Rex High Performance Chain Bucket Elevator Manual 3520

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Introduction

Accidents resulting from the use of conveyors and bulk handling equipment can be reduced or eliminated by following safe practices in installation, operation, and maintenance. Only trained and qualified personnel should perform these activities. Personnel must be trained in recognizing hazards and taking safety precautions. Refer to ***ANSI B20.1-1996, American National Safety Standard for Conveyors***. Additionally, personnel must wear hard hats, safety glasses, steel toed shoes, use a safety harness when appropriate and wear suitable clothing that protects body areas exposed to direct contact. ***Rexnord*** advocates a safety program consisting of the following elements.

- Management commitment
- Written lockout/tagout procedures
- Accident investigation/prevention
- Assignment of responsibility
- Procedures for startup of equipment
- Documented training program

Installing, Servicing, Maintaining, or Repairing Equipment

The following steps are followed when servicing, maintaining, or repairing equipment where the unexpected startup, energization, or the release of stored energy could cause injury to employees working on or around the equipment serviced. Refer to ***OSHA/ MSHA*** lockout/tagout standards.

1. NOTIFY ALL AFFECTED EMPLOYEES that a lockout/tagout system is going to be utilized and state the reason why. The authorized employee shall know the type and magnitude of energy that the machine utilizes and understands the associated hazards.
2. PREPARATION FOR SHUTDOWN. Before turning off the machine or equipment, the authorized employee shall be familiar with the types of energy involved, the hazards associated with the energy sources, and the method and means to control the energy. At this time, all affected employees should be notified of the proposed shutdown.
3. EQUIPMENT SHUTDOWN. The equipment shall be shut down per established company standards in accordance with ***OSHA/ MSHA*** standards. Shutdown shall be conducted in the sequence prescribed in the company's written procedure.
4. LOCKOUT DEVICE APPLICATION. The authorized employee shall affix lockout devices on all energy isolating devices.
5. STORED ENERGY. Every potential hazardous stored or residual energy shall be relieved, disconnected, restrained, or rendered safe. This is usually accomplished using blocks, blanks, straps, etc.
6. VERIFICATION OF ISOLATION. Before starting work on the machines or equipment that have been locked out, the operating controls shall be activated to verify proper energy isolation. At this time, maintenance, repairs, or service can be conducted.

Startup Procedures

When maintenance, repairs, or service is complete, the equipment can be released from lockout. Lockout devices are removed and energy is restored to the equipment using the following procedures:

1. THE WORK AREA IS INSPECTED to ensure that all nonessential items have been removed. Any machine or equipment guarding that was removed MUST be reinstalled.
2. ALL AFFECTED EMPLOYEES ARE NOTIFIED that the machine or equipment is to be activated and lockouts are being removed.
3. CHECK WORK AREA, VERIFY IT IS CLEAR OF EMPLOYEES AND TOOLS. Verify that all operating controls are in the off or neutral position. Authorized employees can then remove their specific lockouts.
4. THE EMPLOYEE WHO APPLIED EACH lockout device must remove it from the energy-isolating device.

Safety Inspection

Conduct a minimum of one documented safety inspection per year by someone trained and authorized by management. This certification should include the following elements:

- Date of inspection
- Verification of safety training/conformance
- Name of person performing the inspection
- Verify safety equipment functional

Operation

- An elevator 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 is observed.
- Only a trained person is permitted to operate an elevator. Training includes instruction in operation under normal conditions and emergency situations.
- Where safety is dependent upon stopping devices or starting devices or both, they are kept free of obstructions to permit ready access.
- The area around loading and unloading points is kept clear of obstructions that could endanger personnel.
- Personnel working on or near an elevator are instructed as to the location and operation of pertinent stopping devices.
- An elevator is used to transport only loads it is designed to handle safely.
- Under no circumstances are the safety characteristics of the elevator to be altered if such alternations would endanger personnel.
- Routine inspections and corrective maintenance measures are conducted to ensure that all guards and safety devices are installed and function properly.
- Elevators are NOT maintained or serviced while in operation.

- Safety Signs: labels are placed conspicuously in hazardous areas to warn of possible injury. Contact ***Rexnord*** to obtain additional safety labels.

Maintenance

Only qualified and trained personnel perform maintenance and service.

- Whenever possible, elevator is emptied of material before maintenance activities.
- No maintenance or service is performed when an elevator is in operation.
- When an elevator is stopped for maintenance or service, the starting devices, prime movers, or powered accessories are locked out in accordance with a procedure designed to protect all persons or groups involved with the elevator against an unexpected restart.
- Personnel alerted to the hazards of stored energy, which may exist after the power source is locked-out.
- When an elevator is stopped, allow sufficient time for material/elevator to cool before direct contact.
- Allow sufficient time for dust/fumes to settle before servicing enclosed elevators.
- Anytime a guard or safety device is removed, they are reinstalled and function properly before startup.

Lubrication

Elevators shall not be lubricated while in operation.

- Where the drip of lubricants or process liquids on the floor constitutes a hazard, drip pans, or other means of eliminating the hazard shall be provided.

Adjustment

Elevators shall not be adjusted while in operation.

Housecleaning

Personnel performing these routine activities require awareness training of the hazards while housecleaning near an operating elevator. These hazards are, among others, inadvertent contact, entanglement, high temperatures, slipping/falling, toxic dust, fumes and noise. The precautions described in *Operation, page 1-2* must be followed.

Noise

The sound pressure level produced by elevators are known to exceed 70 dBa, at distances and locations on the elevator where affected personnel are present. Total sound pressure levels near an elevator depend largely on the material handled, loading and unloading chute profiles, additional equipment functioning in conjunction with the elevator and the environment and/or structure wherein elevators operate. As each application varies, ***Rexnord*** recommends that end-users measure the sound pressure level for each elevator and take appropriate action as required by government regulations.

Preface

This manual contains instructions for installation, operation, and maintenance of ***Rex*** High-Performance Bucket Elevators. The reliable operation and long service life of these elevators depend to a great extent on the care taken during installation and operation, and the degree of maintenance.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, the matter should be referred to ***Rexnord Industries Incorporated***.

Workmanship

This manual is intended only as an aid for the installation, operation and maintenance of ***Rexnord Industries Incorporated*** equipment.

It is further based on the assumption that only qualified workmen will perform the service work, utilizing good workmanship and practices at all times.

Technical Services

Various technical services are available to you. If you are interested, we can furnish supervision of erection, erection inspection only, or inspection service. As you can readily understand, the finest equipment available will not do the job unless it is installed properly.

Supervision of Installation:

Supervision of Installation permits you to furnish your own manpower, tools, payroll, insurance, etc., with the assurance of a competent man to supervise the work and assure you of a job properly installed. This type of work is done on a per diem basis as outlined in our material proposal. If it is to be handled on a contract basis, there would be a time limit included.

Rexnord highly recommends using this service when installing a new piece of ***Rex*** equipment.

Installation Inspection:

Installation Inspection service allows you to handle complete erection and avail yourself of our specialist for a final check of erection and initial operation. Payment would be on a per diem basis as outlined in our material proposal.

Inspection Service:

Inspection Service covers such matters as trouble-shooting and correction of difficulties after initial or extended operation and inspection for repairs and replacement purposes.

Since many of our customers are availing themselves of these services, our servicemen are in the field much of the time. Therefore, please allow sufficient time for us to schedule a man to coincide with your needs.

To place an order for technical services please contact ***Rexnord Industries Incorporated***, ***Industrial Chain and Conveyor, 4800 W. Mitchell St., Milwaukee, WI 53214***, **Attention: Field Service Manager** and provide the following information:

- ***Rexnord*** Order Number
- Your Order Number
- Company Name who purchased equipment
- End User Company Name of equipment
- Your Name & Title
- Type of service required
- Date work required
- Purchase order number for the Technical Service to be provided
- Location and directions to the site.

Elevator Nomenclature

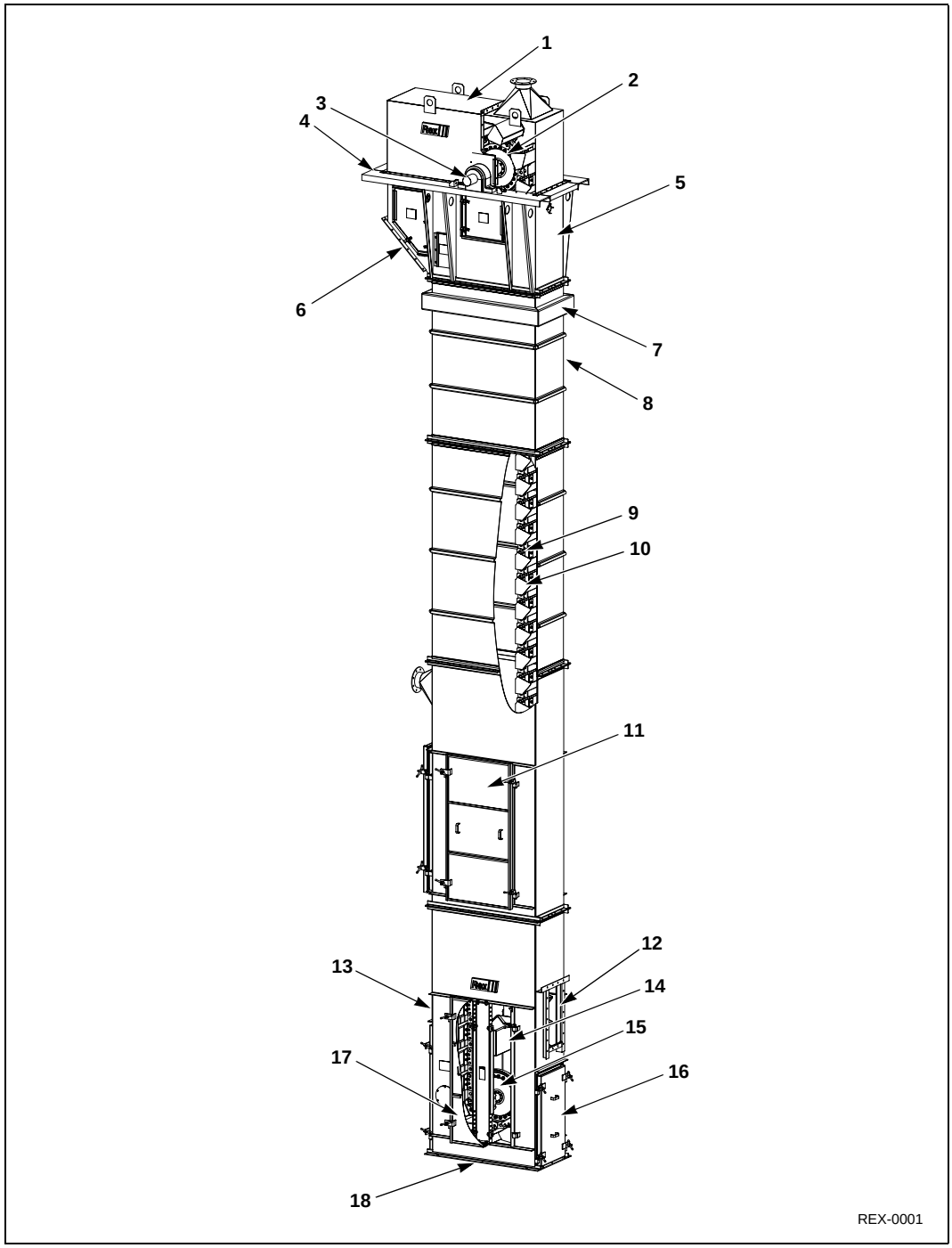


Figure 2-1: *Typical **Rex** High-Performance Chain Bucket Elevator*

1 – Split upper head section
2 – Segmental rim traction wheel or sprocket with solid steel body
3 – Pillow block roller bearings
4 – Head shaft bearing supports integral with lower head section
5 – Lower head section
6 – Stub discharge spout with adjustable rubber peeler lip
7 – Support collar
8 – Intermediate casing with deep beaded crimps for stiffness

*9 – Heavy-duty **Rex** steel roller-less chain*
10 – Buckets
11 – Intermediate hinged type inspection door (optional)
12 – Flanged inlet opening for easy connection to loading chute
13 – Boot section
14 – Internal gravity take-up
15 – Segmental rim traction wheel or sprocket with body
16 – Front and rear cleanout and access panels with quick acting latches
17 – Double hinged access doors with quick acting latches
18 – Flanged bottom with flat base plate for complete bearing on foundation

WARNING
Failure to observe and follow all safety instructions may result in serious personal injury or property damage.

Safety

Elevator moving parts operate unguarded by necessity of function, i.e. belts, chain, pulleys, buckets, etc. create hazards to be avoided. We strongly recommend that equipment installers, operators and maintenance personnel use a LOCKOUT/TAGOUT safety procedure whenever installing or servicing equipment, and that all affected personnel receive training in safety practices, including awareness of hazard areas to be avoided. In addition, the use of proper tools and methods can prevent accidents that can result in severe injury to all affected personnel.

A number of safety instructions are listed throughout this manual. They are designated by a black triangle around a white exclamation point and the word **WARNING** in bold letters. These instructions alert affected personnel of hazard areas or unsafe procedures. Study them carefully and follow them: insist that those working with you do the same, accidents are often caused by carelessness or negligence. Safety instructions describe hazards presented by the elevator, but due to the variety of material handled and the means the material enters and exits the elevator, ***Rexnord*** cannot describe all of the hazards present in an installation. The ***Rex*** High-Performance Bucket Elevator must be operated in accordance with all installation and safety instructions in this manual.

Shipping

Copies of packing lists are attached to the shipment and sent to personnel as specified in instructions of your purchase order.

It is the responsibility of personnel at the installation site to obtain a copy of this list.

As the material is unloaded, a careful check should be made against the packing list.

Damaged material is to be reported to the carrier company and ***Rexnord Industries Incorporated*** immediately to insure proper substantiation for claims and adjustments.

It is your responsibility to file claims as ***Rexnord Industries Incorporated*** has no authority to allow claims.

Site Preparation

Before the actual installation of the equipment is begun, a thorough inspection of the site is necessary.

Rexnord Industries Incorporated assumes no responsibility for site preparation.

It is recommended that the site be cleared of all excess material to allow for free and easy movement by installation personnel and the equipment they are utilizing.

All foundation anchor bolts and other steelwork embedded in concrete must be checked for cleanliness, accuracy of location, and alignment.

Constant referral to General Arrangement Drawing(s) and Anchor Bolt Layout Drawing(s), and diligent use of a ruler, surveyor's transit, etc., will insure accuracy when the equipment is erected.

It is understood that, in the event of error in location of embedded steelwork or anchor bolts, they will be correctly positioned by the party or parties responsible *before* installation of the equipment proceeds.

Drawings

The material furnished on this order will be assembled as indicated on ***Rexnord Industries Incorporated*** General Arrangement Drawings.

The drawings were prepared specifically for this equipment.

The drawings are located in the back of this manual under the tab heading "Drawings".

If additional copies are required, contact ***Rexnord Industries Incorporated***, ***Industrial Chain and Conveyor, 4800 W. Mitchell St., Milwaukee, WI 53214***, with the following information:

- ***Rexnord*** Order Number
- Your Order Number
- Company Name who purchased equipment
- End User Company Name of equipment

Material Identification

The materials and components needed to install and operate a piece of equipment are assigned a series of mark numbers to help identify the parts as they are received and installed. These mark numbers are indicated on the General Arrangement Drawings which are a part of this manual, located under the tab labeled "Drawings".

This marking system is intended to provide a cross-reference between the General Arrangement Drawing(s) [Erection Drawings(s)] and piece parts. For example, the mark number identification system enables you to take a piece part and establish on which General Arrangement Drawing it is shown, and also where it is located on the drawing. Conversely, you can use the mark numbers that are shown on the General Arrangement Drawings to identify all of the piece parts that are needed for a piece of equipment.

Further identification is shown on each piece and/or sub-assembly as noted below.

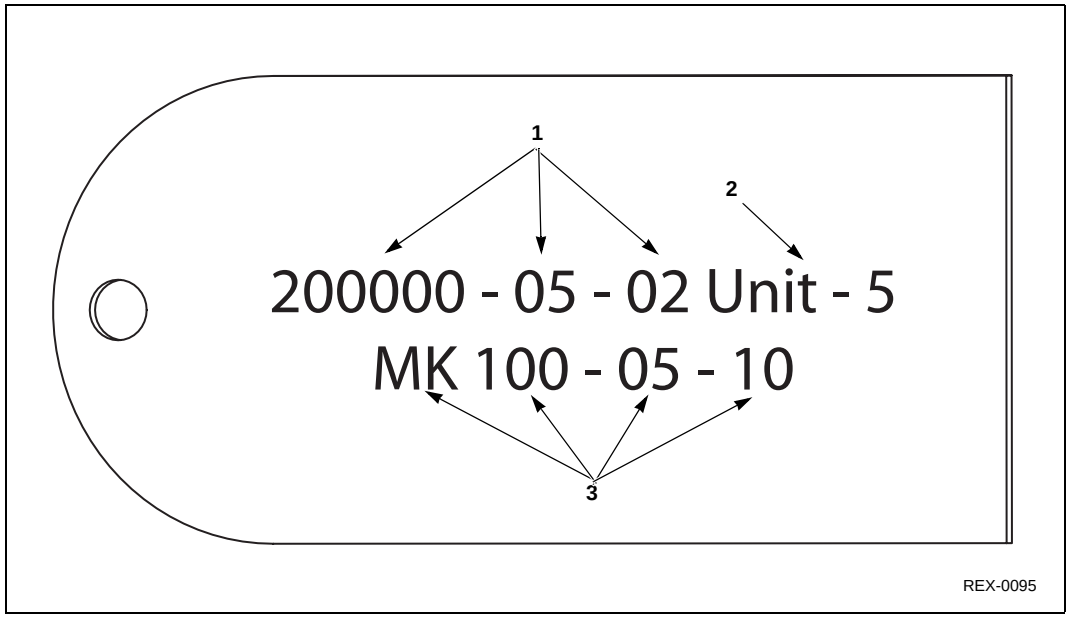


Figure 2-2: Example 1 of Structural Mark Number Tag

1 – General Arrangement Drawing Number - The "200000" is the order number and the "05-02" is the drawing suffix
*2 – **Rexnord** Unit Number - The unit number "Unit - 5" refers to a complete piece of equipment such as one complete bucket elevator*
3 – Mark number - Fabrication Drawing Suffix Number "10" (200000 -05 - 02 number with 200000 omitted)

On the General Arrangement Drawing, you will find this piece identified as MK100-05-31 or 735-80200-80. An arrow is drawn to the exact location of the piece or sub-assembly on the General Arrangement Drawing.

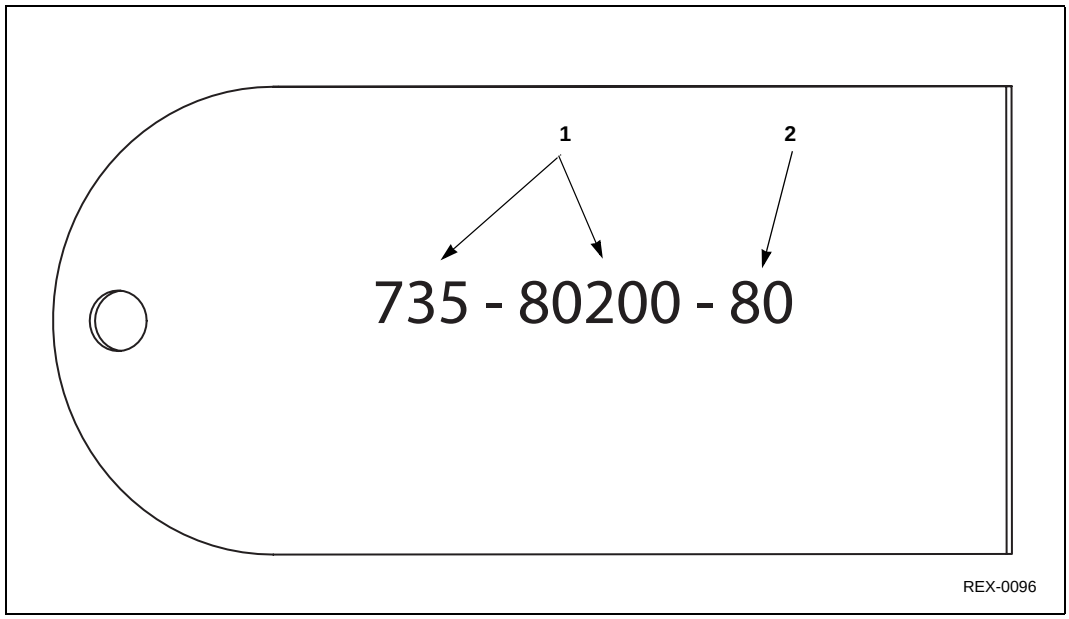


Figure 2-3: Example 2 of Structural Mark Number Tag

1 – Fabrication Drawing Number - Numbers such as "325630", "103-595", or "CA3240" may also used instead of the "735-80200"

2 – Mark number - Fabrication Drawing Suffix Number "80"

Where there is a large quantity of identical pieces, such as collars, buckets or bearing plates, only a representative number of pieces in each bundle will be marked. At least one marked piece from each bundle should be saved until the last of the bundle has been erected. Otherwise, the remaining pieces not marked cannot be identified.

When material is shipped direct from our vendors, pieces may be marked similarly to above examples for easy identification.

Machinery shafting will be stamped on one end with ***Rex*** order number, mark number and shafting assembly drawing number.

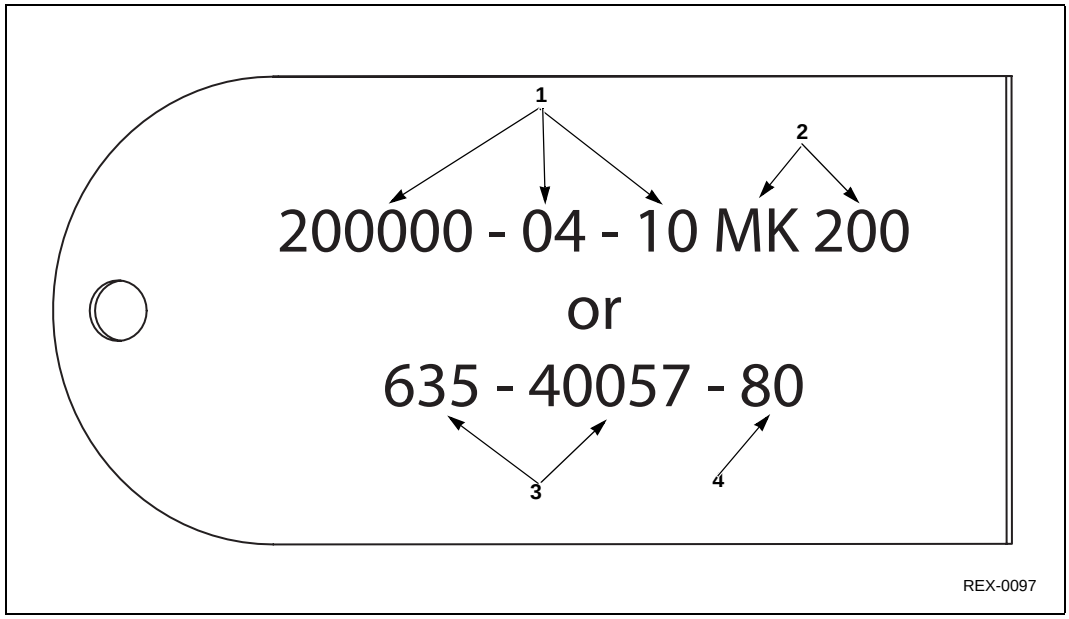


Figure 2-4: Example 1 of Structural Mark Number Tag

*1 – Shafting Assembly Drawing Number - The "200000" is the **Rexnord**order number, the "04" identifies the unit number and the "10" is the drawing number*
2 – Mark number - "MK 200"
3 – Shafting Assembly Drawing Number - "635-40057"
4 – Mark number - "80"

All miscellaneous loose items such as bolts, nuts, washers, etc. are identified as “Field Material” in addition to our regular marking. This material will be packaged individually according to fabrication drawing numbers.

When a number of “Field Material” packages are required to complete your order, the packages are collectively shipped in one or more larger containers. These containers will be identified as Box #1, Box #2, etc., and the contents of each outlined on our packing list.

Any special markings which you requested have been added to our regular method of identification

READ THIS MANUAL COMPLETELY BEFORE INSTALLING OR OPERATING THIS EQUIPMENT.

Installation Procedures

The procedures outlined represent an accepted method for installing bucket elevators. It is recognized that other procedures may be equally effective and that variations may prove advisable, depending on conditions and surroundings. However, variations from the methods described in this manual must be approved by ***Rexnord*** prior to installation of the unit. It is recommended that personnel familiar with elevator installation be used for installation of equipment.

Tolerances

Rexnord supplied equipment is made to the tolerances and specifications specified on ***Rexnord*** intermediate casing or fabricated weldment drawings, so the work required to align, shim, plumb, etc. is kept to a minimum during the field installation of the bucket elevator, thus assuring successful operation.

Rexnord often implements the use of jigs and fixtures to ensure that fabricated items supplied by ***Rexnord*** are held to the drawing tolerances. ***Rexnord*** expects/requires that items fabricated by purchaser or purchaser's vendor(s) for ***Rex*** equipment also meet these same tolerances and specifications. If the geometric tolerances and specifications are not met on items fabricated by purchaser or purchaser's vendor(s) for ***Rex*** equipment, it is the responsibility of the customer or contractor installing it to meet final assembled tolerances as defined in the ***Rexnord*** field service manual. ***Rexnord*** assumes no additional financial responsibility for any additional installation time or materials that might be required to meet assembled elevator tolerance (as defined in ***Rexnord*** Service Manual) or is required to make the equipment operate successfully.

