	Missing key or loose bushing	Replace key and/or tighten bushing.
Excessive Shaft End Play	Worn bearings	Worn bearing balls and raceways have a dulled appearance. Replace worn bearings. Clean and flush drive and replace oil.
Excessive Backlash	Worn gears or loose parts	Replace worn gears and keys. Tighten loose screws.

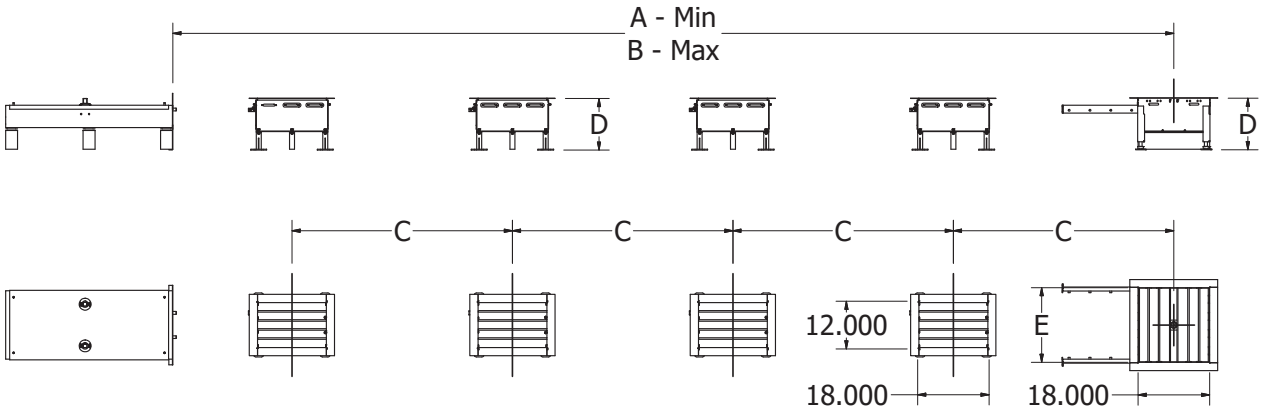
Spec Sheet



MODEL	A	B	MIN	MAX	D	E	F	G	H	I	J	K	L
6”	43.228”	49.921”	70.040”	82.921”	51.728”	8.500”	86.563”	71.750”	95.063”	77.447”	19.250”	44.188”	91.188”
8”	46.048”	53.726”	71.412”	90.543”	55.532”	9.500”	85.563”	70.750”	95.063”	77.448”	19.750”	45.188”	91.188”
10”	48.873”	57.538”	74.963”	92.543”	59.346”	10.500”	84.563”	69.750”	95.063”	77.500”	20.000”	46.188”	91.188”
12”	55.353”	64.998”	80.323”	96.543”	66.826”	11.500”	83.563”	68.750”	95.063”	77.500”	20.500”	47.188”	90.188”

C

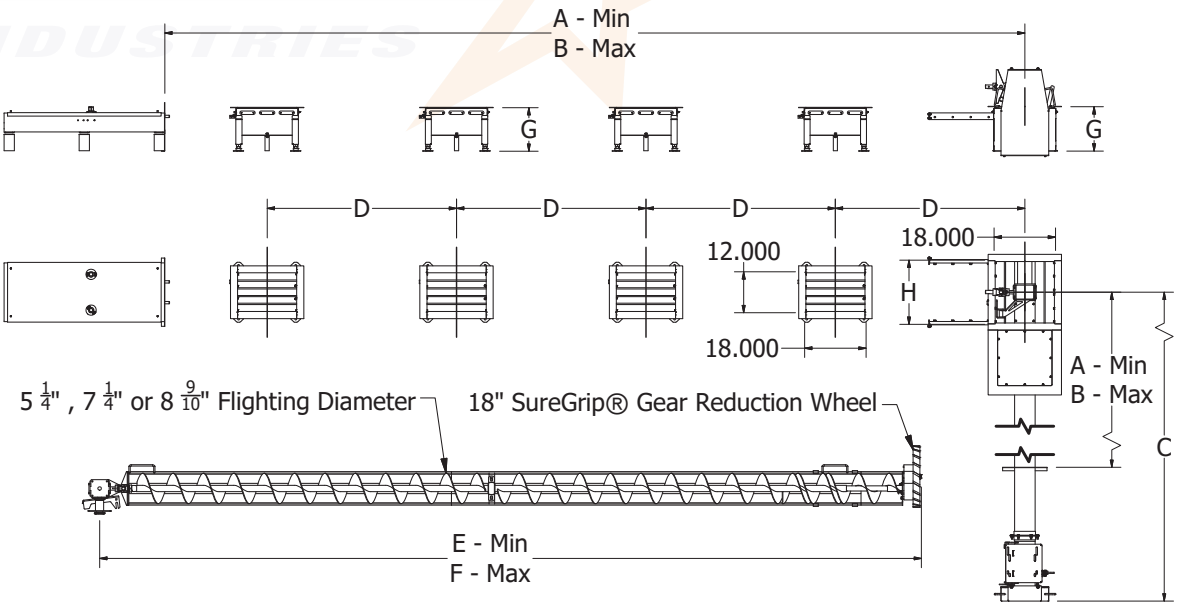
Chain Loop Spec Sheet
Portable Sweep Sumps