Corrections of Minor Misfits

Standard construction for fabricated steel allows for tolerance in lengths and hole locations.

Minor misfits are considered a normal part of erection work.

The accumulation of the tolerances in foundations, grades, setting of anchor bolts, etc. create the necessity to use drift pins, reamers, and gas cutting and welding equipment.

Dimensional tolerance must be compensated for in fit-up.

When new units are tied into existing units, it can be expected that a major amount of fit-up is required because, accumulated tolerances are already built into the existing equipment, making the job of tie-in and alignment a matter of detail fit-up.

Corrections of minor misfits and a reasonable amount of cutting and reaming are considered a part of installation. Any assembly error which prevents further assembly by moderate use of drift pins, cutting, or welding is to be reported in writing to *Rexnord Industries Incorporated*. Do not proceed without written approval from *Rexnord Industries Incorporated*.

Failure to comply with all procedures within this manual will relieve ***Rexnord*** of any and all liability in connection with the installation and operation of the elevator.

READ THIS MANUAL COMPLETELY BEFORE INSTALLING OR OPERATING THIS EQUIPMENT.

Elevator Assembly

Foundation

The concrete pad or steel supports on which the elevator is to be installed should be checked before installation of the boot section. There are three vital points to look for when checking the pad.

1. Elevator centerlines are established properly within work points.
2. The top of the concrete pad is at the proper elevation.
3. Anchor bolts are properly located about elevator centerlines and are at the proper height.

See *Figure 4-1*.

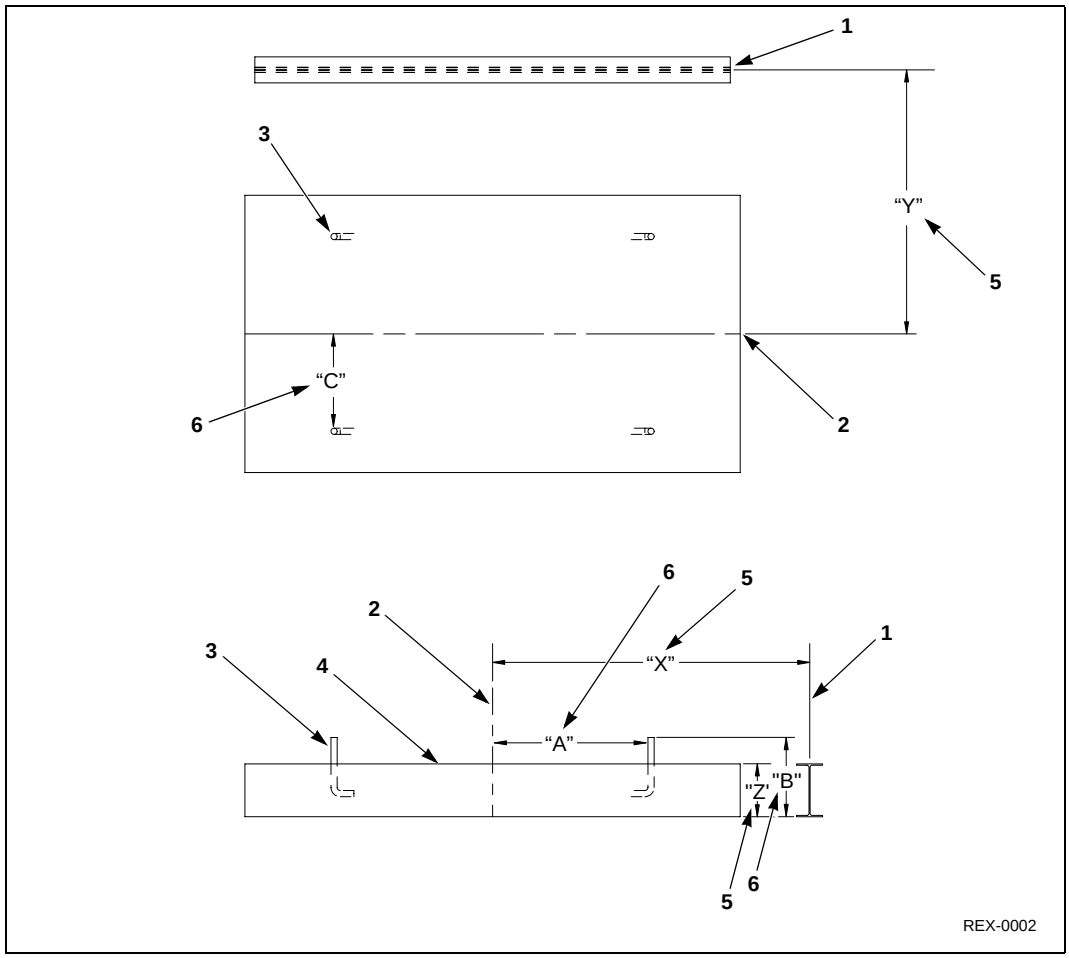


Figure 4-1: Locating Elevator Foundation

1 – Typical work points
2 – Elevator centerlines
3 – Anchor bolts
4 – Top of concrete pad

5 – *Elevator centerlines set to “X” “Y” “Z” dimensions for typical work points*
6 – *Anchor bolts set to “A” “B” “C” as shown on General Arrangement Drawings*

The anchor bolts’ position and projection must be as shown in the General Arrangement Drawings located under the tab labeled “Drawings”. If location of anchor bolts is not correct, this situation must be remedied at once.

Any sizeable error in locating the anchor bolts would undoubtedly mean additional trouble later in the installation of the elevator. Tie-in points could be missed, loading and discharge areas misdirected and even interference from existing structures could be encountered.

The anchor bolts should be imbedded in the concrete at least several days before installing the elevator.

Boot Section

The boot section should be placed over the anchor bolts.

It is imperative and absolutely essential that the boot section be plumb vertically and level horizontally. If this is not achieved, the balance of the elevator will not line up, and its operation will be seriously affected.

Shim as required to plumb boot section. Use plumb lines or transit to plumb sides and ends of boot. When this has been accomplished, and only then, secure the boot by tightening down the anchor bolts. Care must be exercised here not to disturb the alignment of the boot section. At this time, the boot section must be grouted into place. See *Figure 4-2*.

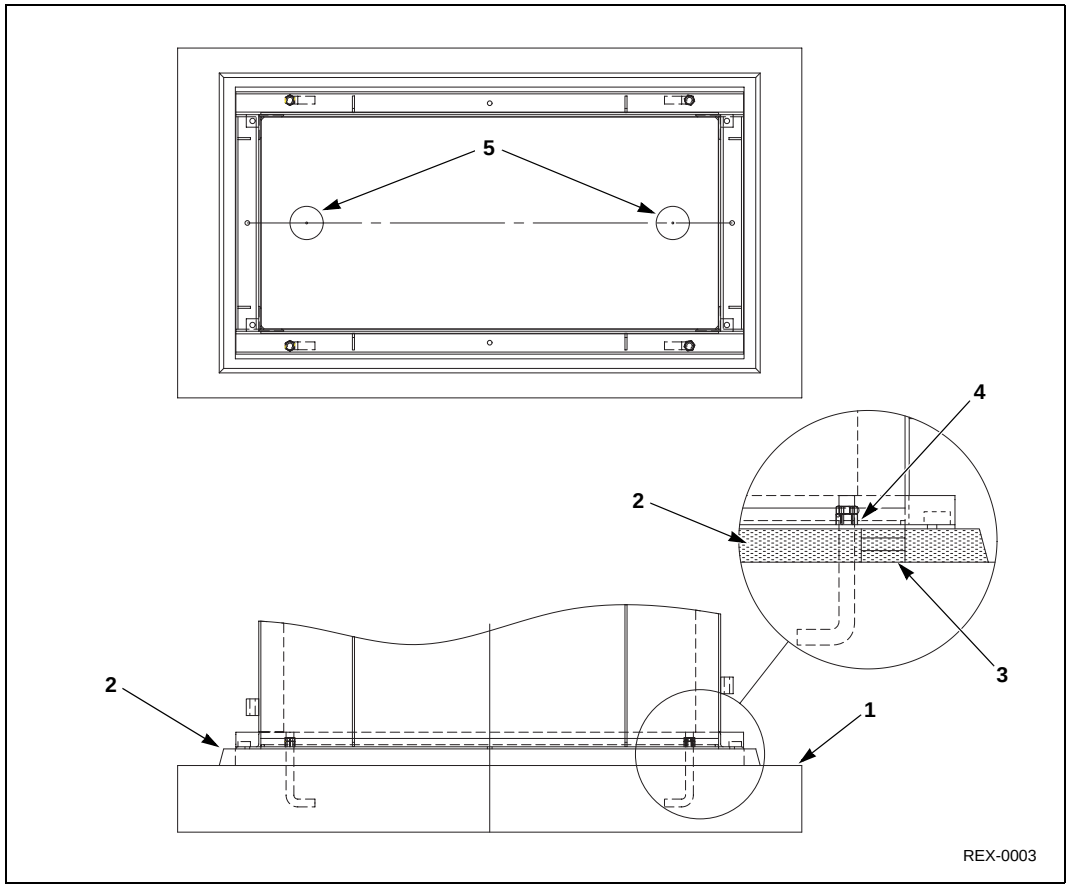


Figure 4-2: *Elevator Foundation*

1 – Top of concrete
2 – Grout
3 – Shims
4 – Place 2 nuts on each anchor bolt
5 – Plumb bobs/plumblines – Top and bottom of boot section plumb

Two nuts are to be used on all anchor bolts to insure against nuts becoming loose.

Intermediate Casings

The intermediate casings are assembled to the boot section after the boot has been properly grouted. Install the intermediate casings on the boot in the sequence shown in the General Arrangement Drawings located under the tab labeled “Drawings”.

Intermediate casings must be installed on elevator as shown in the General Arrangement Drawings found under the tab labeled “Drawings” *or inspection doors and lateral support collars will not be located at the proper elevation, and platform steel will not bolt together.*

Intermediate casings must be installed onto the elevator individually. ***Rexnord*** suggests fabricating a lifting beam which bolts to the casing flanges to handle individual casings.

See *Figure 4-3* for a typical design of a lifting beam.

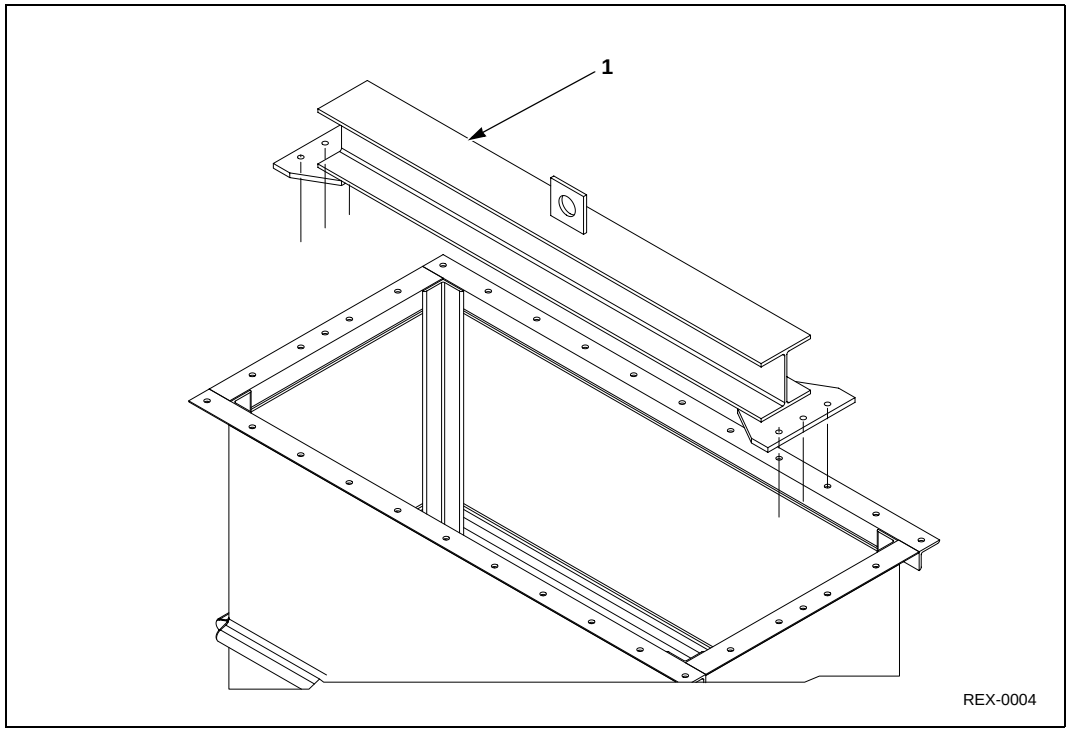


Figure 4-3: *Typical Lifting Beam For Handling Individual Sections*

1 – Lifting beam – Field fabricated

Be sure that the sealing compound specified in the General Arrangement Drawings is placed between all sections.

Each intermediate casing must be plumbed to a tolerance of 3 mm (1/8”) maximum with respect to the boot, as it is assembled to the preceding section.

When assembling casings, secure the center bolts only. The center bolt holes are located at midpoint on the casing flange connection angle. The balance of the bolts should be inserted and tightened after the section is plumbed and before proceeding with the next section.

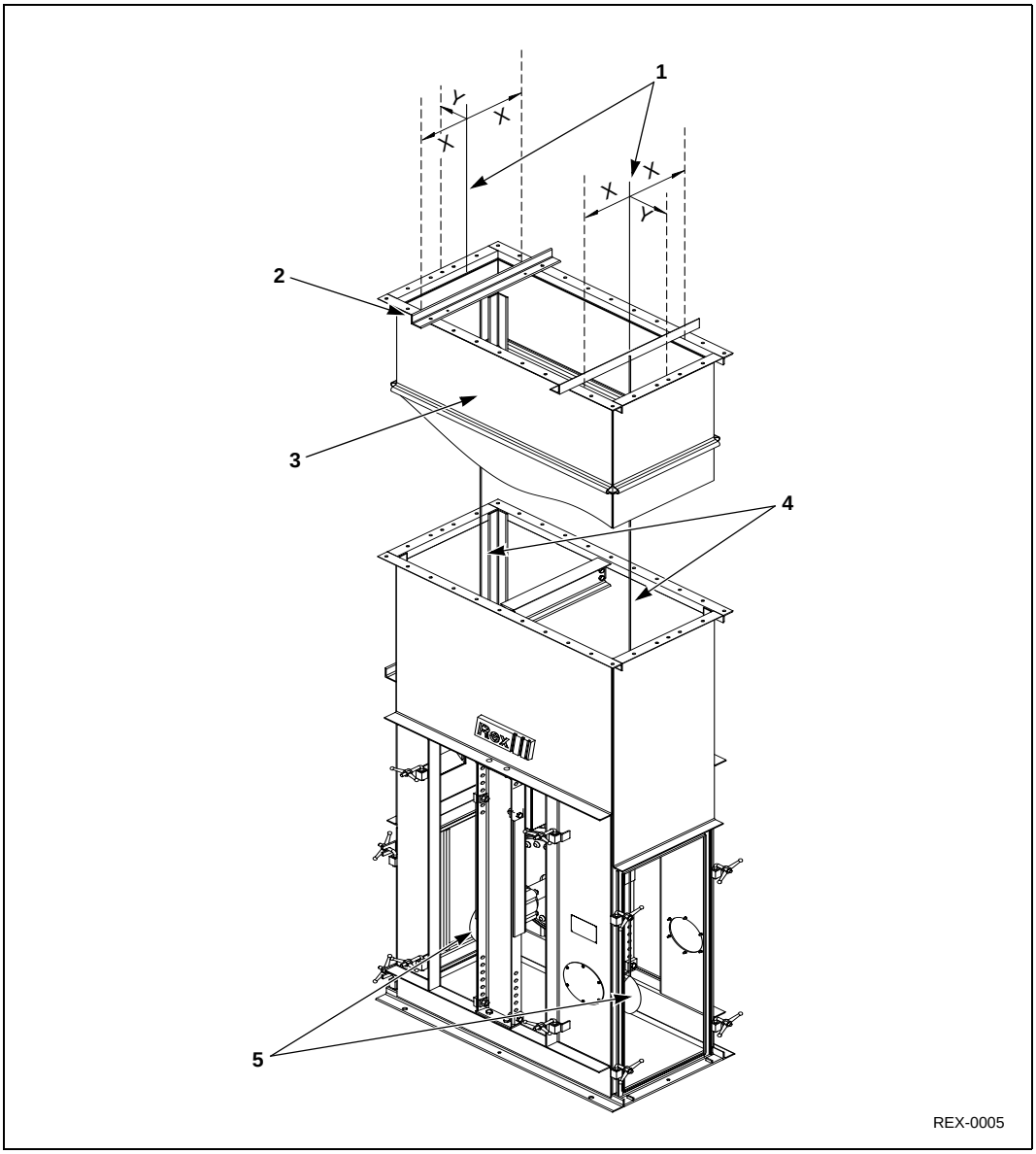


Figure 4-4: *Plumbing Elevator Casings*

1 – Record measurements from plumblines to sides and ends of casings.
2 – Bracket to hold plumblines – Field fabricated
3 – Casing being installed
4 – Plumblines
5 – Plumb bobs approx. 4 kg (10 lbs.) each

To plumb casings, fabricate brackets as illustrated and drop at least two plumblines as indicated. Measure from wire to sides and ends of casing at the top flange angle of the casing. In the boot section take measurements as close to the bottom of the boot as possible. Mark the places in which measurements were taken in the boot when checking the plumb of the first casing installed, and use the same spots as a reference for plumbing all the following casings.

Securing Flange Bolts.

Rexnord recommends that site personnel fasten bolts using the 'Turn of the Nut' tightening technique, as bolt tension and not torque, create the safest connection. Bolts are installed in all holes of the connection and brought to a snug tight condition; that is when the mating flanges or plies of the joint are in firm contact. Snug tightening progresses systematically from the most rigid part of the connection to the free edges until all bolts in the connection are fully compacted. Following this operation, all bolts are tightened further another 1/3 turn, progressing again from the most rigid part of the joint to it's free edges.

The flanges on the casing sections are not machined. It is, therefore, possible that small fabrication inaccuracies, within structural tolerances, may be present. Check each identical intermediate section as it is placed in position. Check for plumbness after securing only the four bolts at midpoint of each flange connection angle.

Check each casing as it is placed in position, and if necessary, rotate 180°. If inaccuracy is not compensated for, invert section end-over-end. If necessary, the section as inverted may be rotated 180°.

Casings with doors or openings cannot be inverted. However, it may be possible to rotate these casings180° to achieve plumbness.

The balance of the bolts should be inserted and tightened after the casing is plumbed and before proceeding with the next casing.

The installation of all of the remaining casings must follow this procedure.

To secure and hold elevator casings in plumb, install lateral support bracing as lateral support bracing elevations are reached with the intermediate casings.

Lateral Support Bracing

Elevators are self-supporting but not free standing.

Lateral supports are required for all elevator casings due to their design and basic construction.

For outdoor installation, lateral bracing must be furnished to support the elevator casing satisfactorily to a foundation or an adjoining structure. See *Figure 4-5*. Refer to the following recommended information regarding suitable bracing.

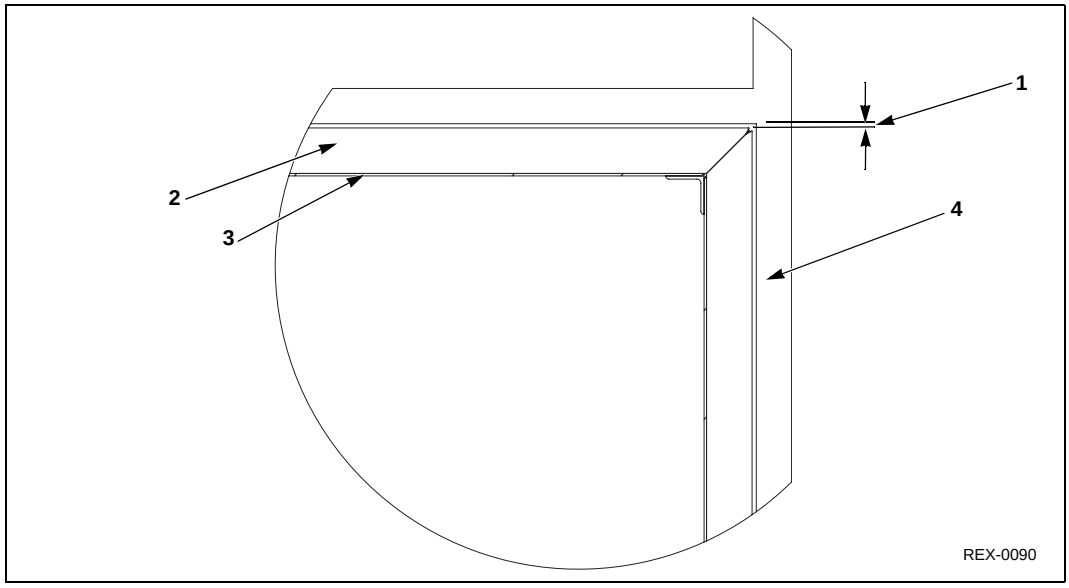


Figure 4-5: *Typical Lateral Bracing*

1 – Clearance of 2 mm (1/16") required between each side of lateral support collar and support frame
2 – Lateral support collar
3 – Casing
4 – Support frame

If the elevator is installed indoors, the casings being installed must be supported by the floor framing or building framework for required lateral support.

It is recommended that lateral supports for elevator bracing, where possible, be horizontal and constructed so that vertical loadings transmitted to lateral supports are negligible. Guy wires are not recommended.

Any seismic conditions or unusual wind conditions should be noted in the original contract specifications so that provision for accommodating such conditions is incorporated within unit construction.

Single Leg Casing

Unless otherwise indicated in the General Arrangement Drawings located under the tab labeled "Drawings", all single leg elevators are to be laterally braced approximately every 6.1 m (20' 0") of height. The upper lateral support is to be located at the base of the lower head section or immediately below the head platform knee brace support collar.

It is recommended that slip joint bracing be utilized. The type shown below should be employed. When in doubt, consult ***Rexnord Industries Incorporated***.

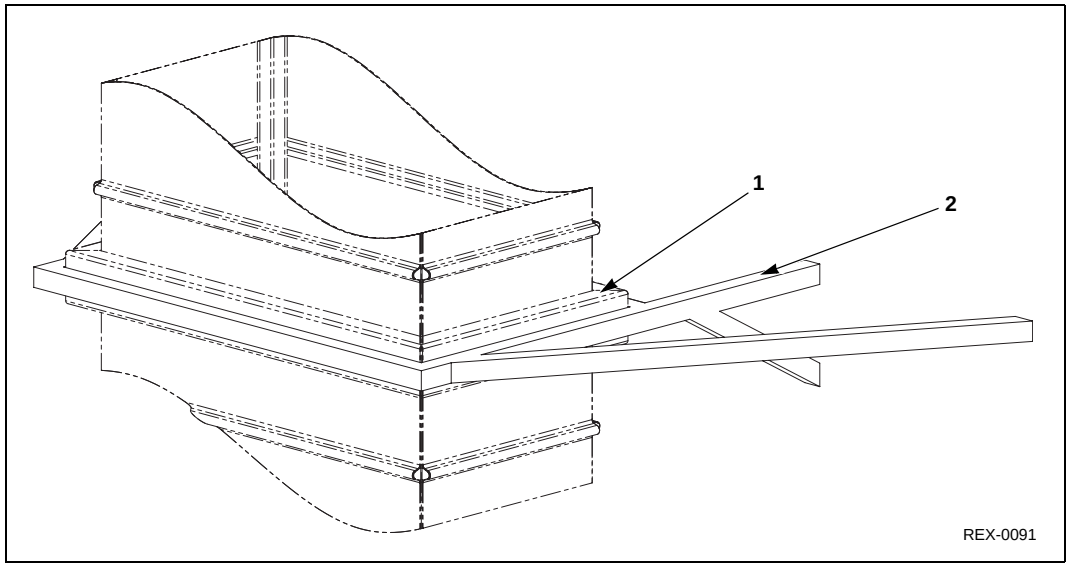


Figure 4-6: Lateral Supports Exterior

*1 – Lateral support collar - furnished by **Rexnord** installed in field*
2 – Support frame - furnished and installed by customer

*Lateral support collars, furnished by **Rexnord**, are field welded to the elevator casings. Bracing and support frame are not furnished by **Rexnord**.*

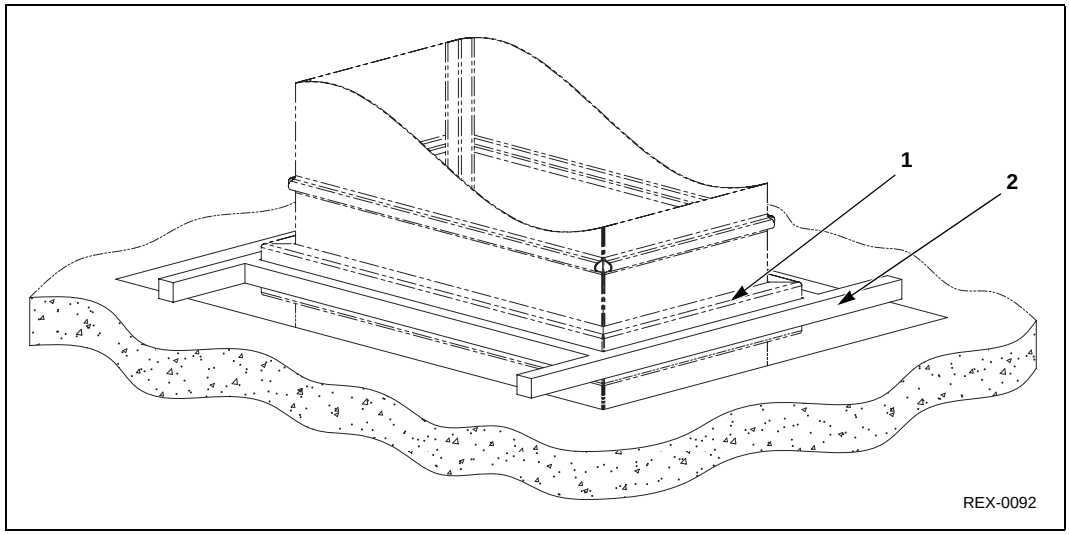


Figure 4-7: Lateral Supports For Units That Extend Through Floor Openings

*1 – Lateral support collar - furnished by **Rexnord**, installed in field*
2 – Support frame - furnished and installed by customer

Double Leg Casing

Unless otherwise indicated in the General Arrangement Drawings located under the tab labeled “Drawings”, all double leg elevators are to be laterally braced approximately every 18.3 m (60' 0") of height. If the unit is 18.3 m or less, it must have at least one lateral support at the lower head section. The upper lateral support is to be located at the base of the lower head section or immediately below the head platform.

It is recommended that slip joint bracing be utilized. The type shown below should be employed.

When in doubt, consult ***Rexnord Industries Incorporated***.

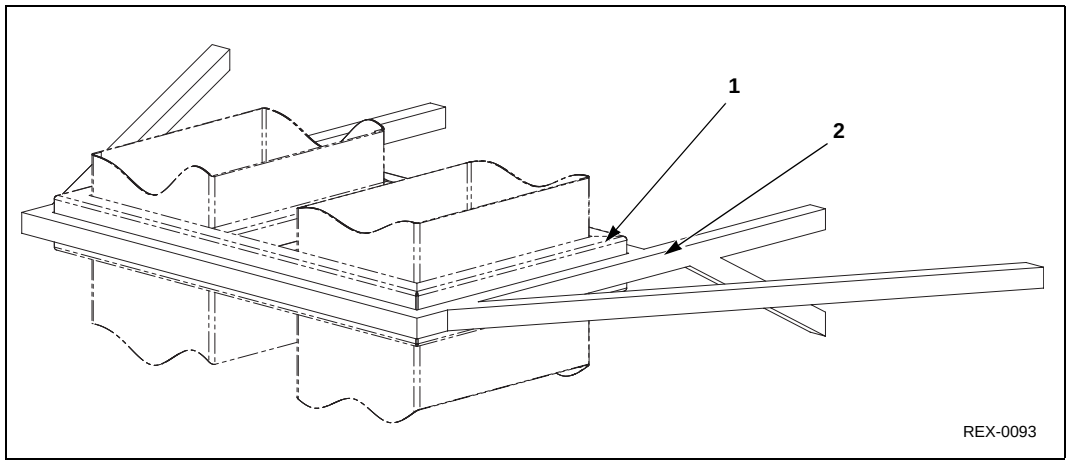


Figure 4-8: *Double Leg Lateral Supports*

*1 – Lateral support collar - furnished by **Rexnord** installed in field*
2 – Support frame - furnished and installed by customer

*Lateral support collars, furnished by **Rexnord**, are field welded to the elevator casings. Bracing and support frame are not furnished by **Rexnord**.*

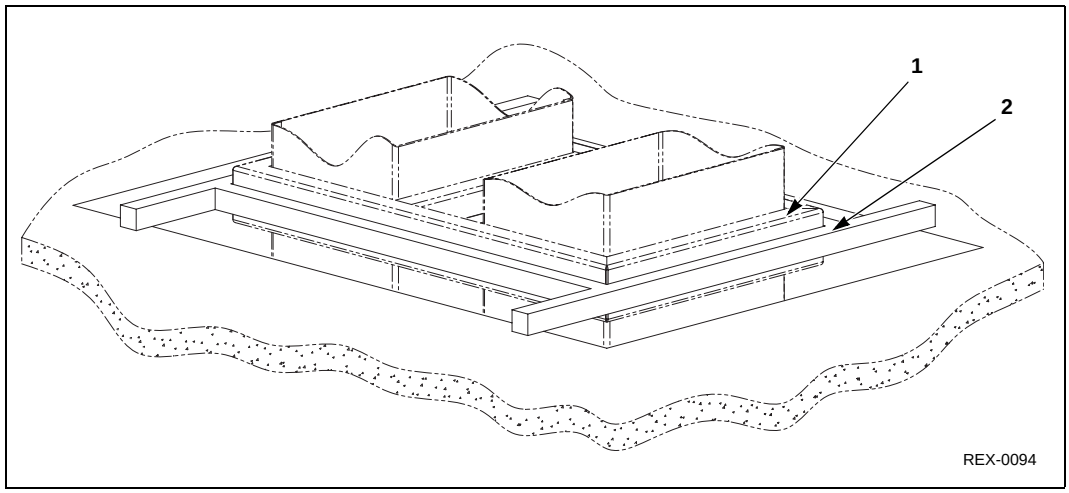


Figure 4-9: *Bracing For Units That Extend Through Floor Openings*

*1 – Lateral support collar - furnished by **Rexnord**, installed in field*
2 – Support frame - furnished and installed by customer

Platform, Platform Collars, Grating and Handrails

Rex head platforms are supported by the elevator by incorporating the head platform frame and the platform knee brace support collar as part of the intermediate casings.

The platform frame and support collar must be assembled on the elevator at the proper elevation as shown in the General Arrangement Drawings located under the tab labeled “Drawings”.

The platform frame and the support collar must be plumb to the boot section using the same procedure and tolerances used to plumb the intermediate casings.

The platform, grating, and hand railing comes disassembled and must be installed per the platform grating and handrail drawings included in the drawing packet of this manual.

Lower Head Section

The lower head section can now be assembled to the top intermediate section. This section, like all others must be plumbed.

Plumb the lower head section to the boot using the same procedure used to plumb the intermediate casings.

The maximum out-of-plumb tolerance between the boot section and the lower head section should not exceed 6 mm (1/4”) maximum.

Upper Head Section

The upper head section should be installed after all components have been installed in the elevator and the head shaft assembly has been leveled and aligned within the elevator.

Before installing the upper head section to the lower head section, check and correctly orientate the head shaft dust seals. The head shaft dust seals mount to the outside of the upper head section with the rubber half of the seal pressed against the upper head. In many cases the head shaft dust seals are rectangular and will fit between the dust seal holding bars in the upper head section only one way. If the seals are oriented incorrectly the upper head section must be removed so seals can be rotated.

Bolt split upper head section in place. Use the sealant furnished with the elevator between all the bolted connections.

Ladder and Safety Cage

The ladder and safety cage should be completely assembled before attaching it to the elevator proper. It can be attached in one piece or in sections, depending on its length or facilities available.

Refer to the ladder drawing, which is part of this manual, for complete and detailed assembly instructions. Start the first cage ring so that the slot in the cage ring fits over the top of the ladder rung. Subsequent cage rings are also hooked over a ladder rung.

By observing this procedure, no trouble should be encountered with ladder section splices interfering with the cage ring assembly. A special cage ring spacing dimension is provided near the top of the ladder. These rings do not necessarily have to fit over the top of the ladder rungs. Attach the ladder in the location and position indicated in the General Arrangement Drawings located under the tab labeled “Drawings”.

When mounting ladder to surrounding steel, mount ladder so that it can move with the elevator as it expands and contracts.

Do not apply force to ladder when trying to mount it to surrounding steel, doing so could force elevator out of alignment and cause operational problems.

Hoist Frame

The hoist frame comes disassembled and must be installed per the hoist frame drawings included in the drawing packet of this manual.

The hoist frame is designed to lift the combined load of the chain and **empty buckets** only. The take-up must be in the raised position, and raised independently from the chain and bucket assembly.

Hoist frame capacities vary. See the General Arrangement Drawings located under the tab labeled “Drawings” for load values. Capacity ratings are also marked on lifting beams.

CAUTION

Capacity of extended hoist beam is significantly less than capacity of hoist beam between columns. Refer to elevator General Arrangement Drawings located under the tab labeled “Drawings” for hoist capacities

Take-up Assembly and Take-up Guide Installation

For proper chain tension and elevator operation it is imperative that the take-up assembly be properly installed within the boot section.

To properly install the take-up assembly, the traction wheel or sprocket must be placed on the elevator centerline and be centrally located within the boot section. Also there must be a 3 mm (1/8”) clearance between each side of the take-up frame and take-up guides.

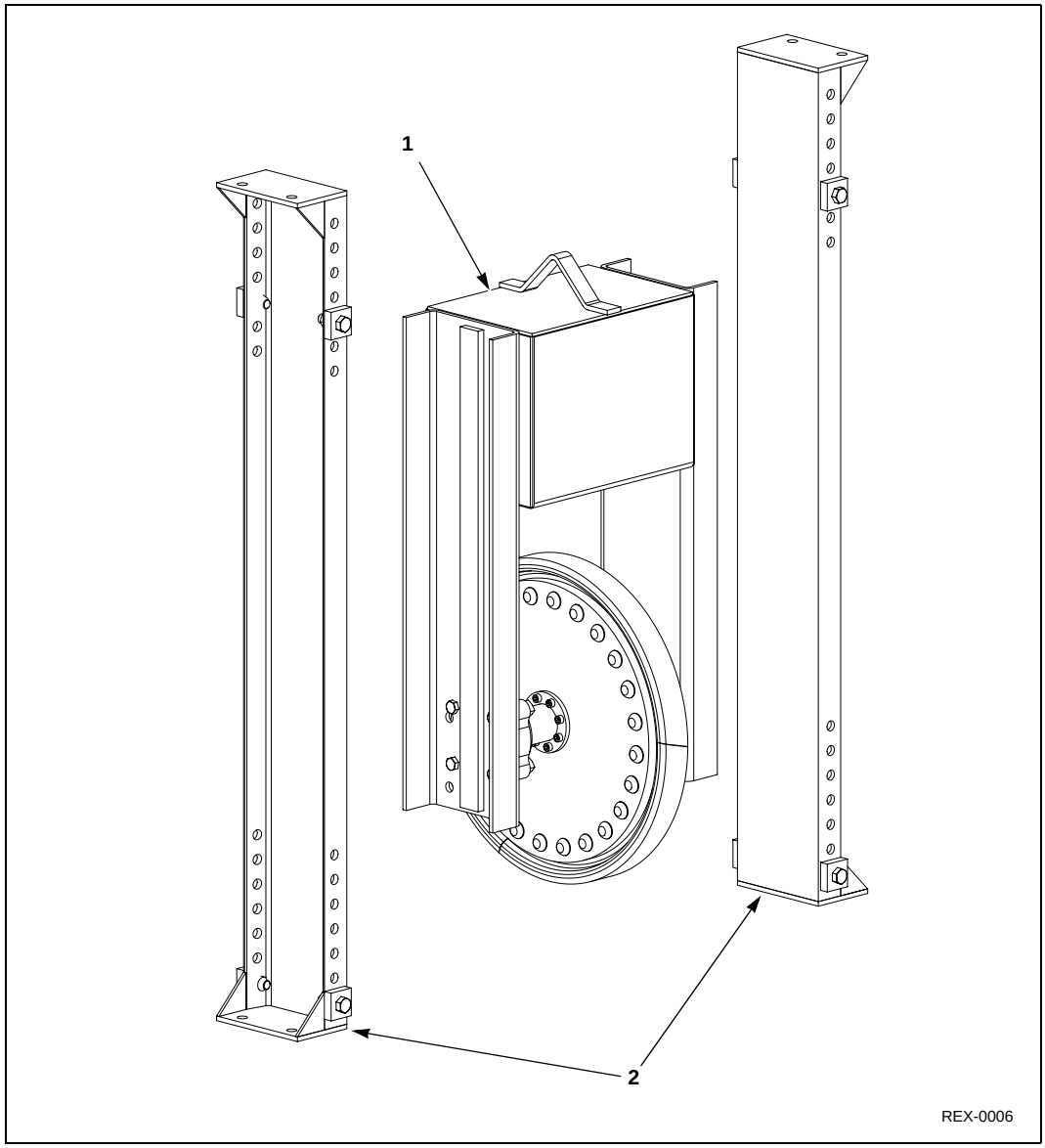


Figure 4-10: Take-up Assembly and Guides

1 – Take-up assembly
2 – Take-up guide assemblies

Installation Note

In some cases the foot shaft assembly is offset from the elevator centerline. Use and refer to the General Arrangement Drawings specific to the elevator being worked on when installing the take-up assembly.

Perform the following steps to ensure proper installation of the take-up assembly:

1. Support take-up assembly within boot section from lifting beam with a chain hoist. See *Figure 4-11*.
2. Install take-up guides within door frames of boot, making sure take-up frame is placed properly within guides.
3. Install take-up guide mounting hardware, but do not tighten.

4. Place 3 mm (1/8”) thick shims between the take-up frame and take-up guides at top and bottom ends of the take-up assembly. See *Figure 4-12*.

Bend 3 mm shims to form a 90° corner. This will keep shims from dropping too far between the take-up assembly and take-up guides and also aid in removal of shims later.

5. Install C-clamps around take-up frame and take-up guides to hold shims in place. See *Figure 4-11*.
6. Shift take-up assembly and guides so the centerline of the traction wheel or sprocket is centered within the boot section and also lies on the elevator centerline.

Plumblines must be strung within the elevator and used to set the traction wheel or sprocket to elevator’s centerline. See Aligning Head and Foot Shaft, page 4-18 for instructions in placement of plumblines.

7. Plumb take-up guides end to end and side to side using a level. Make sure traction wheel or sprocket stays positioned on elevator centerline while plumbing take-up guides.
8. Tighten take-up mounting hardware.
9. Remove C-clamps and shims.

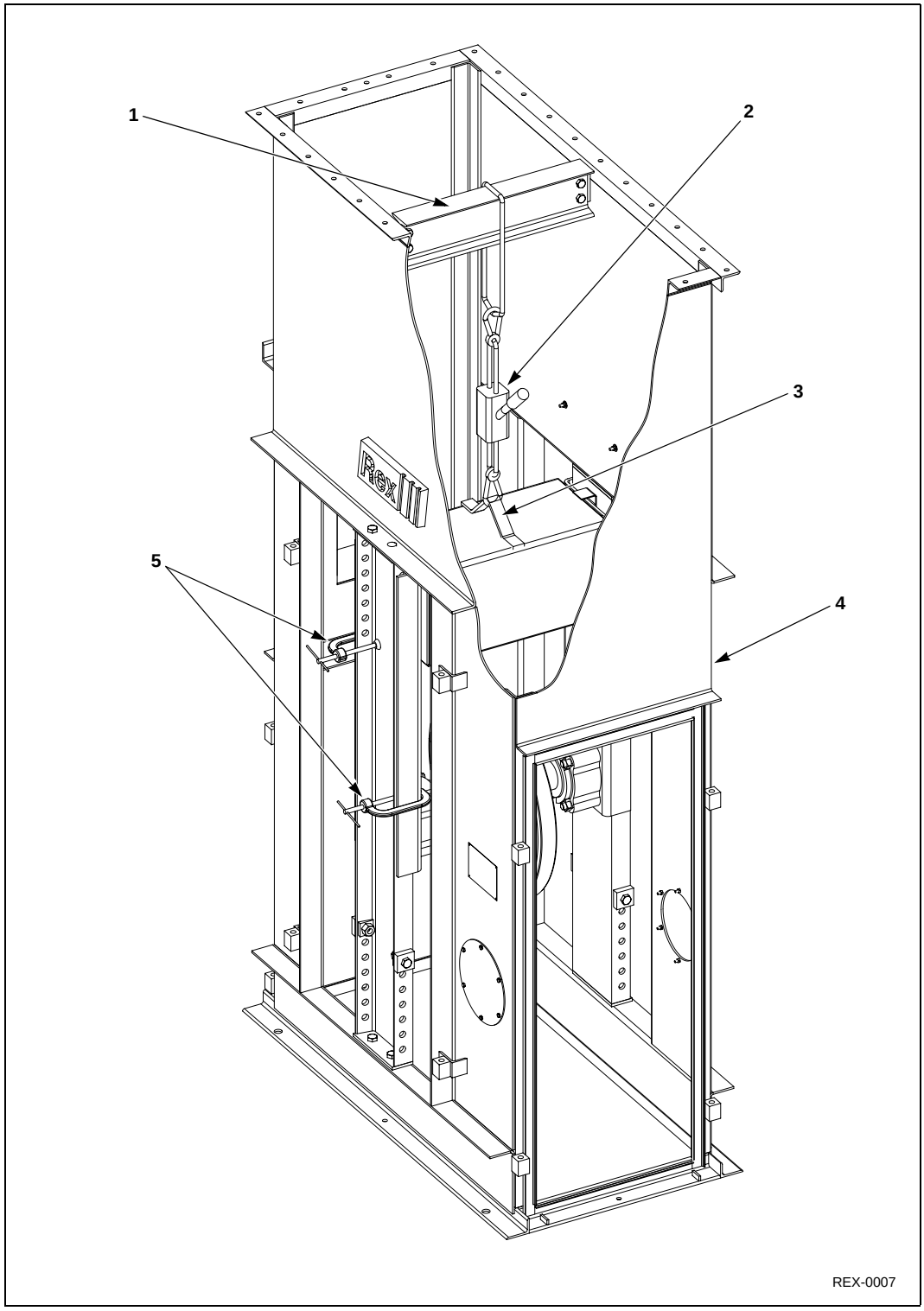


Figure 4-11: *Cutaway of Boot – Positioning/Setting Take-up and Guides*

1 – Lifting beam
2 – Chain hoist
3 – Lifting ring
4 – Boot section
5 – C-clamps

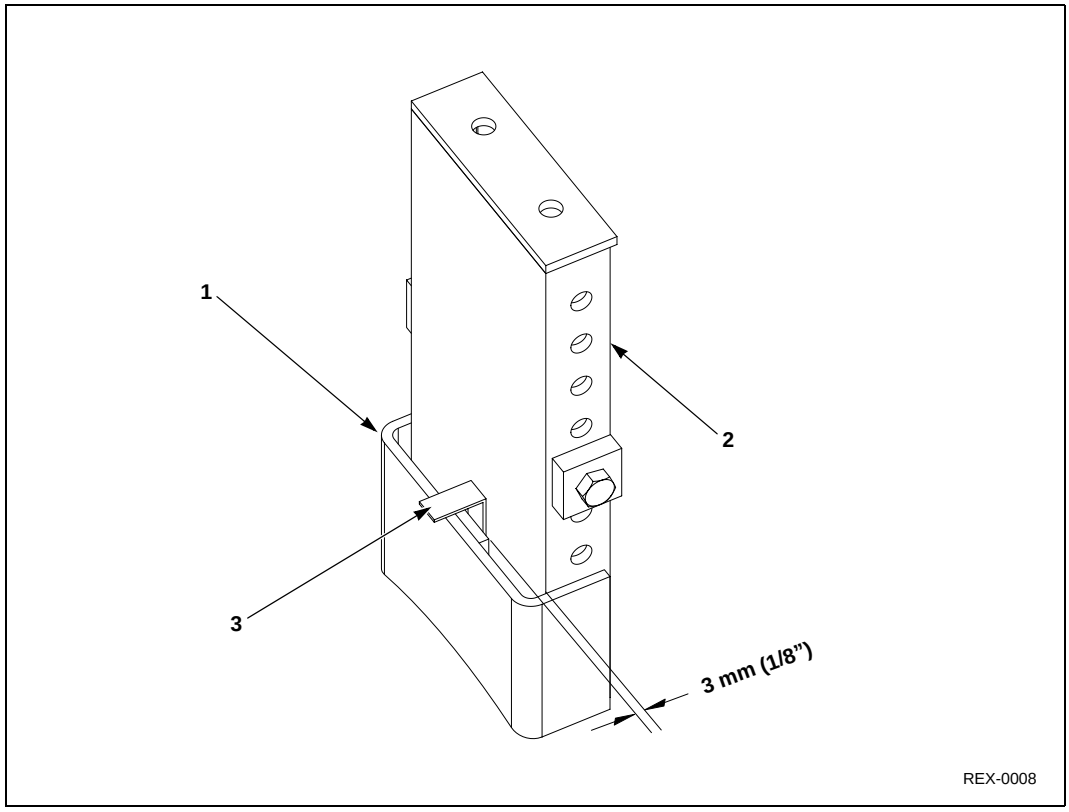


Figure 4-12: *Insertion of Shim Between Take-up and Guide*

1 – Take-up assembly
2 – Take-up guide assembly
3 – Shim, 3 mm (1/8") thick

Head Shaft Installation

Install the head shaft as oriented in the elevator's General Arrangement Drawings located under the tab labeled "Drawings". Mount the headshaft on the lower head, bearing support, utilizing a shim pack (shim packs supplied by ***Rexnord***) under each head bearing.

One shim pack* consists of the following:

Quantity	Plate Gage	Approximate	Approximate
2	16 gage	1.5189 mm	0.0598"
1	10 gage	3.4163 mm	0.1345"

**Quantity and Gage shown for standard shim pack. Quantity and Gage could vary in certain circumstances.*

To ease head shaft assembly installation, lower and align the fixed bearing to the lower head first, then slide the floating bearing into alignment, before lowering and mounting it to the lower head. (The fixed bearing is the bearing closest to the drive input end of the head shaft. See the head shaft assembly drawing for more information.)

Check backstop or holdback device for proper rotation if included as part of the head shaft assembly. See the *Drive Assembly* tab in the manual for specific manufacturer's service instructions.

The mounting bolts on the head shaft bearings are to be double nutted, this will insure against nuts becoming loose.

To level the head shaft properly, the head shaft must be clean. All debris, burrs, and/or protective coatings must be removed before leveling shaft.

To get an accurate level reading on the head shaft, the head shaft bearing mounting bolts must be tight before taking level reading.

The head shaft must be leveled to within 0.25 millimeters per meter (0.003 in per ft.) and parallel with the foot shaft.

To level head shaft, remove shims from shim packs and/or install more shims as necessary.

Installation Note

Additional shims required to level head shaft are to be supplied by customer or contractor. ***Rexnord*** *does not supply shim material over and above shim packs.*

Use full shims across bearing housing base where shimming is required—not just at bolt holes. If two (2) shims are required to shim across housing base due to physical limitations of shim material—butt ends of shims together. **DO NOT OVERLAP ENDS.**

Installation Note

When checking the level of the head shaft the use of a level that is graduated to allow the user to take readings in millimeters per meter or inches per foot is recommended. Machinists', Mechanics' or Precision levels are such levels with the recommended graduations. Because of limited space around shafting area it is recommended using one of the levels listed above with an approximate length of 150–200 mm (6–8").

Shim Requirement Example

To figure the shim thickness required to level the head shaft, follow the example below.

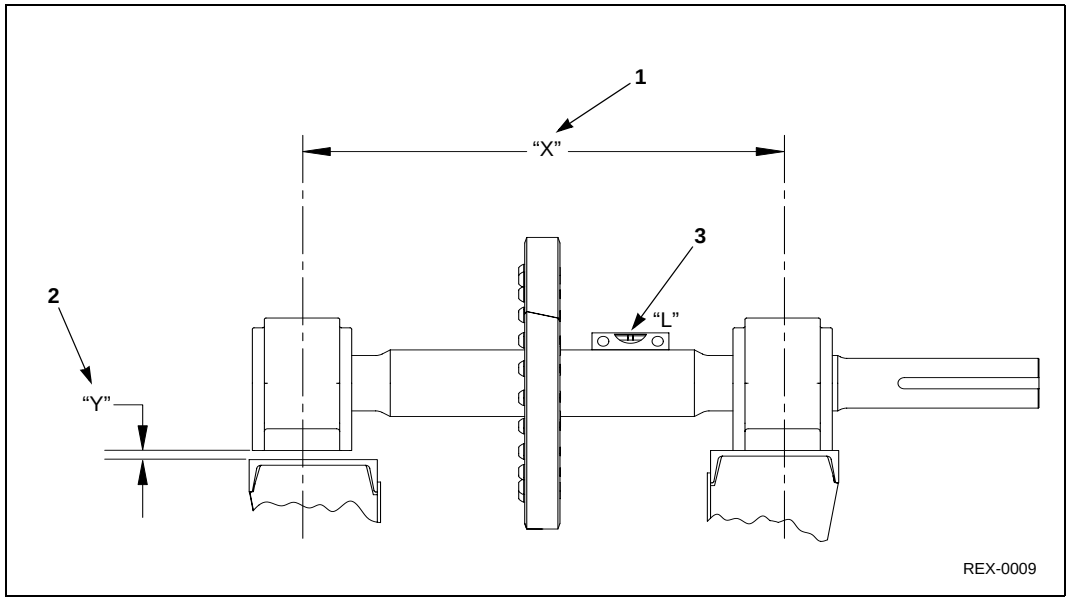


Figure 4-13: Shim Requirements

1 – "X" – Bearing centers in meters or feet
2 – "Y" – Shim required to level head shaft
3 – "L" – Level measurement in mm/meter or inches/foot

To calculate "Y" – (Shim required to level head shaft) use the appropriate equation below.

"X" M x "L" mm/M = "Y" in millimeters.

or

"X" ft x "L" in/ft = "Y" in inches.

Example:

Bearing centers = 1.5 M.

Level reading = 0.40 mm/1 M (Drive bearing being the high end).