MODEL NO.	INTERMEDIATE GATES	A	B	C
14/15	1	84”	90”	54”
18/19	1	108”	114”	78”
20/22	1	120”	132”	90”
24/26	2	144”	156”	57”
27/29	2	162”	174”	66”
30/31	2	180”	186”	75”
32/34	3	192”	204”	54”
35/37	3	210”	222”	60”
38/40	3	228”	240”	66”
42/43	4	252”	258”	55.5”
44/46	4	264”	276”	58.5”
48/50	4	288”	300”	64.5”
54/55	4	324”	330”	73.5”
60/61	5	360”	366”	66”

MODEL NO.	D	E
6” x 13” Floor	13”	14.791”
8” x 13” Floor	13”	16.791”
10” x 13” Floor	13”	18.791”
10” x 15” Floor	15”	18.791”
12” x 15” Floor	15”	20.791”
12” x 17” Floor	17”	20.791”

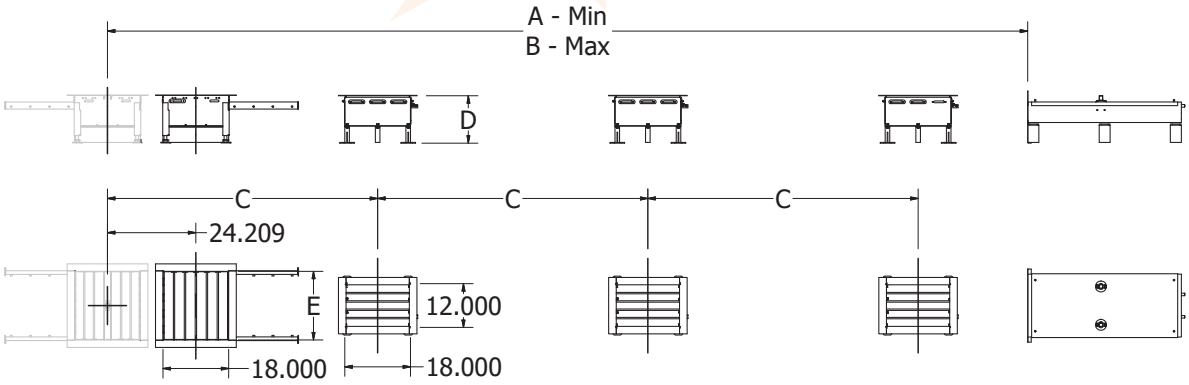
Chain Loop Spec Sheet
Powersweep Sumps



MODEL NO.	INTER-MEDIATE GATES	A	B	C	D	E	F
14/15	1	84”	90”	123.15”	54”	66.25”	96.25”
18/19	1	108”	114”	147.15”	78”	85.25”	115.25”
20/22	1	120”	132”	165.15”	90”	103.75”	133.75”
24/26	2	144”	156”	189.15”	57”	124.25”	154.25”
27/29	2	162”	174”	207.15”	66”	138.25”	168.25”
30/31	2	180”	186”	219.15”	75”	161.75”	191.75”
32/34	3	192”	204”	237.15”	54”	175”	205”
35/37	3	210”	222”	255.15”	60”	193.75”	223.75”
38/40	3	228”	240”	273.15”	66”	211.25”	241.25”
42/43	4	252”	258”	291.15”	55.5”	232.25”	262.25”
44/46	4	264”	276”	309.15”	58.5”	249.25”	279.25”
48/50	4	288”	300”	333.15”	64.5”	268.25”	298.25”
54/55	4	324”	330”	363.15”	73.5”	303”	333”
60/61	5	360”	366”	399.15”	66”	339”	369”

MODEL NO.	G	H
6” x 13” Floor	13”	14.791”
8” x 13” Floor	13”	16.791”
10” x 13” Floor	13”	18.791”
10” x 15” Floor	15”	18.791”
12” x 15” Floor	15”	20.791”
12” x 17” Floor	17”	20.791”