Shim required = 1.5 M x 0.40 mm/M = 0.60 mm thick.

Install 0.60 mm shim under bearing opposite side of drive.

or

Remove a 0.60 mm shim from under drive bearing.

The head shaft should be initially installed square on the lower head section. The centerline of the traction wheel or sprocket should be equal distance from the side walls of the lower head. The bearings should be centrally located within the bearing jack bolts.

Installation Note

It may be necessary to readjust the head shaft after checking alignment between head and foot shaft assemblies. The centerline of the traction wheel and/or sprocketpulley of the head and foot shaft must be in alignment. Also the head and foot shaft assemblies must be parallel. See Aligning Head and Foot Shaft, page 4-18.

Aligning Head and Foot Shaft

The head and foot shaft assemblies must be aligned properly. Improperly aligned shafting will result in operational problems and/or rapid wear of elevator components.

Before aligning the shafting, refer to the General Arrangement Drawing of the elevator being worked on; in some applications the foot shaft is offset from the elevators centerline.

The elevator boot section may or may not have had the take-up assembly installed at the factory, in either case, the alignment of the shafting must be checked.

The head and foot shaft are in proper alignment when the following are true:

- The head and foot shaft are parallel.
- The centerline of the traction wheel(s) and/or sprocket(s) of the head and foot shaft are aligned with each other.

Alignment between the traction wheel(s) and/or sprocket(s) of the head and foot shaft must not deviate more than 3 mm (1/8”). See *Figure 4-14*.

To check the shafting alignment, drop two plumblines from the head shaft. Position lines so they are near the ends of the shafts and are out near the edge of the traction wheels and/or sprockets as shown in *Figure 4-14*. A minimum of two plumblines must be used to check alignment.

Head shaft and foot shaft must be level before aligning shafting.

Installation Note

When installing plumblines:

- *To clear the take-up counterweight box at the boot end of the elevator, it is necessary to offset the plumblines away from the head shaft.*
- *To set plumblines correctly, set the lines so that they are at the ends of the foot shaft. Setting lines near the ends of the head shaft will result in hitting take-up frame in boot sections with the lines or plumb bobs.*

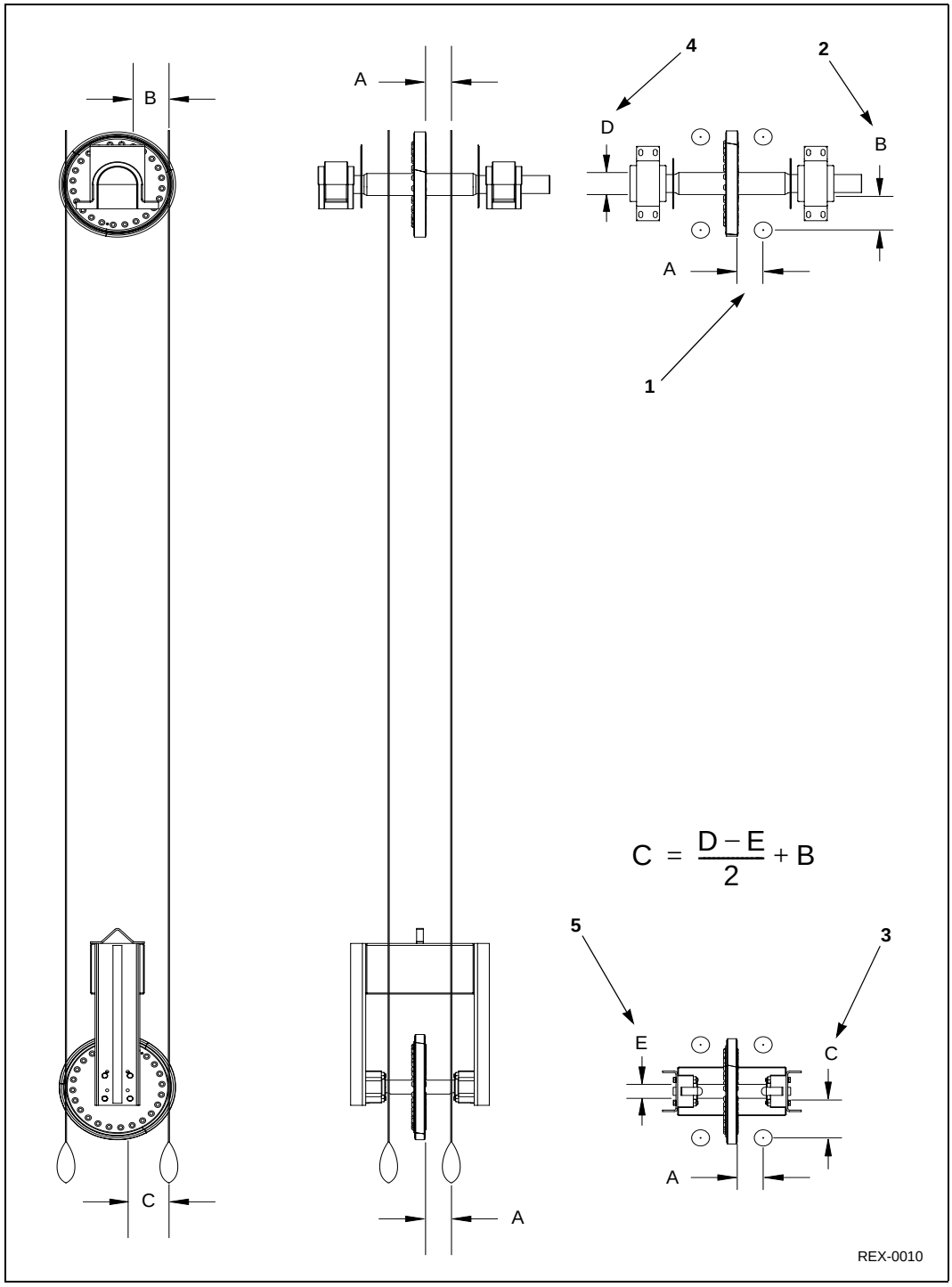


Figure 4-14: *Shaft Alignment*

1 – "A" – Measurement between plumbline and side of segmented traction wheel or sprocket
2 – "B" – Measurement between plumbline and edge of head shaft
3 – "C" – Measurement between plumbline and edge of foot shaft
4 – "D" – Head shaft diameter
5 – "E" – foot shaft diameter

Handling Coiled Chain (Shipping Sections)

For convenience in shipping and handling, chains are coiled in segments approximately 3 m (10') long. The chain is wired together so that it does not uncoil during shipment. In most cases, coiled chain segments are stacked on a pallet and shrink wrapped or boxed.

The chain should not be unwrapped until it is ready to be installed in an elevator. Until the chain is ready to be installed, it should be moved by lifting the pallets with a forklift.

The chain coils when palletized are placed on their side and must be handled properly or the chain can be twisted/damaged. When handling the individual chain coils from a pallet, the whole chain coil must be supported as shown in *Figure 4-15*.

STOP

Never connect a hook into the center or onto the end of a coiled chain in order to lift it; doing so will place great stress against the chain sidebars causing the chain to become twisted.

CAUTION
To prevent personal injury, stand clear when hoisting.

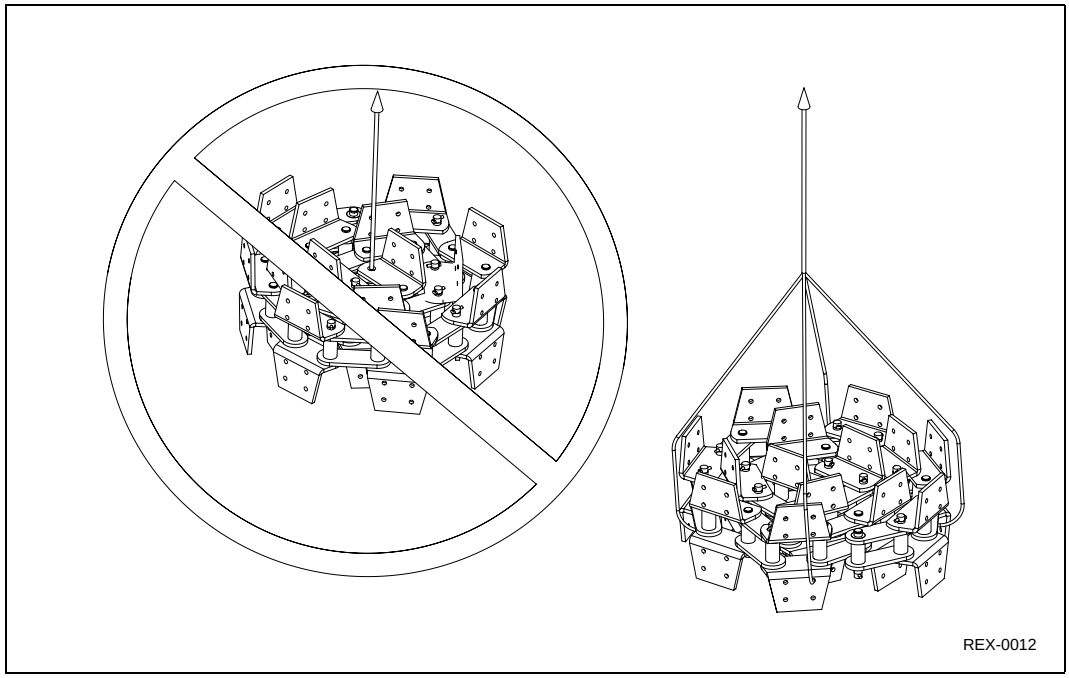


Figure 4-15: Lifting Chain Coils

Coiled chain must be uncoiled before installing it into an elevator.

To uncoil chain, position coil so chain joints are parallel to the ground and roll out the coil into a straight line. The chain segment is now in a position in which it can be installed in the elevator or connected to another segment of chain.

Rigging and Lifting Chain

Determine the total weight of the chain segment or assembly prior to lifting so the proper

lifting equipment can be acquired.

Refer to the elevator's General Arrangement Drawing to determine the weight of the chain to be lifted.

Always connect rigging around a chain bushing, close to one end of the chain segment or assembly to be lifted. See *Figure 4-16*.

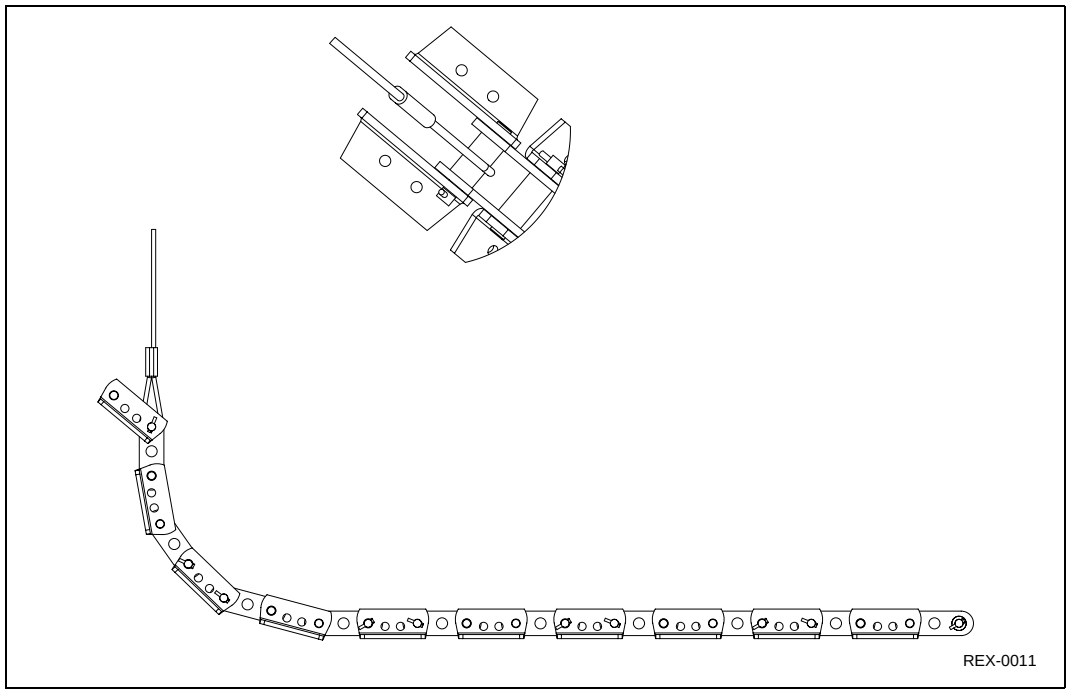


Figure 4-16: Rigging and Lifting Chain

STOP

Never install rigging through the chain pin holes or around a chain pin or damage to the components may result.

Always lift chain with the chain joints parallel to the ground as shown in *Figure 4-17*.

STOP

Never lift a chain while it is laying on the sidebars or the chain can become twisted and damaged. See *Figure 4-17*.

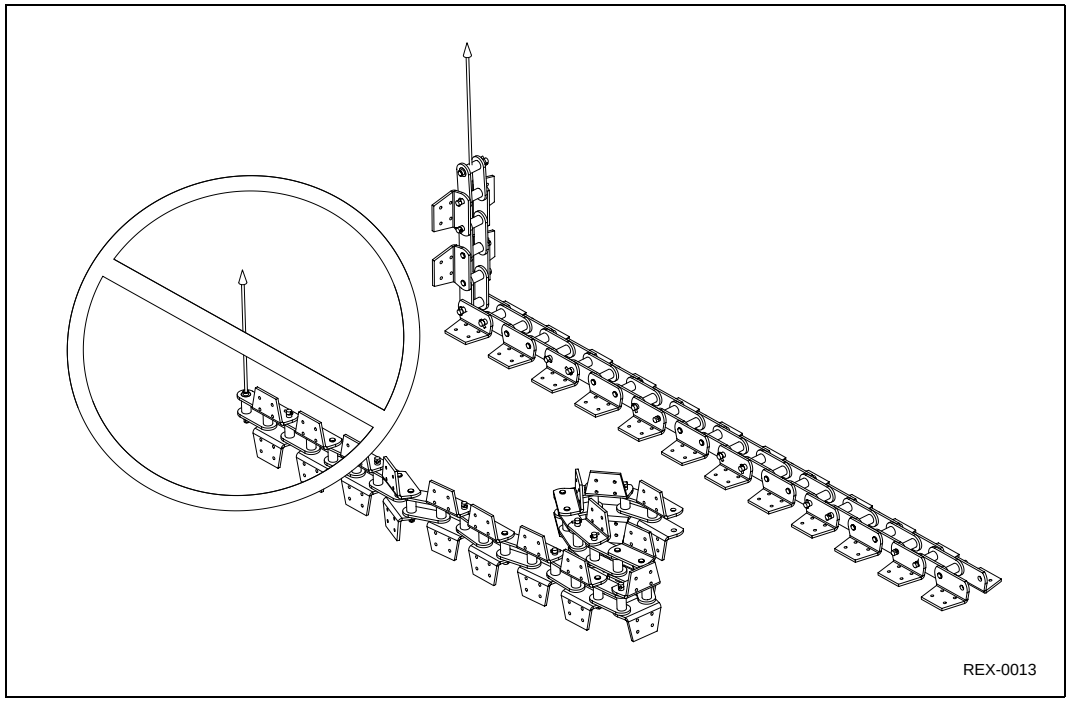


Figure 4-17: Lifting Chain

Interference Fits at Chain Joints

Sidebars of all chain are heat-treated for strength and wear resistance. Bushings and pins are assembled to sidebars with controlled interference (press) fits. These relatively heavy interference fits provide a significant improvement in sidebar fatigue strength. As the pin interference fit increases, the sidebar fatigue strength increases.

This increase in sidebar fatigue strength, as a result of the interference fit, is the reason that the chain pins or holes in sidebars must not be ground for ease of assembly.

Grinding chain pins or holes in sidebars to ease assembly will reduce the fatigue strength of the sidebars. This may result in sidebar failures which will cause the entire chain and bucket assembly to fall into the boot of the elevator.

Do not heat chain side bars, grind the holes in side bars or grind chain pins for ease in assembly. Side bar fatigue may result and chain warranty will be void.

Chain Assembly

Proper chain assembly is crucial in the safe and smooth operation of an elevator.

Pins and rivets are manufactured in a variety of geometric shapes. They can be a straight cylinder, have multiple stepped diameters, have locking flats or various head shapes. These variations in geometry will dictate the proper direction and method of assembly and disassembly. A pin with either a flat on a head end or a larger stepped diameter will not pass through the smaller cotter-side sidebar hole. Likewise, the round shank of a pin with

locking flats on the cotter end will not pass through the slotted cotter-side sidebar hole.

To ensure that the elevator will operate smoothly and safely perform the following steps without deviation.

Chain warranty is void on improperly assembled chain. Elevator components that fail due to improper chain assembly are also void of warranty.

WARNING

Improperly assembled chain may result in chain failure. Falling chain can cause personal injury or death.

1. Make sure the chain attachments of both segments being joined are oriented in the same direction. Chain segments that are being joined while laying on the ground, should be positioned so the chain joints are parallel to the ground.

Installation Note

See Assembling Rex Sealed Joint Chain, page 4-24 for additional chain assembly Step a through Step c that must be performed when assembling sealed joint chain prior to going to Step 2 below.

2. Slide the block (bushing) link end of one chain segment into the attachment sidebars end of another segment and align pin holes.
3. Insert the chain pin by hand through the head side attachment sidebar, the bushing and into the cotter side attachment sidebar.

Installation Note

Pin can be inserted through the chain joint from one side of the chain only. The head side attachment side bar is stamped with an "H", The cotter side attachment side bar is stamped with a "C".

4. Push pin through interference fit of attachment side bars so that the head of the pin is in contact with the head side attachment sidebar.
    - — Chain segments can be assembled either by pressing the pins into the chain sidebars or by driving them in with a hammer. ***Rexnord*** recommends pressing the pins into the chain sidebars with a ***RexLinkmaster*** Chain Tool, because it is less likely that the chain will be damaged during assembly.
    - — Larger size ***Rex*** chains must be assembled by pressing the pins into the chain; driving pins with hammers is not an option because hammering on the pins will not overcome the interference fit between chain pin and side bar.
    - — See *Linkmaster Chain Tools, page 4-26* for more information on pressing pins into chain.

Chain/pins damaged during assembly must be replaced with new chain/pins or chain warranty will be void and chain failure may result.

5. Install pin-lock through hole in end of chain pin. Bend the end of the pin-lock so it can not back out of the chain pin.
6. Check that the newly assembled chain joint flexes freely. If the joint does not flex, firmly strike the cotter end of the pin with a 3–5 Kg (6-12 lb) hammer to loosen the joint.

STOP

Failure to loosen the chain joint will cause erratic chain action and could result in buckets hitting the casing. The chain must flex freely.

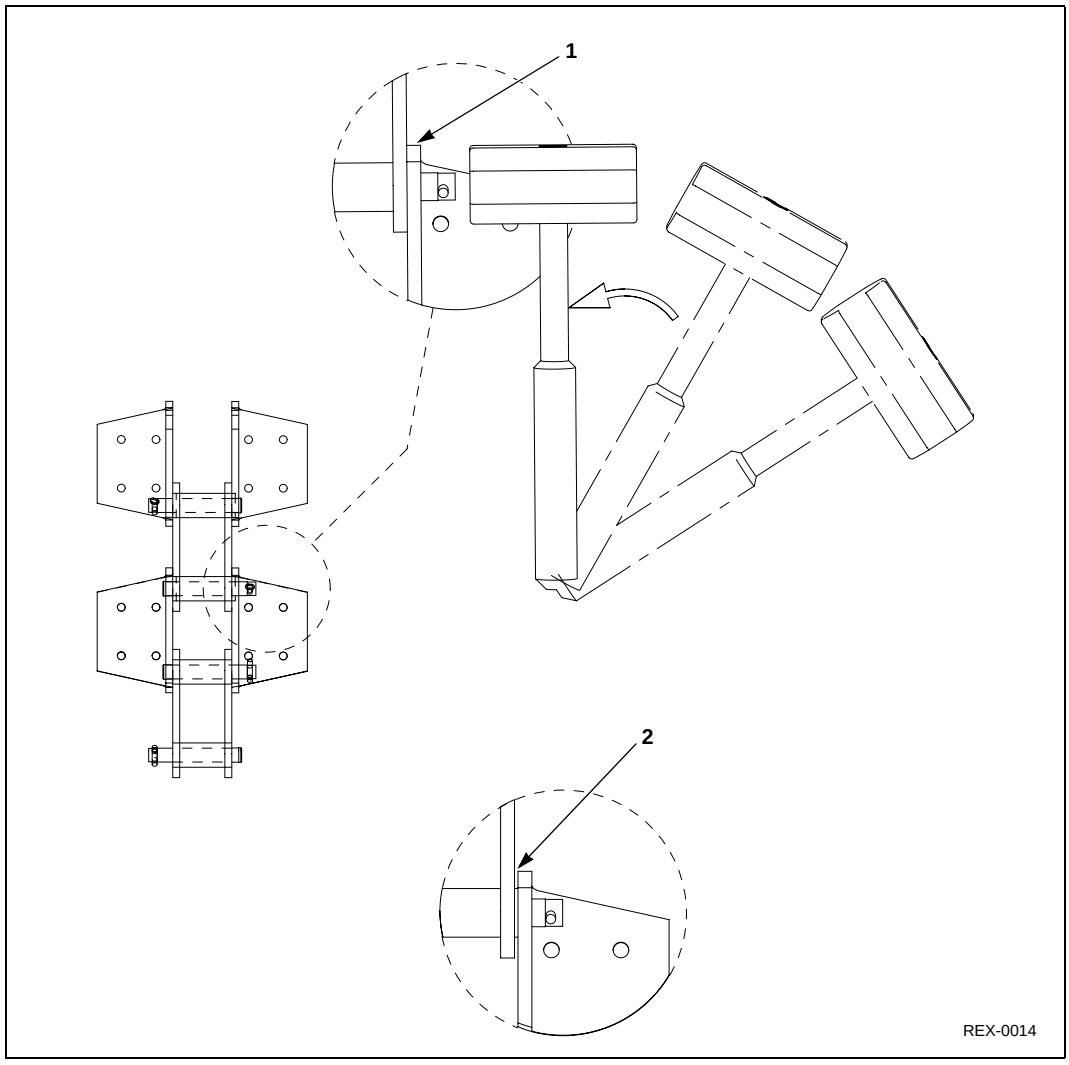


Figure 4-18: Loosening Tight Chain Joints

1 – Tight chain joint
2 – Chain joint loosened

Assembling *Rex* Sealed Joint Chain

Rex Sealed Joint Chain uses a polymeric seal to protect the chain joint and if properly installed will increase chain life significantly. The seal was designed to prevent abrasive

material from entering and lubricant from leaving the chain joint which in turn, reduces joint wear and increases the chain's life.

Each shipped section of ***Rex*** Sealed Joint Chain will have a plastic bag attached to it containing:

Quantity	Item
1	Tube of Lubricant
2	Polymeric Seals
1	Pin-lock

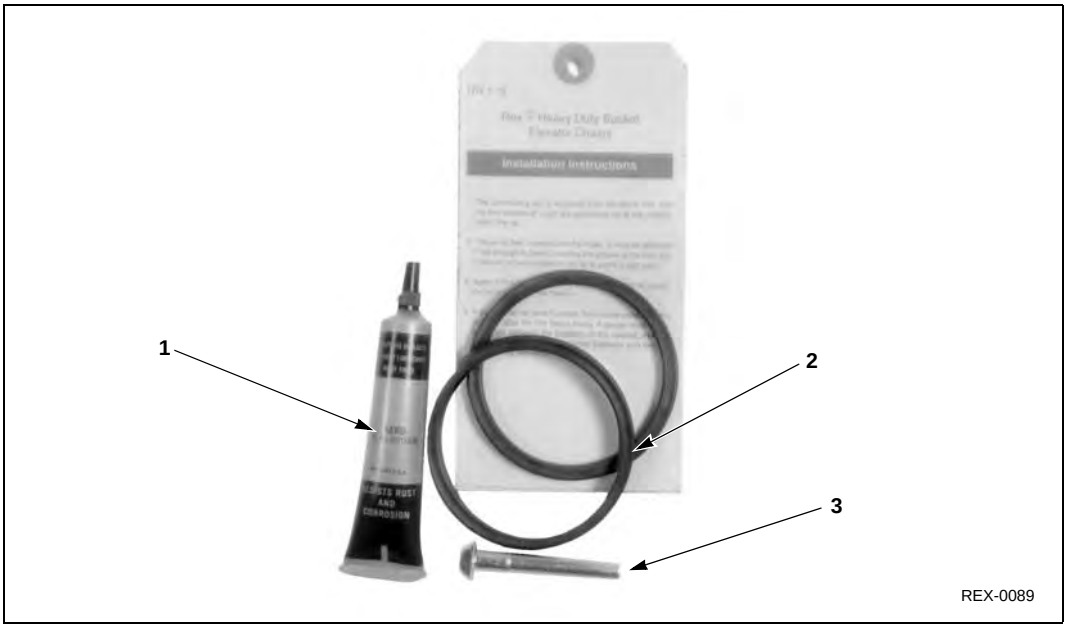


Figure 4-19: Sealed Joint Chain Kit

1 – Lubricant
2 – Seals
3 – Pin-lock

The following steps must be performed in addition to, and prior to, *Step 2* in the steps outlined in *Chain Assembly, page 4-22* to ensure proper assembly of the sealed joint chain sections:

a. Using a clean cloth, wipe clean the connecting pin, ID of bushing, and outer area of the sidebar which the seal will come in contact with including the seal retaining ring mounted on the end of the bushing.

b. Spread a generous amount of the lubricant from the tube into the bushing ID and along the surfaces of the sidebars where the seal comes in contact.

c. Use the remaining lubricant to spread over the pin and inside of sidebar holes to ease field assembly.

STOP

Extreme care must be taken not to damage seals when sliding block link between chain attachment sidebars.

Installation Note

It is often difficult to slide the block link into the attachment sidebars because there is not enough clearance with the seals in place. If the bushing link is forced into position, damage can be caused to the seals! To avoid this, it will be necessary to spread the attachment links about 1–2 mm (1/32-1/16”) to allow easy entry of the bushing link.

STOP

Do not over spread the attachment sidebars as they could bend and/or cause twist in this section of chain.

Linkmaster Chain Tools

Connecting the chain shipping segments or assemblies is best accomplished with the ***Rex Linkmaster*** chain tool. The ***Linkmaster*** chain tool is designed specifically for assembling and disassembling ***Rex*** chains and equivalent ***Linkbelt*** chains. The ***Linkmaster*** chain tool presses the chain pins in and out of the sidebars, greatly reducing the risk of damaging the chain during assembly.

When assembling the chain, use the correct size ***Linkmaster*** chain tool for the job. ***Rexnord*** has developed two models of ***Linkmaster*** chain tools. The original ***Linkmaster*** tool assembles all the smaller to medium size High-Performance elevator chains, the ***LinkmasterII*** chain tool assembles all the largest High-Performance elevator chains. See *Figure 4-20*.

Contact ***Rexnord*** if there is any question to which tool best fits your application.

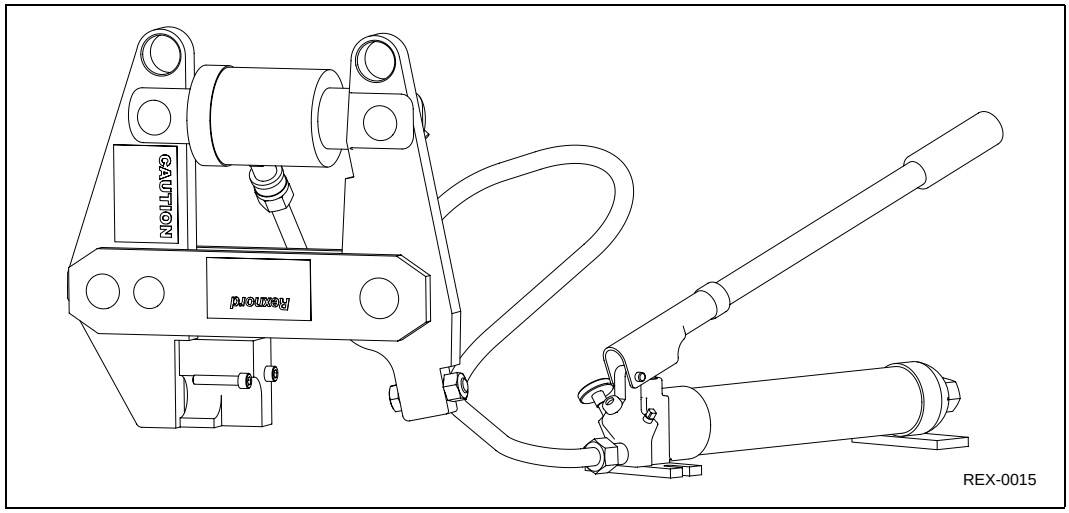


Figure 4-20: ***Rex Linkmaster*** *Chain Tool*

To accommodate and assemble the many ***Rex*** chains used in ***Rexnord*** equipment, the ***Linkmaster*** and ***Linkmaster II*** chain tools use different size adapter support plates or pin pushers to support the chains properly within the tool. When setting up the ***Linkmaster*** or ***Linkmaster II*** chain tool make sure that the correct adapter support plate or pin pusher is bolted into the tool.

If the correct adapter support plate or pin pusher is not available or there is a question of which adapter is correct for your application, please contact ***Rexnord***.

Installation Note

*It is very helpful to apply a light coat of oil to the sidebar holes and surface of the pin to ease assembly prior to using the **Linkmaster** tool.*

Pre-assembling Chain Shipping Sections

To expedite the installation of chain into an elevator it is possible to pre-assemble chain shipping segments prior to installation.

Pre-assemble the chain just prior to it being required/installed in the elevator. Chain segments pre-assembled too early can be subjected to many harsh environments which can damage the chain, causing many operational problems when installed.

Do not pre-assemble chain shipping segments together until the elevator is ready to have them installed. Store the chain as specified in the long term storage section of the manual until it is needed, so it will not be damaged.

Before pre-assembling chain segments, make sure the area in which assembly will take place is secure, chain is not in heavy equipment pathways, subjected to falling objects, sitting in water and/or mud if it rains, etc.

When pre-assembling chain follow all the chain instructions given under the headings:

- *Handling Coiled Chain (Shipping Sections), page 4-20*
- *Rigging and Lifting Chain, page 4-20*
- *Interference Fits at Chain Joints, page 4-22*
- *Chain Assembly, page 4-22*
- *Linkmaster Chain Tools, page 4-26*.

When installing chain at the boot section:

- ***Rexnord*** recommends pre-assembling chain segments into six meter (twenty foot) assemblies for ease in handling.
- Pre-assemble chain in an area close to the boot section so chain is less likely to be damaged when moving it into the elevator.

When installing chain at the head section:

- Assemble chain segments in an area in which the crane operator can easily view and pickup the assemblies without dragging them.
- Do not make the chain assemblies longer than what the crane can lift clear over the top of the elevator and any other objects in the cranes swing path.

Make sure all chain joints flex freely. This is especially important on double strand elevators where the chain attachments on one chain strand must be in alignment and level with the other strand, so the buckets will hang straight/level in the elevator.

Installing Chain in an Elevator

Chain can be installed in an elevator in a number of ways. The best way depends on the

location and access of the elevator.

The following chain installation procedure has two sub-instruction headings below it, to allow the procedure to be used to install chain at the boot section or the head section. ***Rexnord*** recommends when at all possible to use the sub-instructions *Installing Chain at the Boot Section, page 4-34* where the chain is installed through the boot section of the elevator and hoisted up. When there is minimal access to the boot section it is possible to install the chain sections at the head end of the elevator as described in the sub-instructions *Installing Chain at the Head Section, page 4-36*.

The chain installation procedure along with the sub-instructions Installing Chain at the Head Section, page 4-36 were written to also be used to install pre-assembled chain and bucket assemblies. Instructions that pertain only to installing the chain and bucket assemblies are placed in parenthesis {} and should be disregarded when installing chain only.

1. Lift the take-up assembly to its upper end of travel. Use the take-up lifting beam located inside the top of the boot section to rig from and lift the take-up.
2. Make preparations to support the chain at the top of the elevator. The chain segments/assemblies can only be installed in one side of the bucket elevator at a time. Therefore if the chain segments/assemblies are installed in the load side first, preparations must be made to support the chain installed on the load side of the elevator while the chain segments/assemblies are being installed in the return side.

Determine the total weight of the chain {& bucket} strand so the proper lifting and rigging equipment can be acquired. Refer to elevator's General Arrangement Drawings to determine weight of chain strand.

Never attempt to lift or support a chain assembly with a hoist frame above the elevator without checking the hoist capacity. ***Rexnord*** supplied hoist frames are engineered to support the entire chain and bucket assembly, hoist frames supplied by others may not have the required capacity.

When a hoist frame is not available or the capacity of the hoist frame is insufficient to lift and/or support the complete chain {& bucket} strand, structural beams maybe placed across the bearing channels of the lower head section to support it. See *Figure 4-21*.

It is the responsibility of the customer/contractor assembling the elevator to determine the structural beam size needed to support the chain and how to attach/support it on the elevator.

WARNING
At all times use extreme caution when securing the rigging on chain, falling chain can cause personal injury or death.

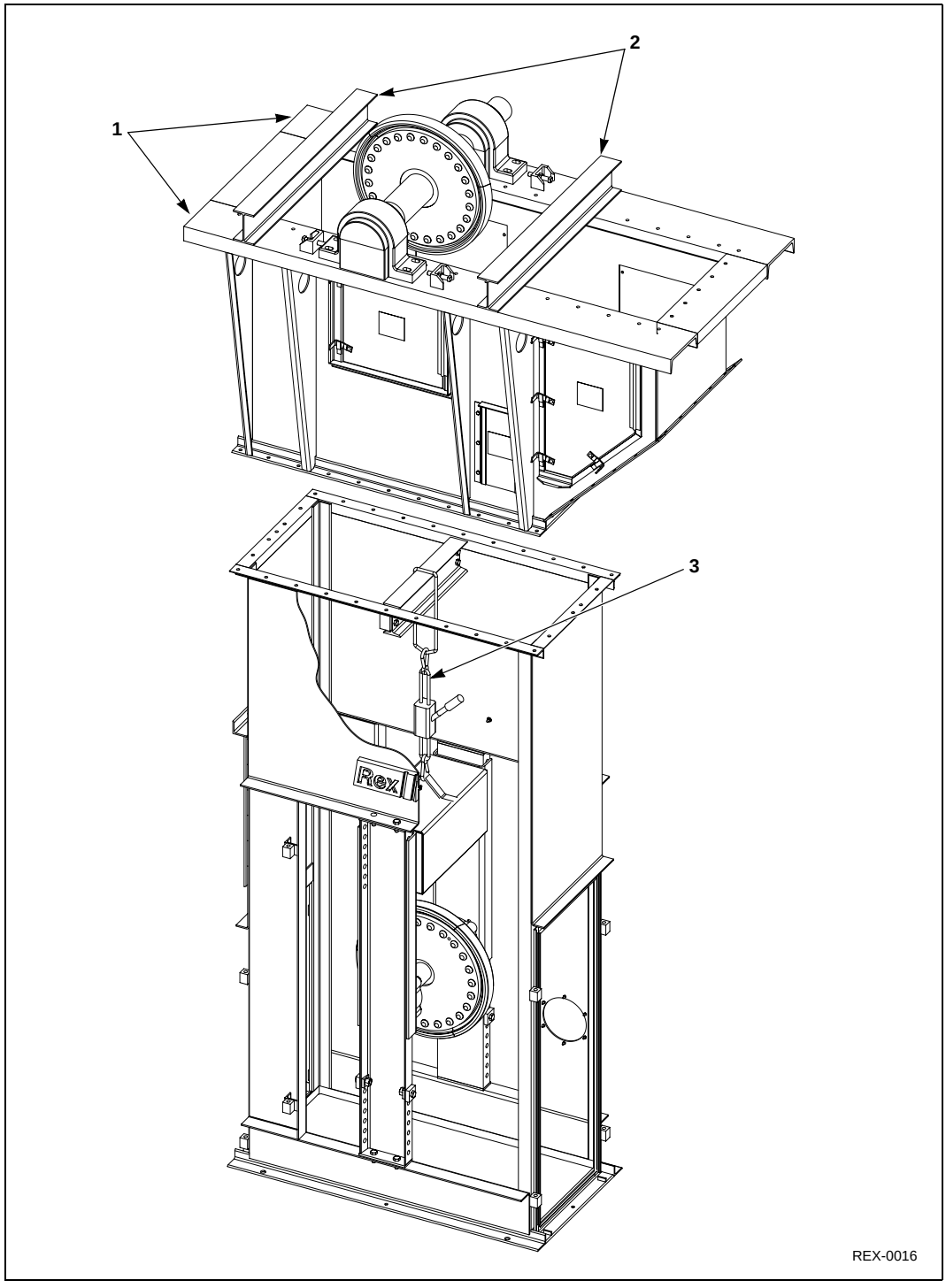


Figure 4-21: *Preparing Elevator For Chain Installation*

1 – Bearing channels
2 – Structural beam
3 – Take-up assembly supported from lifting beam with chain-fall

Customers or contractors planning on pre-assembling buckets to the chain prior to chain installation must read section *Pre-assembling Chain and Buckets, page 4-37* before proceeding. ***Rexnord*** recommends installing the chain in the elevator prior to installing buckets.

3. Follow the additional directions under one of the headings *Installing Chain at the Boot Section, page 4-34* or *Installing Chain at the Head Section, page 4-36* before proceeding on to *Step 4*.

Make sure all chain joints flex freely. This is especially important on double strand elevators where the chain attachments on one chain strand must be aligned and leveled with the other strand, so the buckets will hang straight/level in the elevator. See *Chain Assembly, page 4-22* for more information.

WARNING
On double strand elevators install one chain strand complete before installing the second strand. No work time is allowed under rigged chain. Falling chain can cause personal injury or death.

4. Connect the two strand halves of chain around the head traction wheel or sprocket. Use a ***Linkmaster*** chain tool or equivalent to make the connection. Maintain the rigging installed earlier on the chain while making the connection. See *Figure 4-22*.

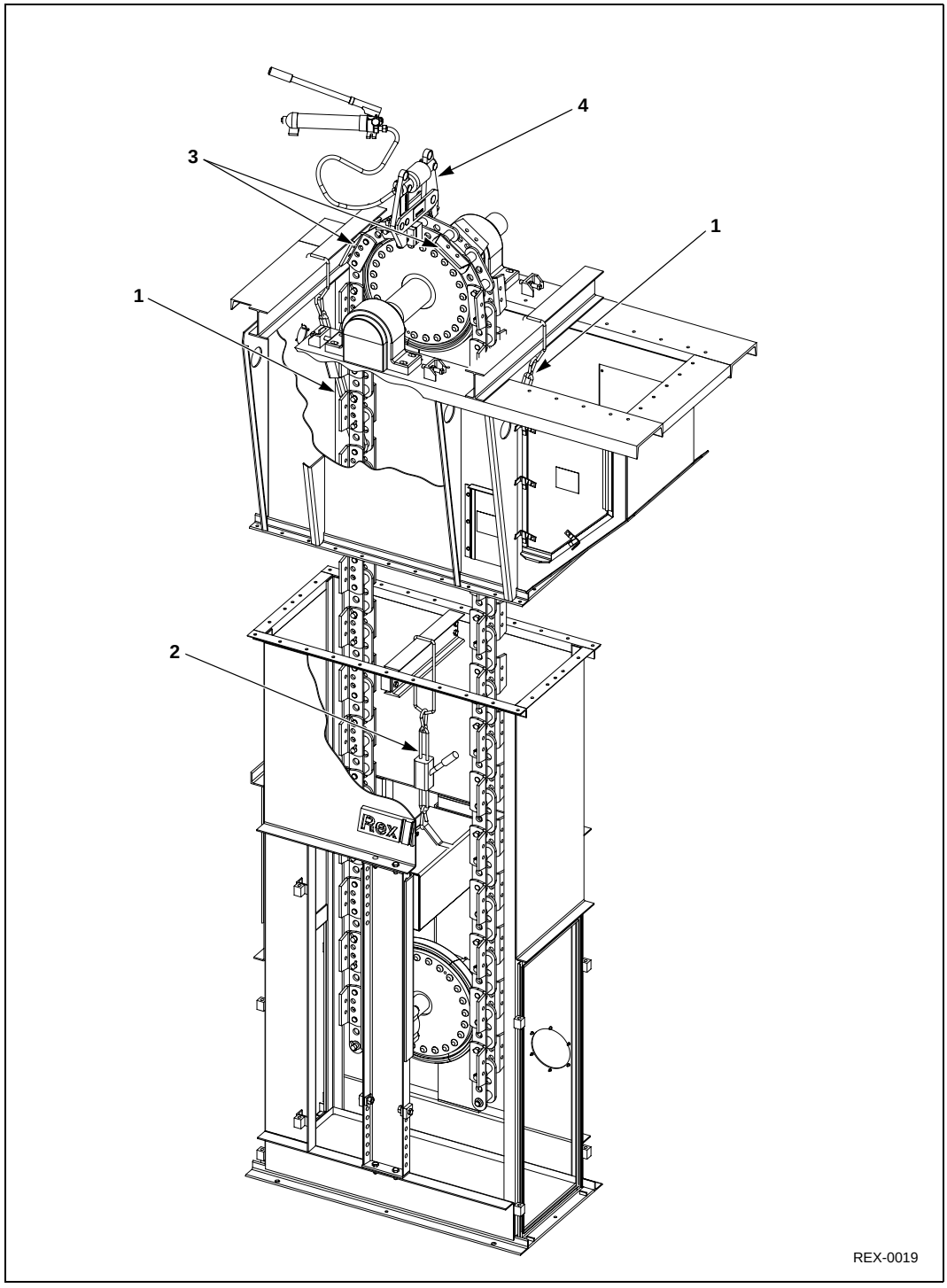


Figure 4-22: *Connecting Chain Strands Around Head Wheel*

1 – Chain strand halves supported by rigging
2 – Take-up assembly supported from lifting beam
3 – Chain strand halves wrapped over head wheel
*4 – **Linkmaster** chain tool used to connect chain strand halves*

5. Connect the chain strand halves at the boot section. Hold the chain securely with rigging before proceeding to connect halves. Use a come-along or a chain fall to draw the chain ends together. Install the chain pin using a ***Linkmaster*** chain tool or

equivalent. See *Figure 4-23*.

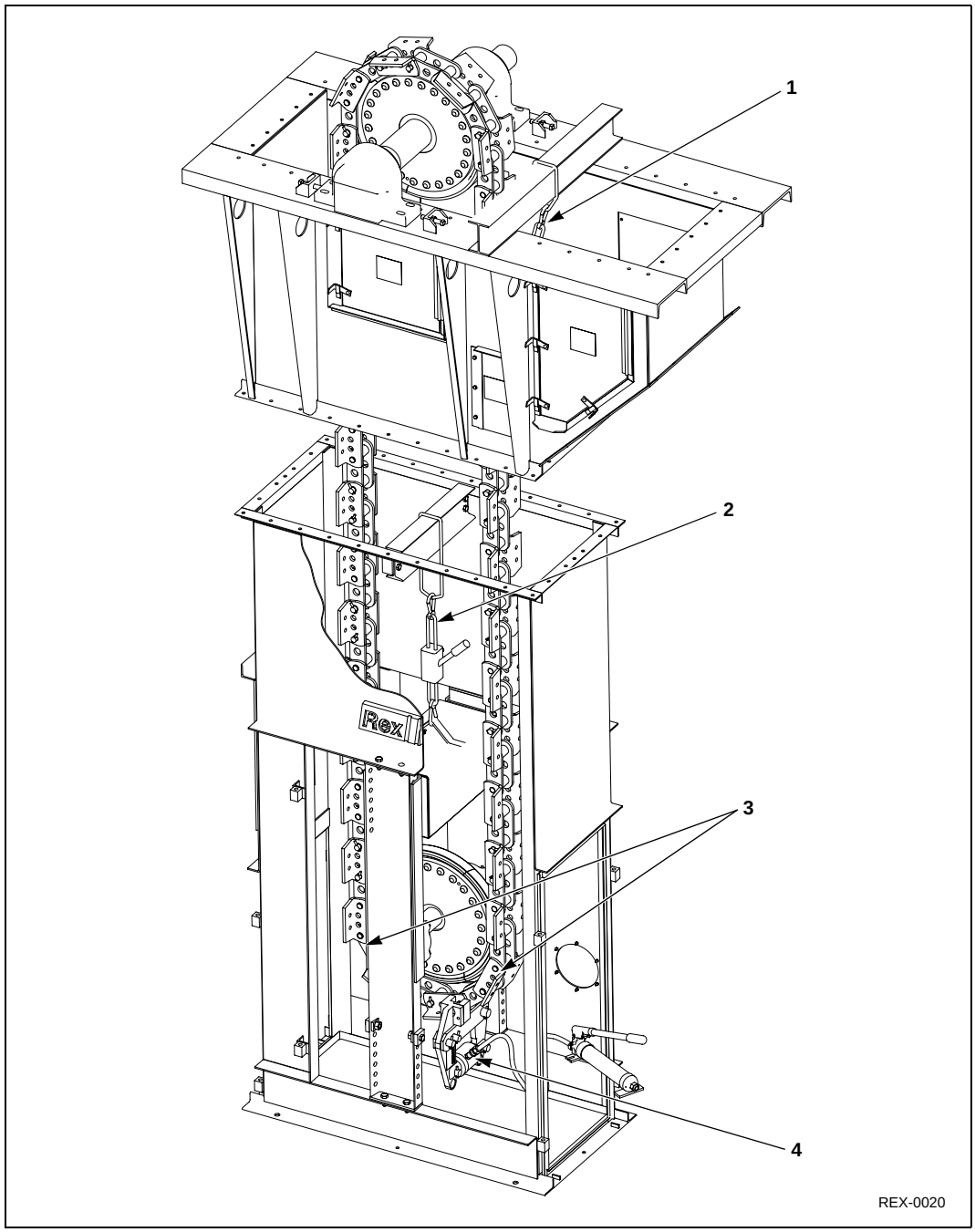


Figure 4-23: *Connecting Chain Strands Around Foot Wheel*

1 – Chain tied off
2 – Take-up assembly supported by lifting beam
3 – Chain strand halves wrapped around foot wheel
*4 – **Linkmaster** chain tool used to connect chain strand halves*

6. For double chain strand elevators only. Perform *Step 3* through *Step 5* to install the second strand of chain.

7. Lower the take-up onto the chain(s) making sure the traction wheel(s) or sprocket(s) is/are positioned on the chain(s) properly.

8. Check the elevator's General Arrangement Drawing for the proper height of the foot shaft. The center of the foot shaft should be located within the take-up measurement given on the drawing. The foot shaft should be positioned as close to the upper limit of the take-up measurement as possible without going above. It may be necessary to remove a two-pitch section of chain {and a bucket} to achieve the proper foot shaft setting.
9. Remove all rigging used to support the chain before proceeding onto bucket installation.

Installation Note

Rexnord *may ship extra chain with the elevator, it is the customer's/contractor's responsibility to install the correct amount of chain to properly position foot shaft as indicated in the elevator General Arrangement Drawings.*

Do not mount buckets to the chain until the chain has been completely installed and all connections made in the elevator.

Installing Chain at the Boot Section

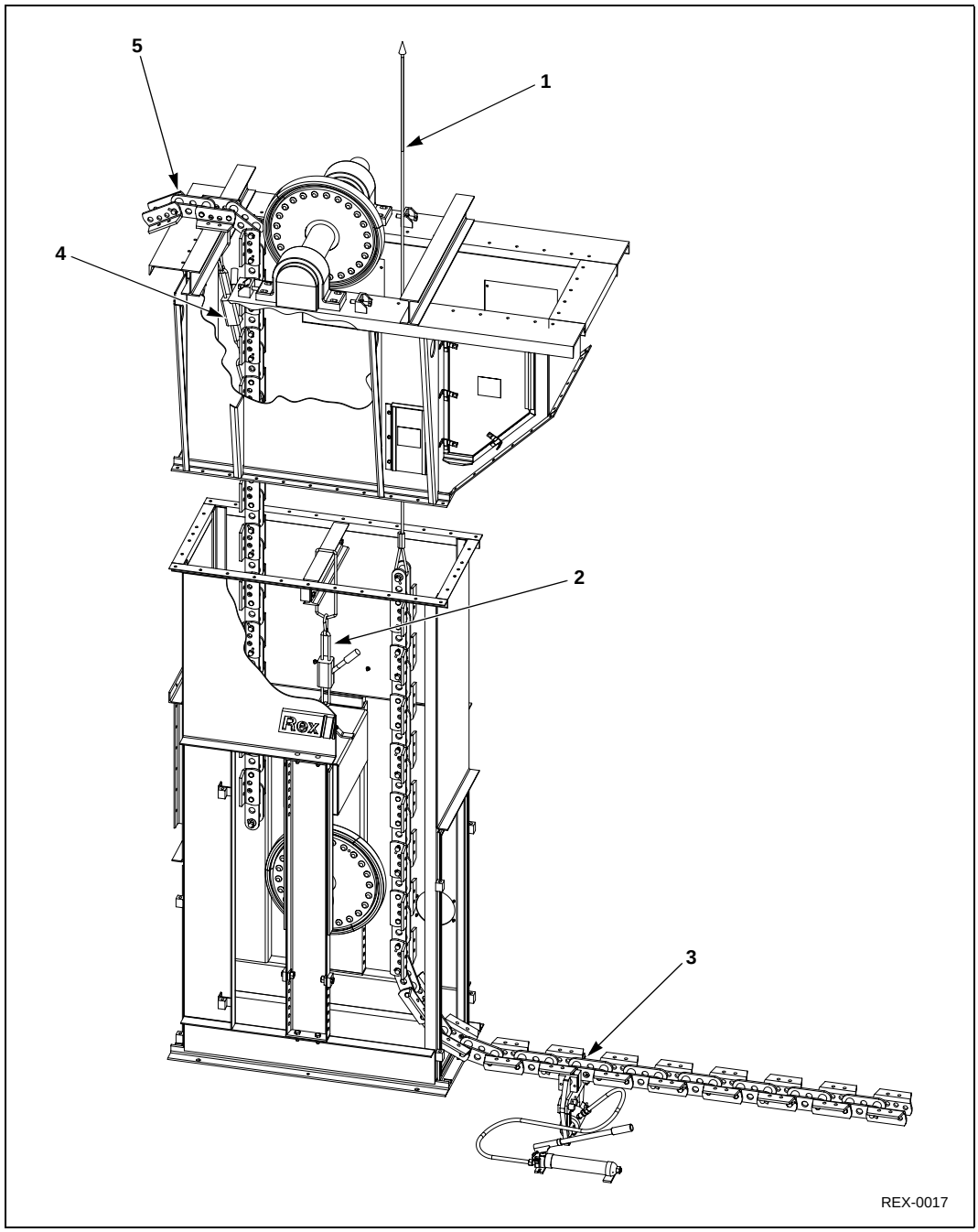


Figure 4-24: Installing Chain Through Boot Section

1 – Chain strand half being pulled into elevator
2 – Take-up assembly supported by lifting beam
3 – Connecting chain sections to chain strand half being pulled into elevator
4 – Supporting chain strand half with rigging while installing opposite side chain strand half
5 – Note: Rig chain to allow chain strand half to be wrapped halfway over head wheel

To install the chain through the boot section of the elevator, perform the following steps:

a. Drop a line into the far side of the casing starting from the top of the elevator; using

a hoist, crane, air tugger, or other means available. The line will be used to lift the chain assembly into the elevator. The working rate of the line, must be rated higher than half of the complete chain strand weight.

b. Two chain segments (shipping lengths) should be connected together just outside the end door in the boot section. To avoid twisting or bending, no more than six meters (twenty feet 20') of chain should be connected together outside of the elevator during installation. Before assembling, be sure to orient the chain segments properly so the chain attachments are pointing in the proper direction when the chain is pulled into the elevator. See the General Arrangement Drawings located under the tab labeled “Drawings” for proper chain orientation.

c. Connect the line dropped in *Step a* around a bushing of the chain assembled in *Step b*.

d. Pull the chain into the elevator, feeding it around the bottom of the foot sprocket or traction wheel and upward towards the head end with the attached line. Stop pulling chain when approximately 1.5 m (5') of it is still outside the elevator casing. Be sure that the chain is oriented properly, so the buckets can be later attached to the chain. See the General Arrangement Drawings located under the tab labeled “Drawings” for proper orientation.