Chain Loop Spec Sheet
Sump Expansion



MODEL NO.	INTERMEDIATE GATES	A	B	C
14/15	1	84”	90”	54”
18/19	1	108”	114”	78”
20/22	1	120”	132”	90”
24/26	1	144”	156”	114”
27/29	1	162”	174”	132”
30/31	1	180”	186”	150”
32/34	2	192”	204”	81”
35/37	2	210”	222”	90”
38/40	2	228”	240”	99”
42/43	3	252”	258”	74”
44/46	3	264”	276”	78”
48/50	3	288”	300”	86”
54/55	3	324”	330”	98”
60/61	4	360”	366”	82.5”

MODEL NO.	D	E
6” x 13” Floor	13”	14.791”
8” x 13” Floor	13”	16.791”
10” x 13” Floor	13”	18.791”
10” x 15” Floor	15”	18.791”
12” x 15” Floor	15”	20.791”
12” x 17” Floor	17”	20.791”

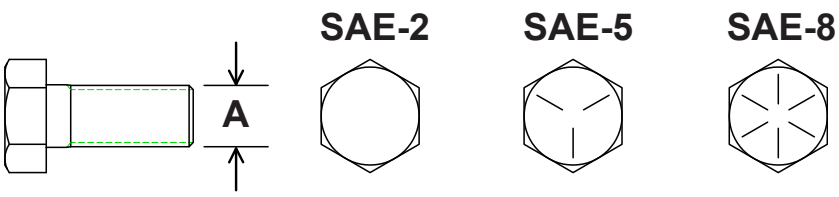
Bolt Torque

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

ENGLISH TORQUE SPECIFICATION

Bolt Diameter	Bolt Torque*					
	SAE 2		SAE 5		SAE 8	
"A"	N.m.	(lb-ft)	N.m.	(lb-ft)	N.m.	(lb-ft)
1/4"	8	(6)	12	(9)	17	(12)
5/16"	13	(10)	25	(19)	36	(27)
3/8"	27	(20)	45	(33)	63	(45)
7/16"	41	(30)	72	(53)	100	(75)
1/2"	61	(45)	110	(80)	155	(115)
9/16"	95	(70)	155	(115)	220	(165)
5/8"	128	(95)	215	(160)	305	(220)
3/4"	225	(165)	390	(290)	540	(400)
7/8"	230	(170)	570	(420)	880	(650)
1"	345	(225)	850	(630)	1320	(970)



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

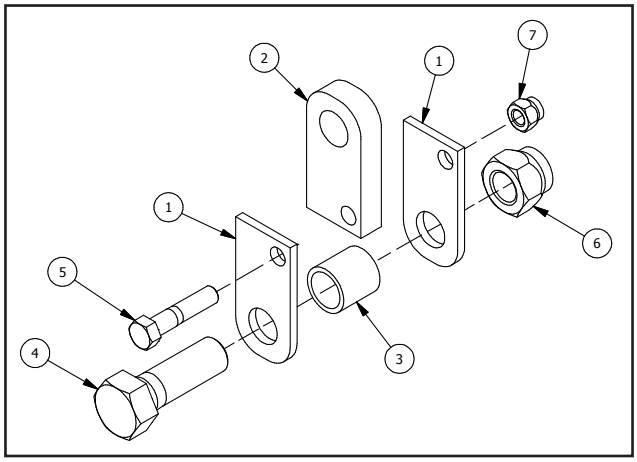
*Torque value for bolts and capscrews are identified by their head markings.

Exploded Views and Parts Lists

The manual contains a parts list and exploded view for your machine. It is separated into major sections which correspond to the groups shown in the Table of Contents and the accompanying illustrations.

The first page of each major section lists the contents of that section, each of which consists of exploded views and related tabular listings.

#s	DESCRIPTION	PART #	QTY
1	Bracket	00001	2
2	Pivot Bracket	00002	1
3	Spacer	00003	1
4	3/4 x 2 1/4” Bolt	00004	1
5	3/8 x 1 3/4” Bolt	00005	1
6	3/4” Nylon Locknut	00006	1
7	3/8” Nylon Locknut	00007	1



WHEN ORDERING PARTS

Always give your dealer the model and Serial Number of your machine to assist him in ordering and obtaining the correct parts. Use the exploded view and tabular listing of the area of interest to exactly identify the required part.

USING THE MANUAL

Parts data consists of exploded view illustrations and associated parts list tables which are read as follows:

ITEM
The item number is the identifier number from the illustration. For example, number 3 on an illustration points to a component which is item 3 on the accompanying table.

DESCRIPTION
This column contains the name or description of the part.

PART NUMBER
The part number is the number by which the component may be identified and ordered from your dealer.

QUANTITY
This column contains the quantity of the items in the assembly.

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