Do not feed the chain into the elevator on its side. Prevent the possibility of twist by feeding it in the manner shown in *Figure 4-24*.

e. Connect two more shipping segments of chain (approximately 6 m (20')) to the end of the chain still outside the boot section.

f. Pull attached chain into the elevator leaving approximately 1.5 m (5’) of chain outside the elevator.

g. Keep performing *Step e* and *Step f* until half the chain is installed in the elevator.

h. Secure this half strand of chain to the hoist frame or the structural beam that was placed over the bearing supports. (one half of the chain assembly is now in the elevator.)

Installation Note

Support the first half of chain so that a few links at the top end of the chain assembly are free. The free links are needed so the chain can be wrapped around the head traction wheel or sprocket and attached to the other half of the chain easily.

i. Install the second half of chain by repeating *Step a* through *Step h*, feeding the chain upward on the opposite side of the casing.

Installing Chain at the Head Section

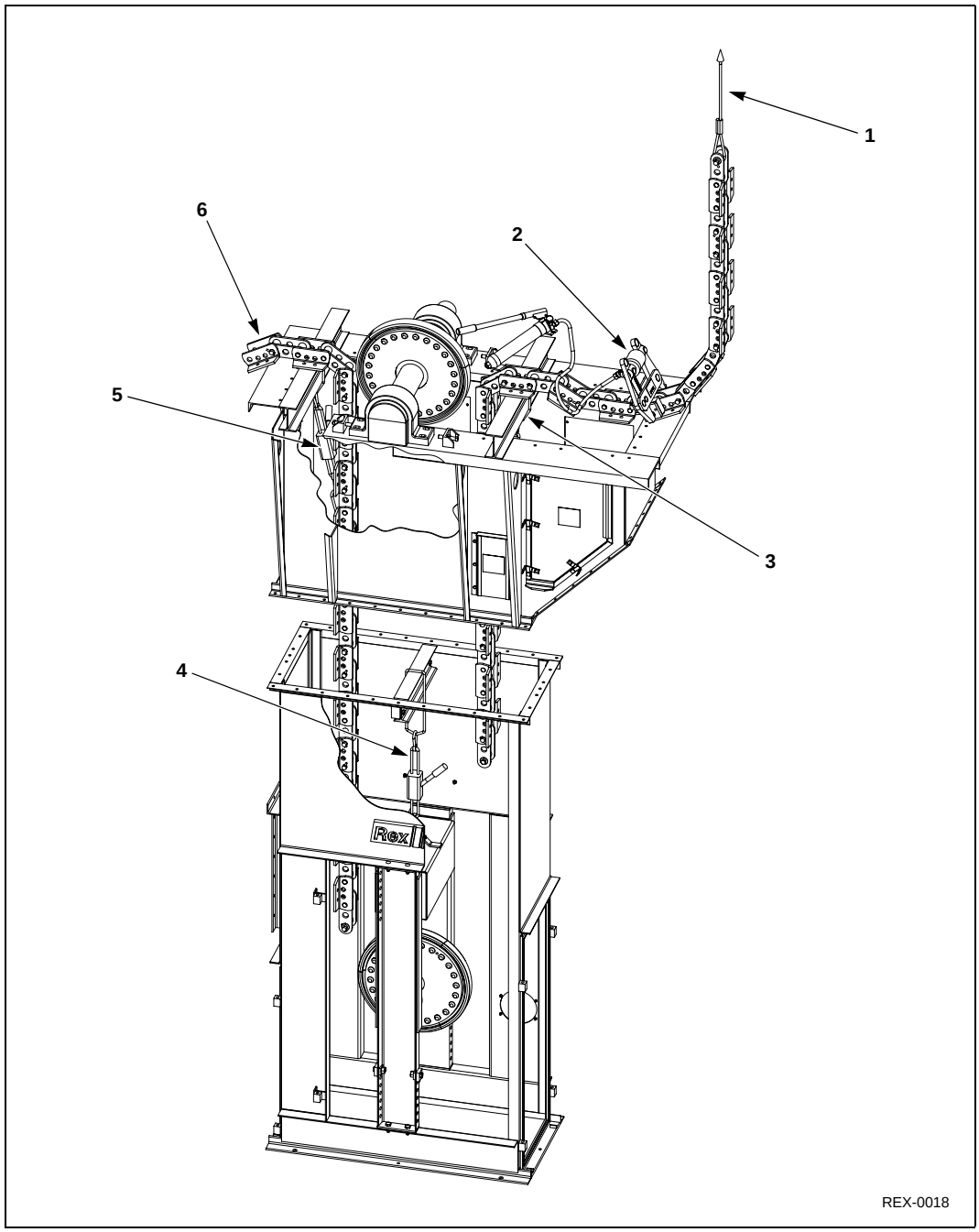


Figure 4-25: Installing Chain Through Lower Head Section

1 – Chain strand half being lowered and supported by crane or hoist
*2 – Connecting chain sections together with **Linkmaster** chain tool*
3 – Supporting chain strand half inside elevator with rigging while connecting chain sections
4 – Take-up assembly supported by lifting beam
5 – Supporting chain strand half with rigging while installing opposite side chain strand half
6 – Rig chain to allow chain strand half to be wrapped halfway over head wheel

To install the chain through the head section of the elevator, perform the following steps:

a. Rig and lift a chain segment/assembly as described and illustrated in *Rigging and Lifting Chain, page 4-20* {*Rigging and Lifting Pre-assembled Chain and Buckets, page 4-39*}. {Make sure the rigging is attached to the proper end of the assembly so that the buckets will be in the correct orientation when the assembly is placed in the elevator}

b. Lift segment/assembly over the top of the head section and other structures as required.

Never install chain segments/assemblies on the carrying and return runs (by wrapping it over the head traction wheel or sprocket) of the elevator at the same time or damage to the chain will result.

c. Lower segment/assembly in through the lower head and down the casings. Guide the segment/assembly while lowering, so it does not hit and damage other components and/or structures.

d. Tie off and support the chain segment/assembly in the elevator so that the crane can be disconnected from it. If one half of the chain strand is now completely installed in one side of the elevator skip to *Step l*.

Installation Note

Support the chain and bucket assembly so that a few links at the top end of the chain are free. The free links are needed so the chain can be easily connected to the next assembly or later wrapped around the head traction wheel or sprocket and attached to the other half of the chain.

e. Rig and lift another segment/assembly to the head section.

f. Lower the segment/assembly until it can be connected to the preceding segment/assembly already being supported in the elevator.

g. Connect the two segments/assemblies together making one long assembly using a ***Linkmaster*** chain tool or equivalent.

h. Lift the long assembly with the crane until the rigging installed to the segment/assembly in *Step d* or *Step j* can be removed safely.

i. Lower the long assembly into the elevator.

j. Tie off and support the assembly in the elevator so that the crane can be disconnected from it.

k. Repeat *Step e* through *Step j* until half of the chain strand is installed on one side of the elevator.

l. Install segments/assemblies on the other side of the elevator by repeating all the steps above.

Pre-assembling Chain and Buckets

Under no circumstances should buckets be mounted to the chain prior to being installed in the elevator unless ALL the following criteria are met:

a. Buckets are designed to be attached to a single strand of chain.

b. The chain and bucket assembly can and will be installed at the head end with a

crane.

c. Crane capacity is greater than complete chain and bucket assembly.

d. All chain and bucket assemblies can be put together in an area in which the crane can reach and pick them up without dragging.

STOP

Buckets designed to be installed on two strands of chain must never be pre-assembled.

STOP

Dragging pre-assembled chain and bucket assemblies will damage the components. Always move pre-assembled chain and bucket assemblies only with a crane and never back flex assemblies while moving them.

STOP

Do not pre-assemble chain and bucket assemblies together until the elevator is ready to have them installed. Store the chain and buckets as specified in the long term storage section of the manual until they are needed.

For detailed information on handling and connecting chain shipping segments see:

- *Handling Coiled Chain (Shipping Sections), page 4-20*
- *Rigging and Lifting Chain, page 4-20*
- *Interference Fits at Chain Joints, page 4-22*
- *Chain Assembly, page 4-22*
- *Linkmaster Chain Tools, page 4-26*.

Buckets assembled to the chain at the site, prior to it being installed in the elevator, must be assembled accordingly:

1. Always assemble chain and buckets in an area in which the crane operator can easily view and pickup the assemblies without dragging them.
2. Assemble the chain and buckets with the bucket's lip facing down and the chain placed on top of the buckets as shown in *Figure 4-26*.

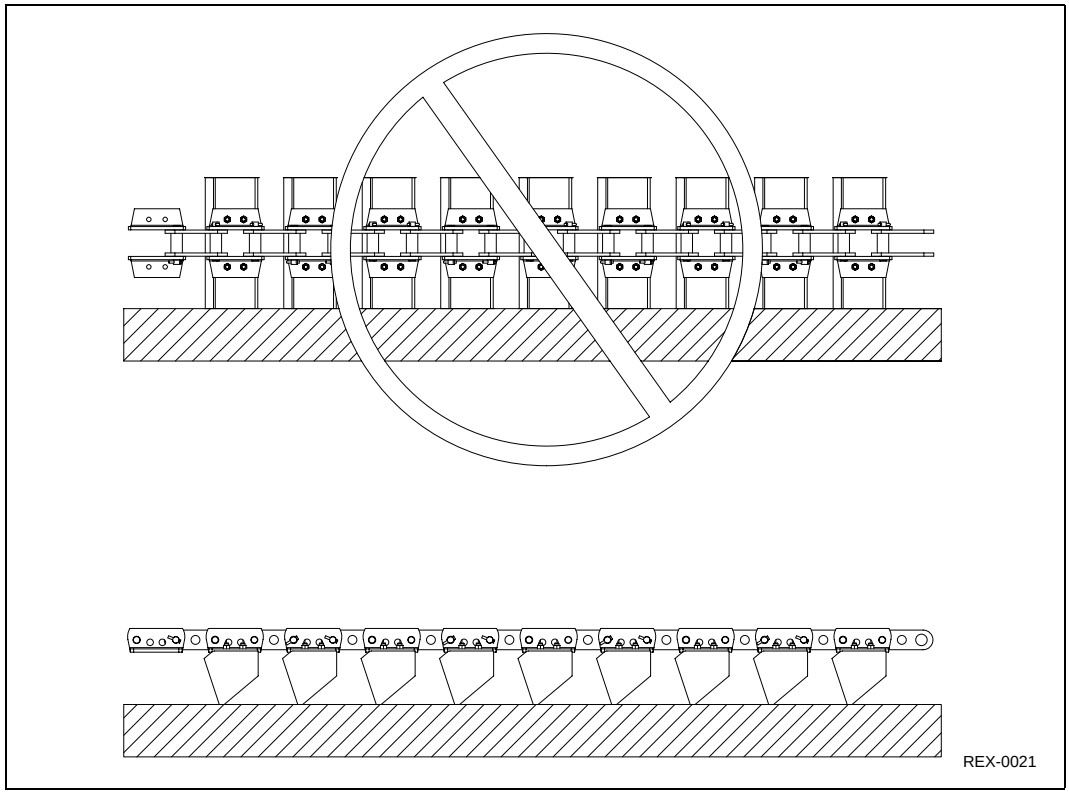


Figure 4-26: Pre-assembling Chain and Bucket Assemblies

— Never assemble the chain and buckets with the buckets laying on their side or with the chain on the ground and the buckets placed on top.

3. Mount bearing plates on the inside of the buckets when they are supplied or called out on the elevator's General Arrangement Drawings.
4. Use the proper sized mounting hardware and tighten to the proper torque value. For more information on installing buckets see *Bucket Installation, page 4-41*.
5. To ease assembly of chain segments it may be necessary to leave the end bucket off of each section. More than one bucket may be left off the very bottom and top assembly of the return and load strand halves of the elevator to ease assembly around the traction wheel(s) or sprocket(s) at the top and bottom of the elevator.
6. Do not make the chain and bucket assemblies longer than what the crane can lift clear over the top of the elevator and any other objects in the cranes swing path.

Make sure all chain joints flex freely.

Rigging and Lifting Pre-assembled Chain and Buckets

Pre-assembled chain and bucket assemblies must be rigged properly or damage to the chain and buckets will result.

Determine the total weight of the chain and bucket assembly so the proper lifting and rigging equipment can be acquired. Refer to elevator's General Arrangement Drawings to determine weight of the chain and bucket assembly.

STOP

Never attempt to lift a chain and bucket assembly unless the crane capacity is greater than the chain and bucket assembly's total weight.

Always connect rigging around a chain bushing close to one end of the chain and bucket assembly to be lifted. See *Figure 4-27*.

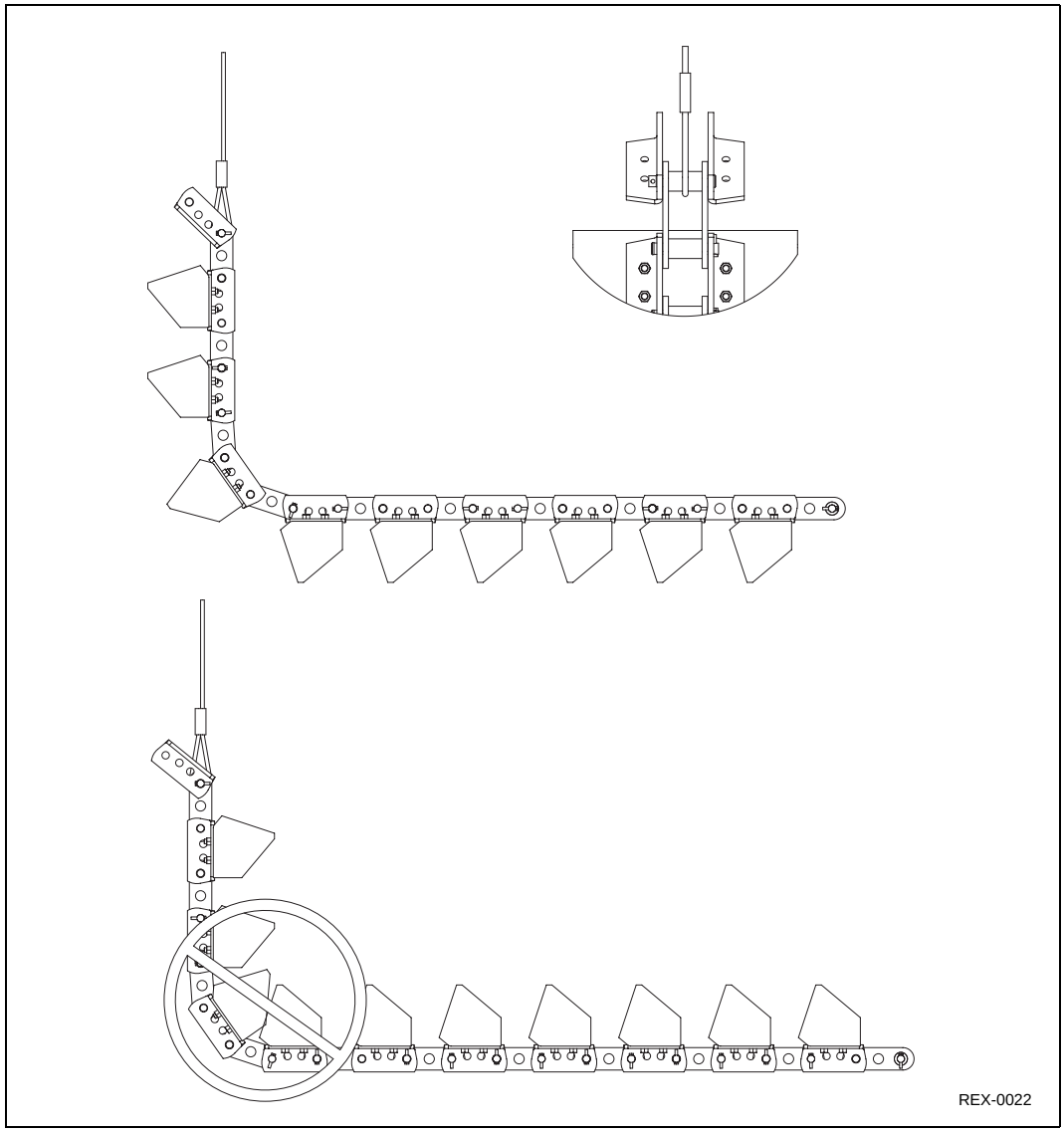


Figure 4-27: Rigging and Lifting Pre-assembled Chain and Bucket Assemblies

STOP

Never install rigging through the chain pin holes, around a chain pin or around the buckets; or damage to the components will result.

Pre-assembled chain and bucket assemblies must be lifted straight up with a crane. Never drag an assembly. See *Figure 4-27*.

STOP

Never back flex a chain and bucket assembly or damage will result.

Installing Pre-assembled Chain and Buckets

1. To install pre-assembled chain and buckets, follow the procedure under the heading *Installing Chain in an Elevator, page 4-27* using the sub instructions for *Installing Chain at the Head Section, page 4-36*. The words “Chain assembly or assemblies” in the instructions also pertain to a Chain and Bucket assembly or assemblies. Instructions with parenthesis {} around them pertain to installing pre-assembled chain and buckets only.
2. Install any buckets removed or left off the chain and bucket assembly to ease the installation of the chain pin between chain and bucket assemblies.

Bucket Installation

The buckets can be mounted to the chain after chain installation is complete.

Install/orientate buckets on the chain as shown on the elevator’s General Arrangement Drawings. Most buckets will mount on the chain with the head of the mounting hardware inside the bucket. When bearing plates are supplied or are called out on the General Arrangement Drawings they must be mounted on the inside of the buckets.

STOP

Failure to install bucket bearing plates when shown on the bucket assembly view in the General Arrangement Drawing will result in bucket failure and bucket warranty is void.

STOP

Do not use split (lock) washers or nylon lock nuts when mounting buckets.

Bucket mounting hardware must be tightened to the following torque values in *Table 4–A, page 4-41*. The mounting hardware must be tightened to the proper torque value during the installation of the buckets and retightened to the proper torque value after the elevator has completed the initial run.

Chain No.	Bolt Size	Bolt Grade or Class	Torque Value Nm	Torque Value ft lb
ER 111, ES833, ER857, SJM857, ER958, SJM 958	1/2”	Grade #2	70 Nm	52 ft lb
	M12 x 1.75	Class 8.8	79 Nm	58 ft lb
RS 856, ER 859, SJM 859, ER 864, SJM 864, ER 956, SJM 956, ER984, SJM 984, ER1084	5/8”	Grade #2	140 Nm	104 ft lb
	M16 x 2	Class 8.8	191 Nm	141 ft lb

Table 4–A: Bucket Bolt Torque Chart

Bucket mounting hardware must be prick punched following the initial run and

retightening of the hardware. When prick punching bucket hardware, distort the bolt threads directly behind the nut with a chisel or punch. Prick punching hardware is recommended but tack welding nut to bolt to distort the threads is acceptable. See *Figure 4-28*.

STOP

If tack welding nut to bolt, DO NOT OVER WELD or hardware failure will result.Welding ground must be connected to bucket, to prevent arcing through mechanical components.

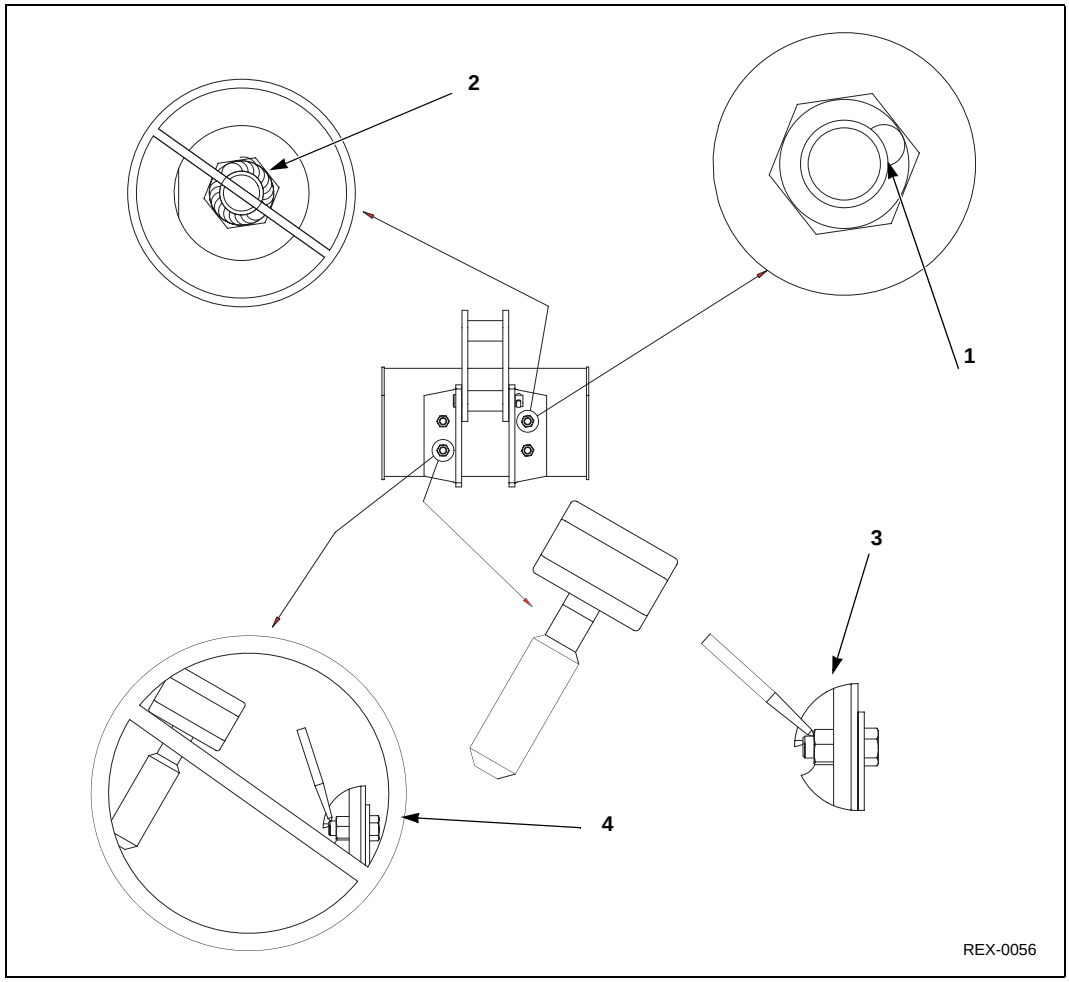


Figure 4-28: Prick Punching or Tack Welding Bucket Hardware

1 – Nut tack welded to bolt properly
2 – Nut over welded to bolt
3 – Bolt prick punched properly
4 – Bolt improperly prick punched

Buckets mounted to the chain using Huck fasteners are tightened to the proper requirement when installed using the proper Huck installation equipment. Therefore, no tightening with a torque wrench is required before or after the initial operation of the elevator.

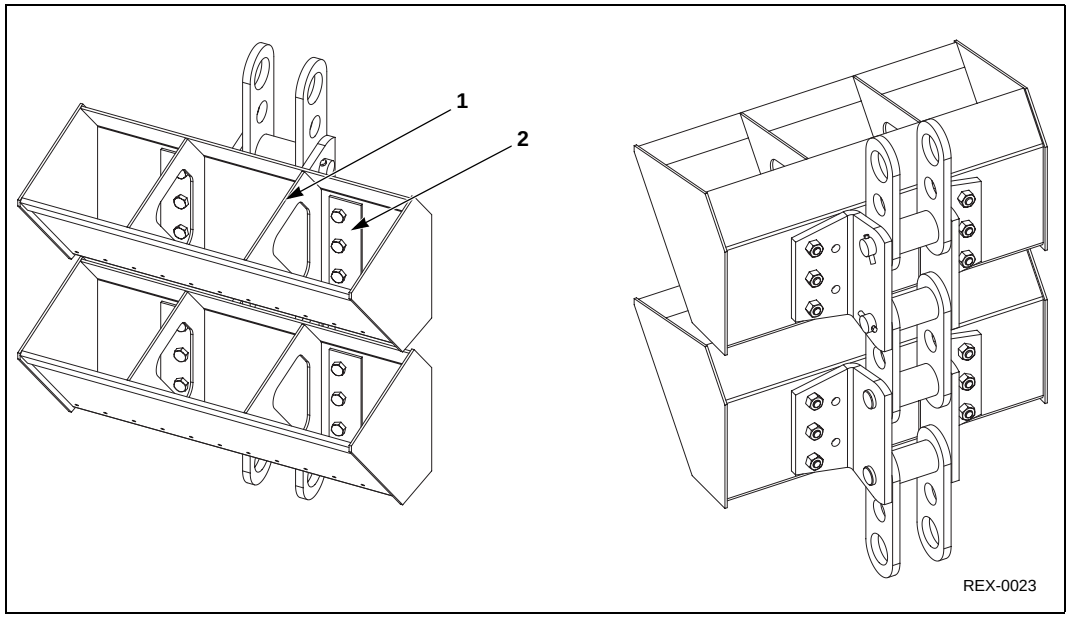


Figure 4-29: AC Bucket Assembly

1 – Stiffeners (Optional)
2 – Bearing Plate

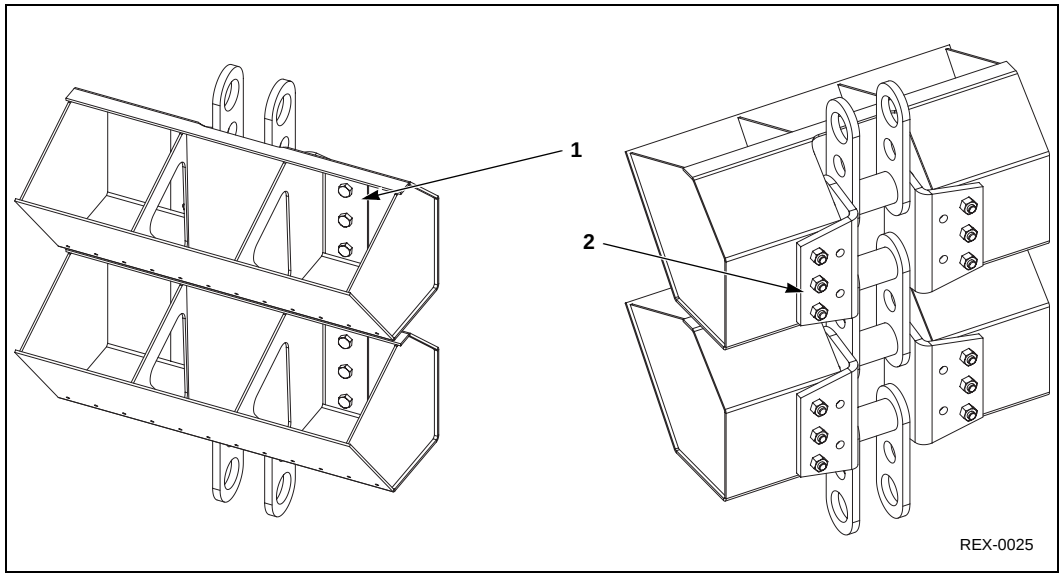


Figure 4-30: ACS Bucket Assembly

1 – Bearing Plate
2 – ACS buckets attach to back side of chain attachment, all other bucket types attach to the front or other side of the attachment

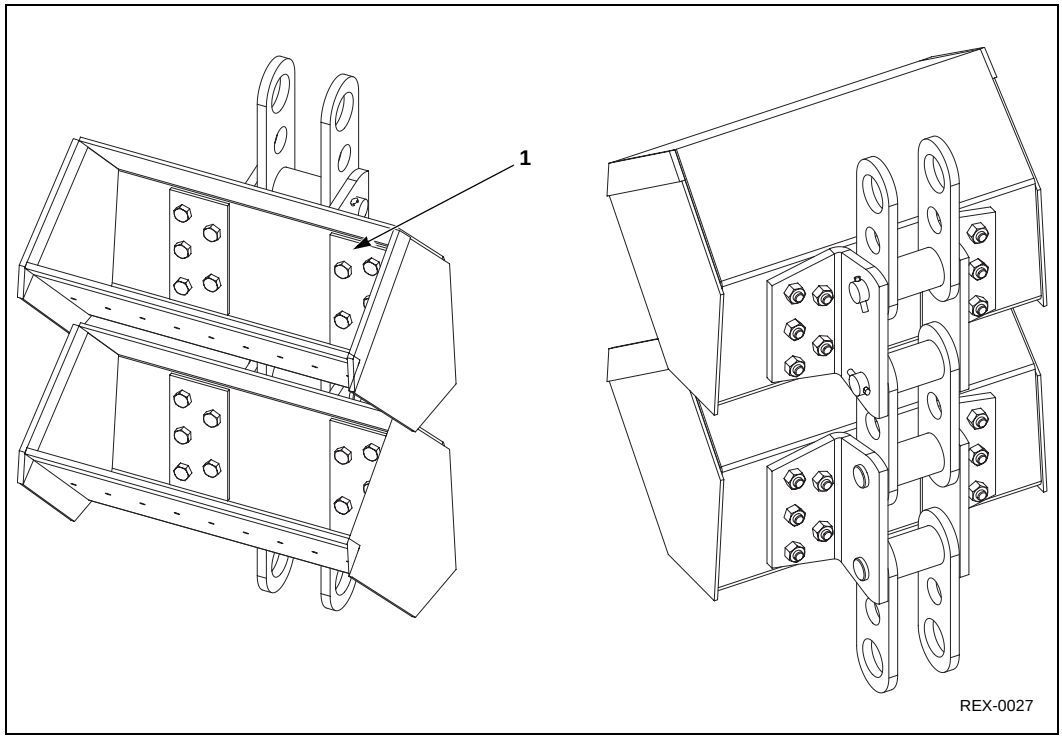


Figure 4-31: *RP Bucket Assembly - single chain strand*

1 – Bearing Plate

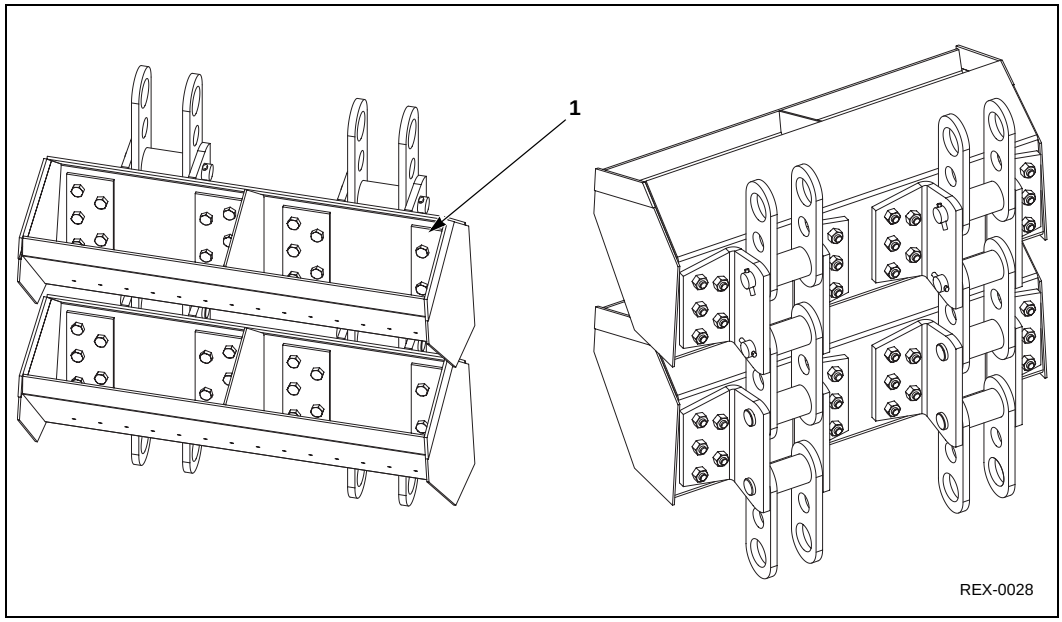


Figure 4-32: *RP Bucket Assembly - double chain strands*

1 – Bearing Plate

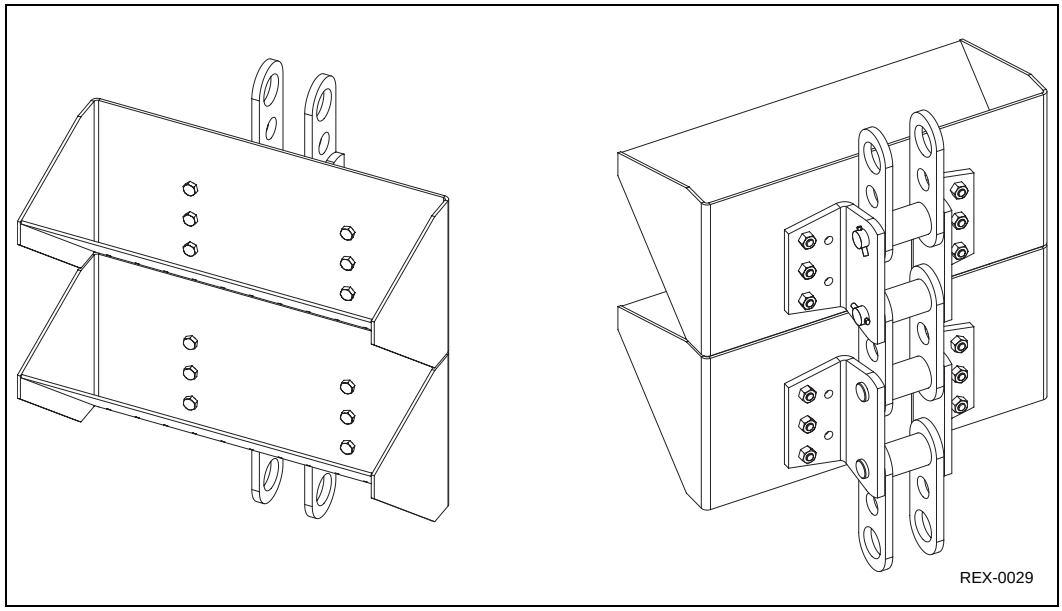


Figure 4-33: *Continuous Bucket Assembly - single chain strand*

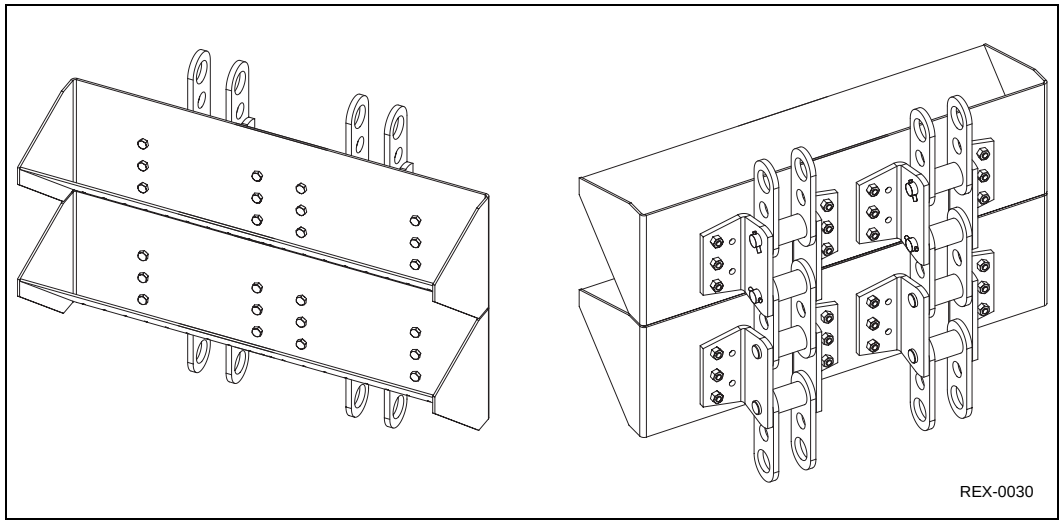


Figure 4-34: *Continuous Bucket Assembly - double chain strand*

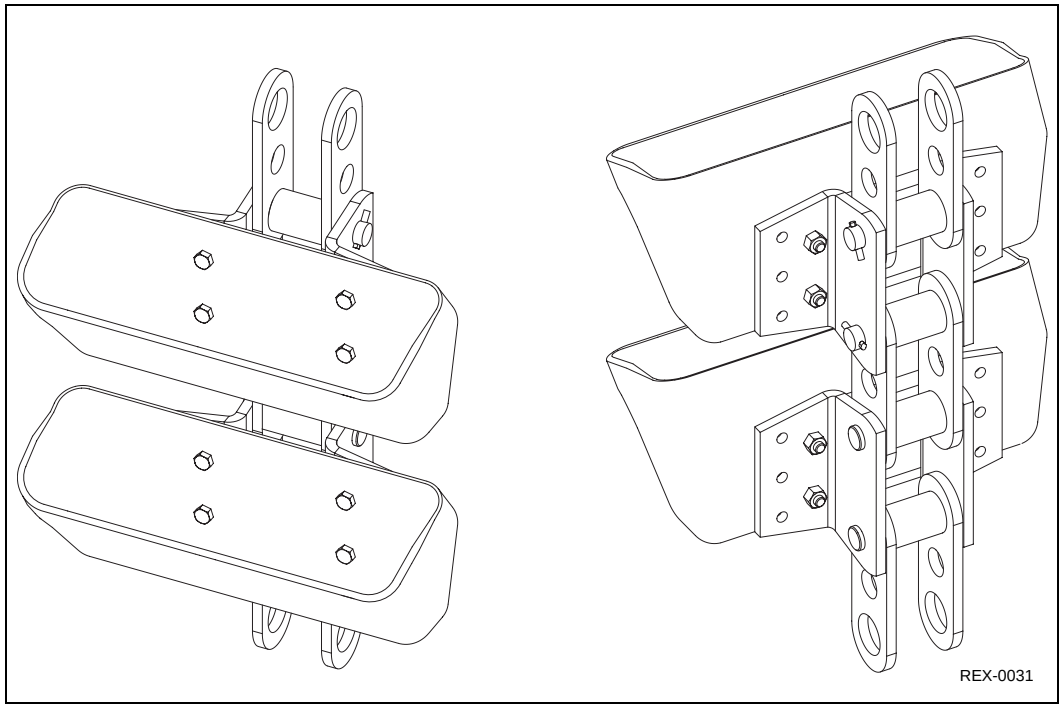


Figure 4-35: *Plastic Bucket Assembly*

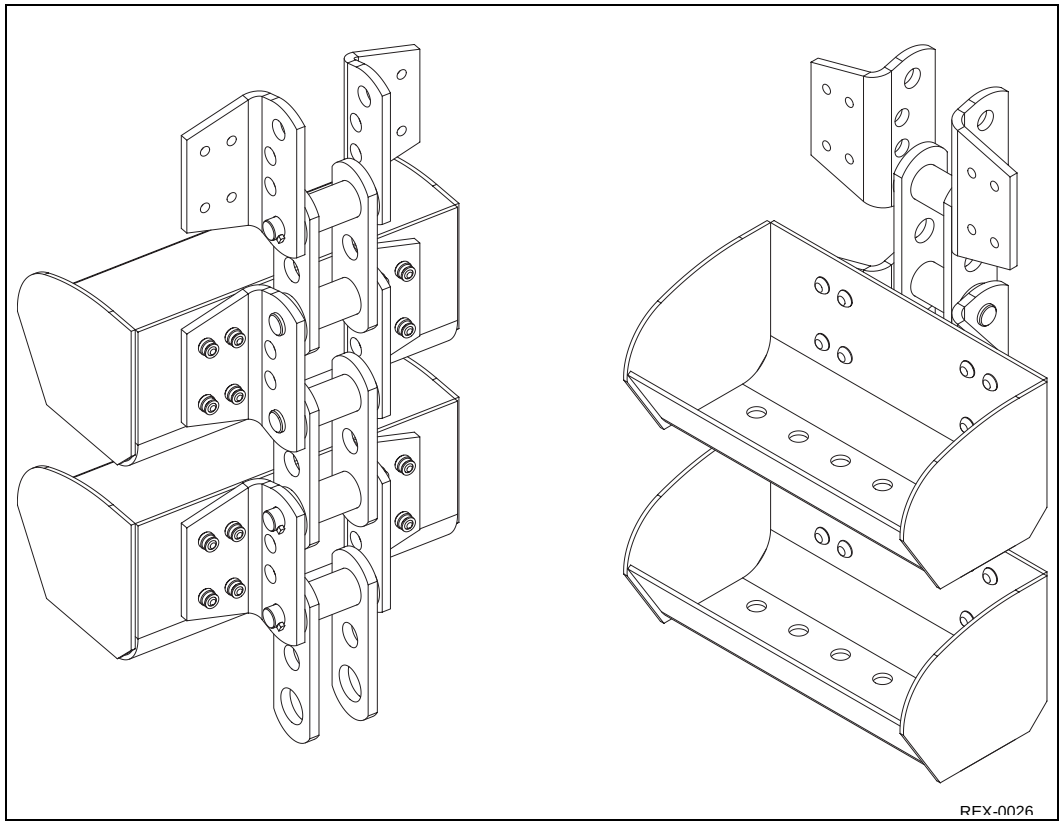


Figure 4-36: *Sugar Cane Bucket Assembly*

Buckets can be mounted in any of three areas, at the boot section, at the head section, or the three door intermediate section if the elevator is so equipped. In general, bucket installation is easiest at the three door intermediate section.

Buckets Mounted on Two Strands of Chain

Buckets mounted on two strands of chain can not be installed until the two strands of chain are aligned. To make sure chain strands are in alignment, at least four buckets must be mounted in the elevator at various places and the level of the buckets checked. All the chain joints in each chain strand must freely flex or chain alignment will not be possible. For information on loosening tight chain joints see *Chain Assembly, page 4-22*.

The head shaft MUST BE LEVEL before proceeding to check and align the chain strands. See *Head Shaft Installation, page 4-15* for more information on leveling the headshaft.

To check and align two chain strands within an elevator perform the following procedure:

1. Move at least two buckets to the head end and foot end of the elevator.
2. At the head end, align the chain attachments of the two strands and mount one bucket to each chain strand.
3. Tighten the hardware used to mount the bucket in *Step 2* to the proper torque value. See *Table 4–A, page 4-41* for proper torque values. Check the level of the bucket using a level approximately as wide as the bucket and with the bucket mounting hardware tightened properly. Loosen bucket mounting hardware and adjust chain until bucket hangs level with mounting hardware tight.

Installation Note

If Huck fasteners are to be used to mount buckets, temporarily substitute bolts and nuts for the Huck fasteners while installing buckets in this procedure. Buckets installed during this procedure may have to be shifted in order to align the chain strands. The bolts and nuts can be replaced with Huck fasteners after the chain alignment procedure has been completed and buckets are being installed following one of the procedures below.

4. At the boot section, the chain attachments of the two strands of chain should appear to be in alignment. If they are not in alignment one chain most likely has a tight chain joint, which will require freeing before proceeding to the following steps. For information on freeing tight chain joints see *Chain Assembly, page 4-22*.
5. If the attachments are aligned in *Step 4*, install a bucket to the two strands of chain at the boot section. Tighten the mounting hardware and check to make sure the bucket hangs level. If the bucket does not hang level on the chains, locate and correct the problem causing the bucket to be cocked before proceeding on.
6. Rotate the chain assembly through approximately one quarter of its cycle path within the elevator (the bucket installed at the head should be straight across from the bucket installed at the boot).
7. Mount a bucket on the two strands of chain at the head section and at the boot section as was done in steps 2–5 making sure the buckets hang level within the elevator.
8. Start installing buckets in the elevator as instructed in one of the two methods below.

Bucket Installation Procedures

There are two methods of moving the chain in the elevator during the bucket installation process. The first method uses the inching drive of the elevator if so equipped to move the chain. The second method uses chain falls, come-alongs or equivalent to pull the chain

around the elevator.

Installing buckets using the inching drive to rotate the chain:

Before the following procedure can be performed the drive assembly must be properly installed/mounted to the elevator before the buckets can be assembled to the chain. See *Drive Installation, page 4-55* and the manufacturer's literature for the drive in this manual for drive installation instruction.

1. Block the chain.
2. Mount approximately five buckets. Heavier buckets may require a smaller amount of buckets to be installed at one time. See item 1 *Figure 4-37*.
3. Tighten the bucket mounting hardware to the proper torque value given in *Table 4–A, page 4-41*.
4. Unblock chain.
5. Rotate the chain until the first five buckets are positioned 180 degrees from the area the buckets were installed. See item 2 *Figure 4-37*.
6. Block the chain.
7. Install approximately ten buckets. See item 3 *Figure 4-37*.
8. Unblock chain.
9. Rotate the chain approximately 180 degrees so the buckets can be mounted directly after the first five buckets mounted in *Step 2*. See item 4 *Figure 4-37*.
10. Block chain.
11. Install ten bucket after the first five buckets. See item 1 *Figure 4-38*.
12. Keep rotating the chain 180 degrees, and installing ten buckets until all the buckets are mounted to the chain. See item 2 *Figure 4-38*.

Installation Note

The above procedure keeps the carrying (up) side and the return (down) side of the chain strand(s) out of equilibrium by the weight of 5 buckets maximum. Installing more buckets at a time before rotating chain increases the unbalanced load between the two chain strands.

WARNING
Always block chain before entering elevator. Unbalanced chain strands can start to rotate in elevator and serious injury or death can result.

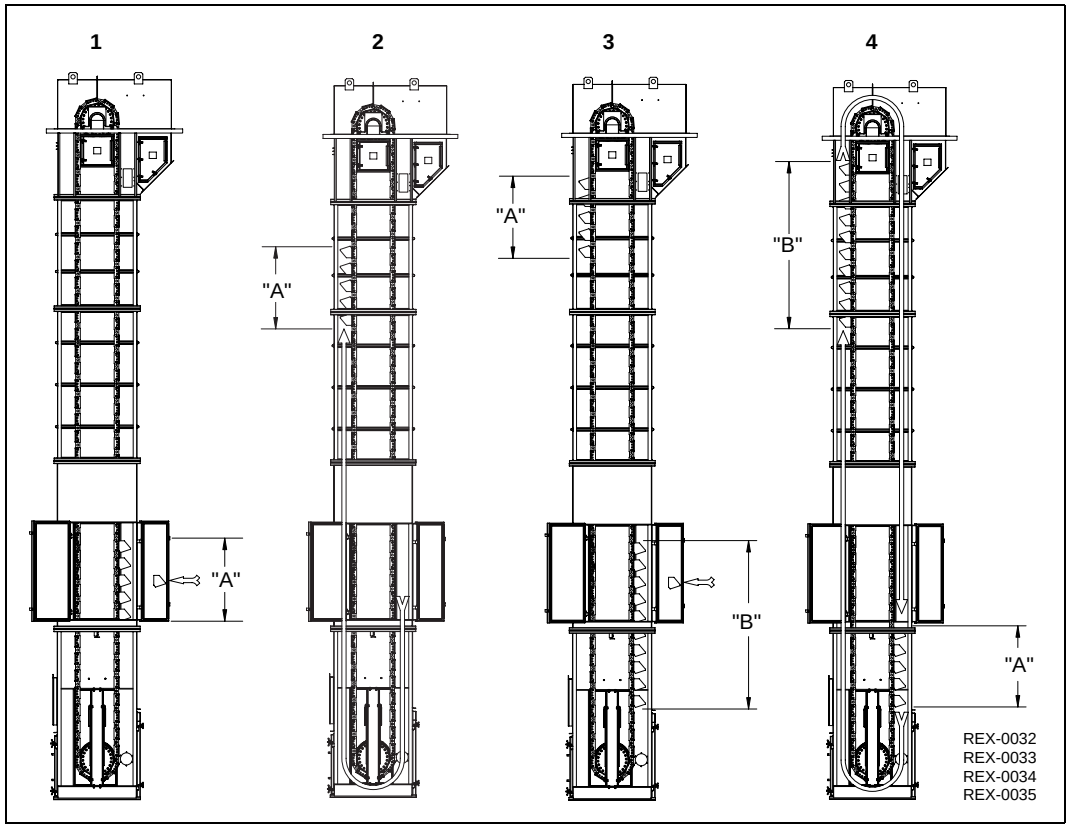


Figure 4-37

1 – Installing 5 buckets “A”
2 – Rotating 5 buckets “A” 180°
3 – Installing 10 buckets “B”
4 – Rotating 10 buckets “B” 180°

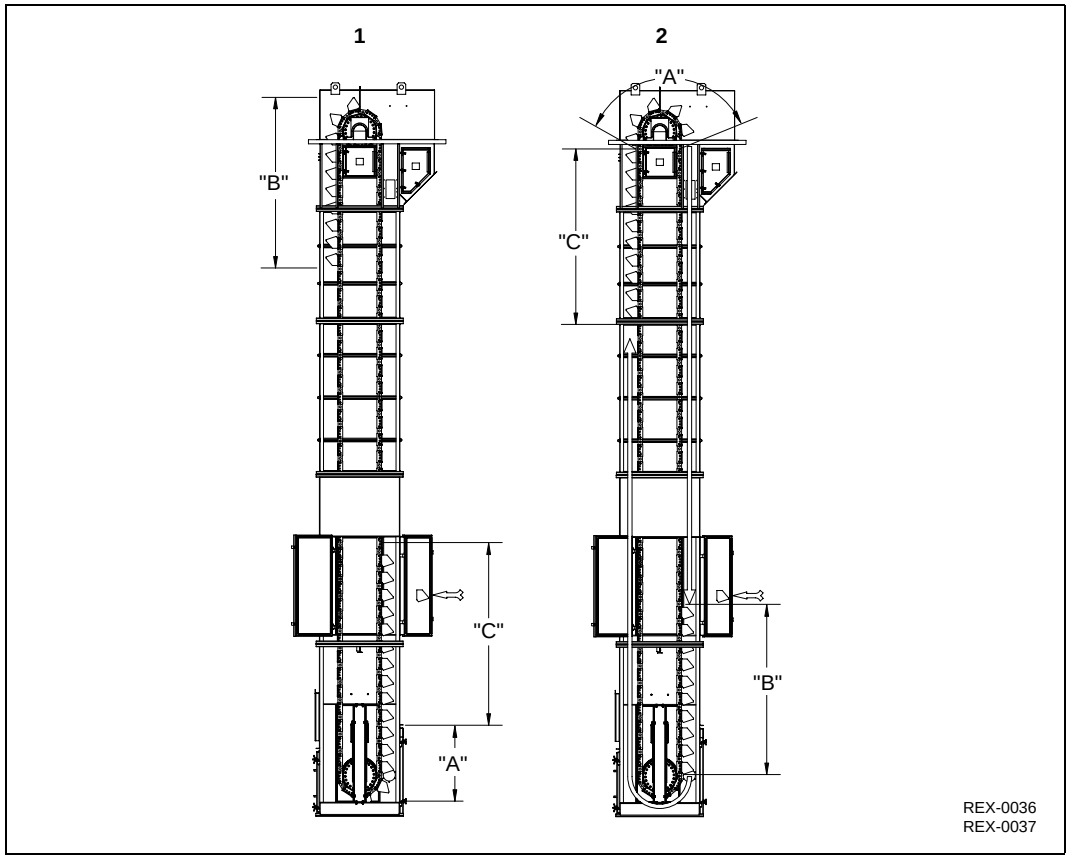


Figure 4-38

1 – Installing 10 buckets “C” behind first 5 buckets “A” installed
2 – Rotate latest installed buckets “C” 180° to install 10 more buckets

Installing Buckets Using Chain hoists or Equivalent

1. Block the chain.
2. Install the buckets at a convenient location.
3. Tighten the bucket mounting hardware to the proper torque value given in the *Table 4–A, Bucket Bolt Torque Chart, page 4-41*.
4. Unblock chain.
5. Rotate chain using chain fall until more buckets can be installed.
6. Repeat *Step 1* through *Step 5* until all the buckets are installed.

WARNING
At all times use extreme caution when securing rigging on chain, chain strands are very unbalanced using method above, runaway chain and bucket assembly can cause personal injury or death.

Installing Stop Blocks on Take-up Assembly

The stop blocks are installed after the chain and bucket assembly has been installed and the take-up shaft has been properly located within the take-up range shown on the elevator's General Arrangement Drawing.

Upper Stop Blocks

The upper stop blocks are mounted in the holes provided in the take-up guides above the take-up. The upper stop blocks are positioned to allow a 6–25 mm (1/4"–1") gap between the upper stop block and the top of the take-up.

Do not force the take-up down to place the stop blocks in a lower hole on the take-up guide. A minimum gap of 6 mm (1/4") is needed to allow the take-up to move freely.

Lower Stop Blocks

The lower stop blocks are installed on the take-up guide in a position that stops the take-up assembly from driving the buckets into the bottom of the boot if the chain is left to elongate in excess. To determine the proper placement of the lower stop blocks perform the following steps:

1. Rotate the chain and bucket assembly so that one bucket is located in the lowest position in the boot when going around the foot shaft wheel.
2. Measure and record the distance from the lowest point of the bucket (usually the bucket lip) and the bottom of the elevator.
3. Subtract approximately 25 mm (1") from the measurement recorded in *Step 2*, and record this figure.
4. Starting from the bottom of the take-up and measuring down the take-up guide, make a mark on the take-up guide at the figure recorded in *Step 3*. If the take-up guide is shorter than the figure recorded in *Step 3* go on to *Step 5* without making the mark.
5. Install the lower stop blocks in the hole of the take-up guide that is in line with, or is just above, the mark made on the take-up guide. If the take-up guide was too short to make a mark on it in *Step 4*, install the lower stop blocks in the lowest holes in the take-up guides.

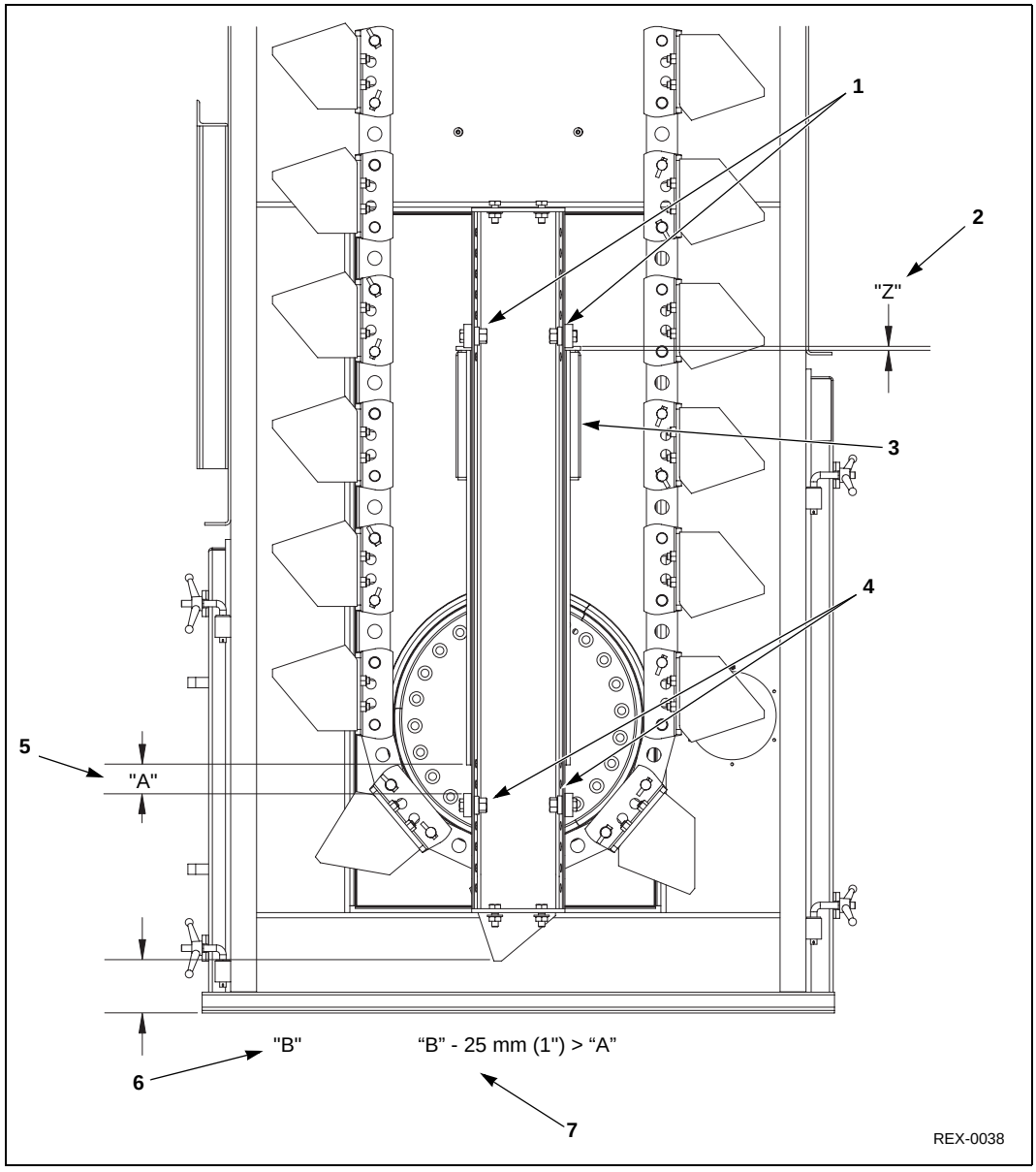


Figure 4-39: Adjusting Stop Blocks

1 – Upper stop blocks
2 – "Z" – Space between upper stop blocks and top of take-up assembly. Z = 6–25 mm (1/4"–1"). Adjust by moving upper stop block.
3 – Take-up assembly
4 – Lower stop blocks
5 – "A" – Space between bottom of take-up assembly channel and top of lower stop blocks
6 – "B" – Space between bucket and bottom of boot section
7 – Space "A" must be set 25 mm (1") less than space "B" by adjusting lower stop blocks

Installing/Adjusting Rubber Peeler Lip

All ***Rex*** High-Performance Bucket Elevators have an adjustable peeler lip. The function

of the peeler lip is to direct material that is still inside the buckets after rotating around the head shaft assembly towards the discharge spout.

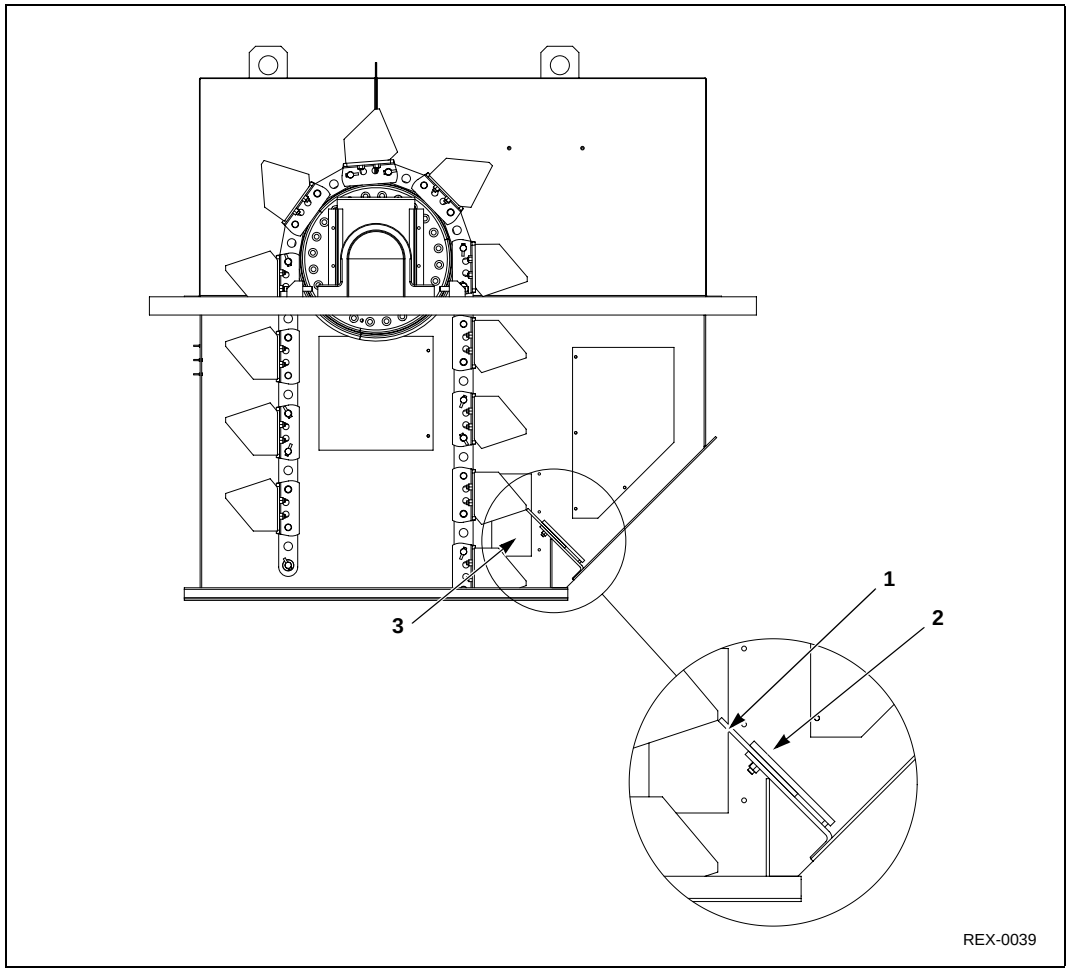


Figure 4-40: *Properly Adjusted Peeler Lip*

1 – Rubber lip
2 – Mounting hardware
3 – Sliding access panel

It is very important that the peeler lip be adjusted properly. See *Figure 4-40.* The rubber peeler lip should make slight contact with the bucket lip to minimize the amount of material falling to the boot section.

STOP

Boot flooding can occur if material falling from buckets is excessive.

If the peeler lip is worn out, missing, or deformed it must be changed immediately!

The mounting hardware of the peeler lip can be easily loosened and tightened by opening the sliding access panels near the bottom of the lower head section.

WARNING
Always lock out all power sources and block chain before entering elevator to work on peeler lip.

Backstop Installation

There are two different backstop styles that are engineered into ***Rex*** equipment. The two backstop styles are:

a. Externally mounted backstop mounted on the equipment's head shaft with an integrated torque arm that is supported from equipment's frame or casing. See *Figure 4-41*.

b. Backstop integrated as part of the drive assembly; usually mounted in or on the main reducer.

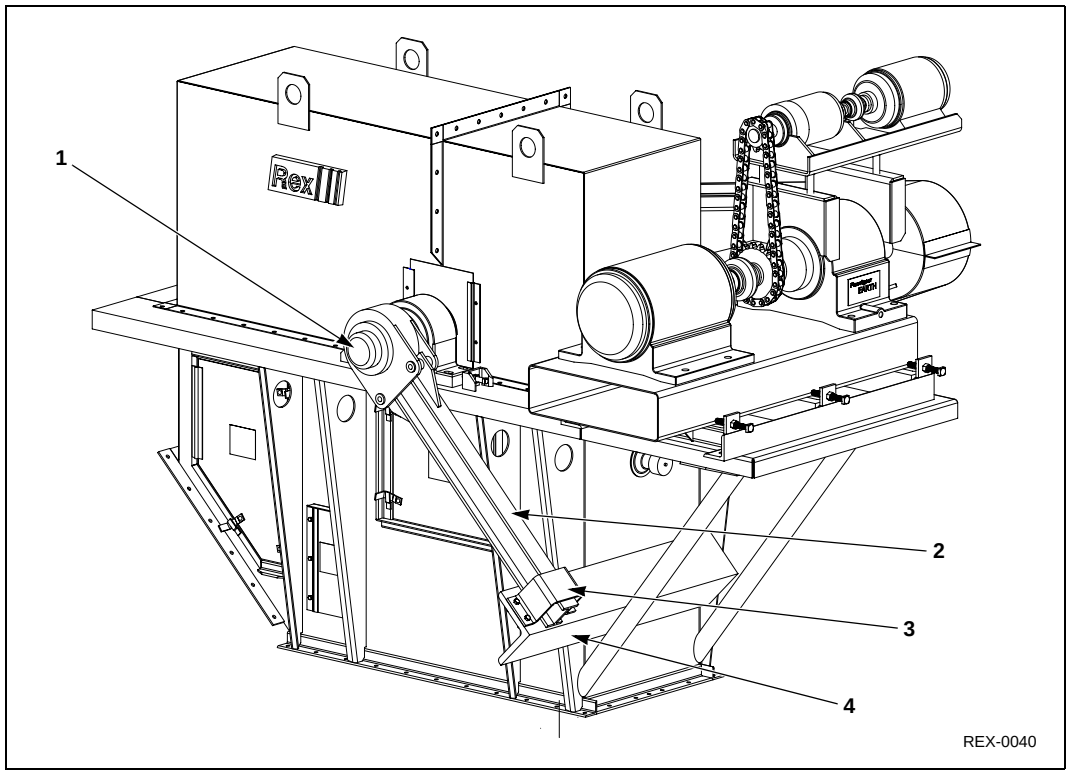


Figure 4-41: *Head Assembly With External Backstop*

1 – External backstop
2 – Backstop torque arm
3 – Torque arm support bracket or stirrup
4 – Torque arm support

**Guards removed to show coupling arrangement*

In most cases only one of the backstop styles will be used on a single piece of equipment.

STOP

It is recommended that all elevators be equipped with a positive stopping device. This feature will eliminate extensive damage to the equipment by preventing a backward action of the elevator if a power failure or some other unforeseen circumstance occurs. Without this feature, material and/or equipment could be dropped into the boot whenever an unscheduled stoppage occurs.

The following points should be followed when an externally mounted backstop is used.

1. Before mounting, clean mounting area of head shaft thoroughly, removing the rust inhibitor and any burrs from the shaft and keyway area.
2. Mount backstop as shown in the General Arrangement Drawings located under the tab labeled “Drawings”, following the manufacturer’s installation and lubrication instructions.
3. Make sure backstop torque arm is mounted as shown in the General Arrangement Drawings.

The following points should be followed when using an integrated backstop as part of the drive.

1. Check reducer rotation before mounting.
2. Lubricate backstop per manufacturer’s instructions.

Check motor rotation uncoupled or damage to backstop and other components will result.

Drive Installation

General

Reducer(s) may be filled with a preservative for protection during shipment and storage. Refer to tagging and manufacturer’s service manual instructions regarding draining and flushing procedures.

Couplings, clutches, and internal backstops must be checked and filled with the proper lubrication. Refer to the *Drive Assembly* tab in the manual for specific manufacturer’s service instructions on proper types of lubrications and fill levels.

Coupling alignment(s) must be field checked whether motor and coupling is installed in the field or were installed on drive base before being shipped to site. Alignment of drive assemblies shipped completely assembled can be shifted during shipment.

Drive units with integrated backstops or holdback devices should be checked for correct rotation before drive unit is installed on equipment. To check rotation, turn the input shaft on the reducer by hand. This rotation check must be made prior to coupling motor to reducer. The backstop is an emergency device only and should not be used to prevent backward actions under normal conditions.

Motor must be checked for correct rotation before it is coupled to the reducer.

Hollow Shaft Mounted Drives

The following points should be followed when shaft mounted drives are used.

1. Properly prepare head shaft and reducer hollow shaft as instructed in reducer manufacturer’s literature. Make sure each shaft is thoroughly clean and free from burrs.

2. Check and fit key to keyway if one is used.
3. Properly locate reducer on the head shaft.
4. Install the torque arm to support the reducer at the proper angle.
5. Secure the reducer in place using Shrink disc, Tapered Bushing, or other locking device supplied with drive. See locking device manufacturer's instructions for proper installation method and torque rating for fasteners.

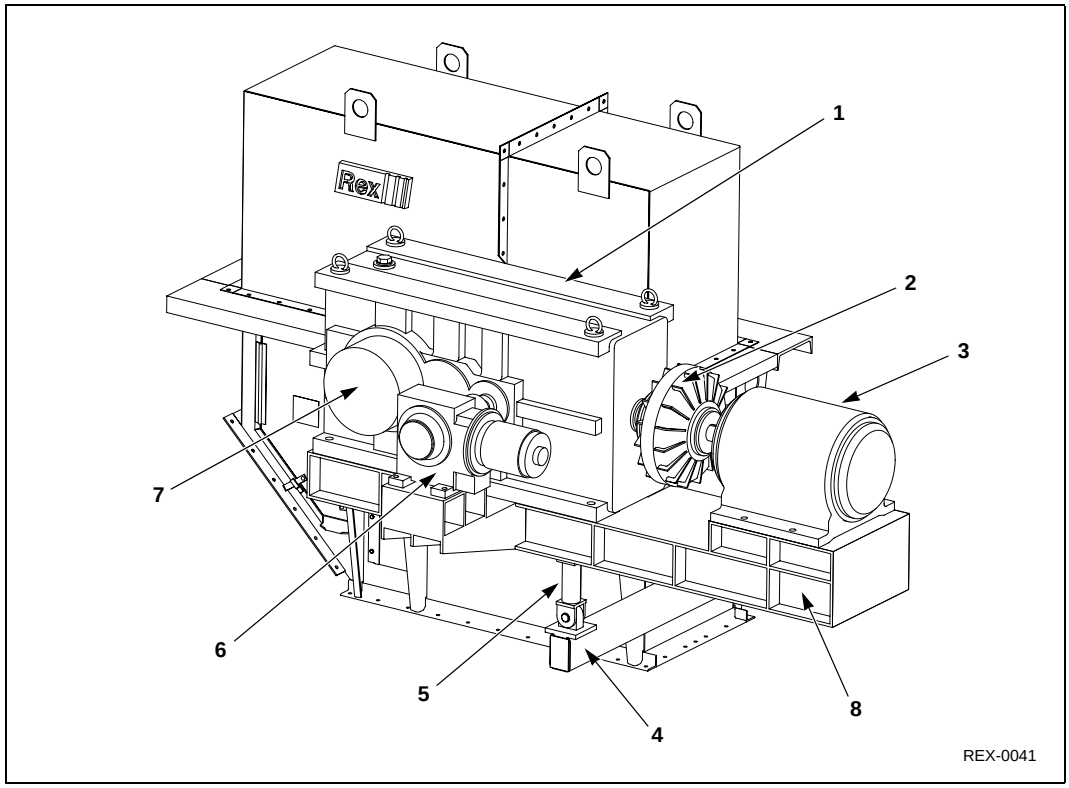


Figure 4-42: Hollow Shaft, Style "R" Reducer

1 – Reducer "R" type
*2 – Coupling (fluid type shown)**
3 – Motor
4 – Torque arm support
5 – Torque arm
6 – Inching drive option
7 – Shrink disk – under cover
8 – Bed Plate

**Guard removed to show coupling arrangement*

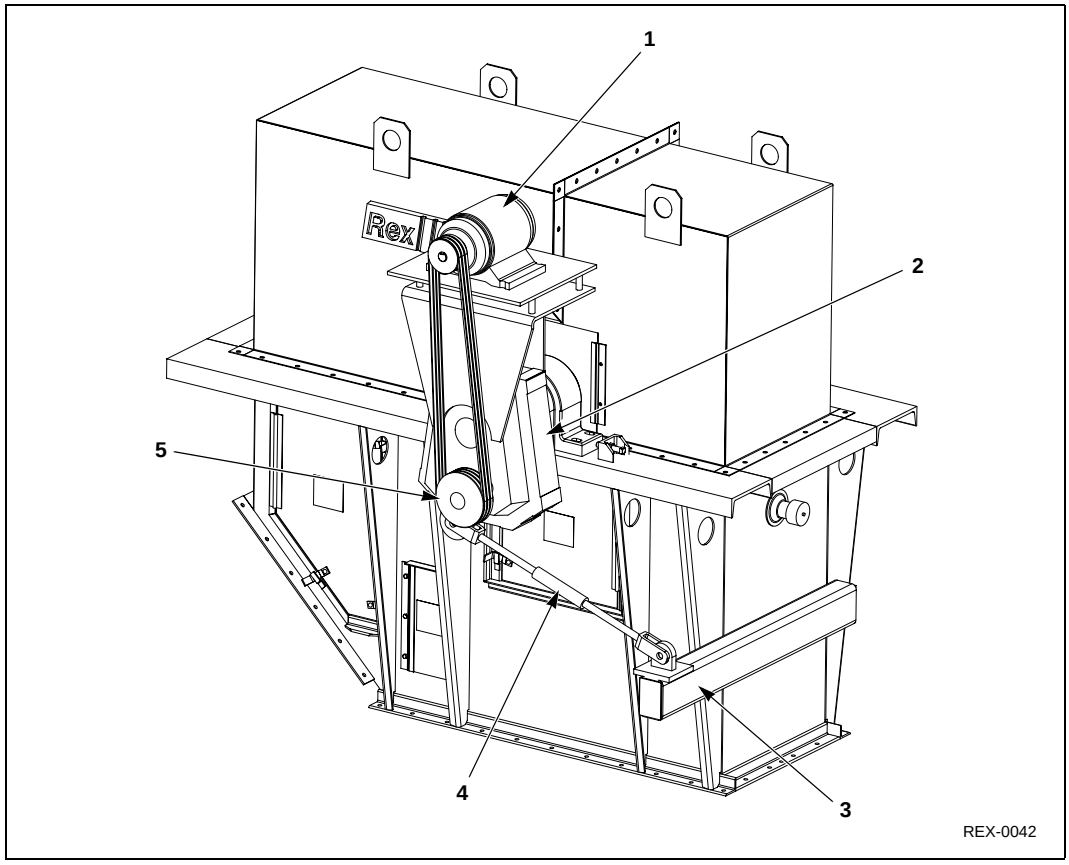


Figure 4-43: *Hollow Shaft, Style "F" Reducer*

1 – Motor
2 – Reducer style "F"
3 – Torque arm support
4 – Torque arm
*5 – Belts and sheaves**

**Guard removed to show assembly*

Solid Shaft Mounted Drives

The following points should be followed when using a solid shaft direct drive reducer:

1. The head shaft must be level and head and foot shaft alignment complete, before aligning the reducer. This includes alignment of head and foot shafts and traction wheels and/or sprockets.

Verify that the head shaft is in its final proper location before aligning the reducer. Adjusting the head shaft after aligning the reducer will require re-aligning the reducer a second time.

2. Verify that one half of the drive coupling (low speed) is mounted to the drive end of the head shaft. If the coupling has not been mounted, position it onto the head shaft following the coupling manufacturer's instructions.
3. Position the reducer as shown on the installation drawings.
4. Adjust the reducer so that the gap between the two drive couplings (low speed) halves

meets the coupling manufacturer's specifications.

5. Use the four jackscrews provided with the reducer bed plate and shim under the reducer as necessary to achieve proper drive coupling (low speed) alignment.
6. Secure the reducer to the bed plate when the proper drive coupling (low speed) alignment has been achieved.
7. Follow the coupling manufacturer's instructions for joining the drive coupling (low speed) halves together.
8. Install all of the safety guards.

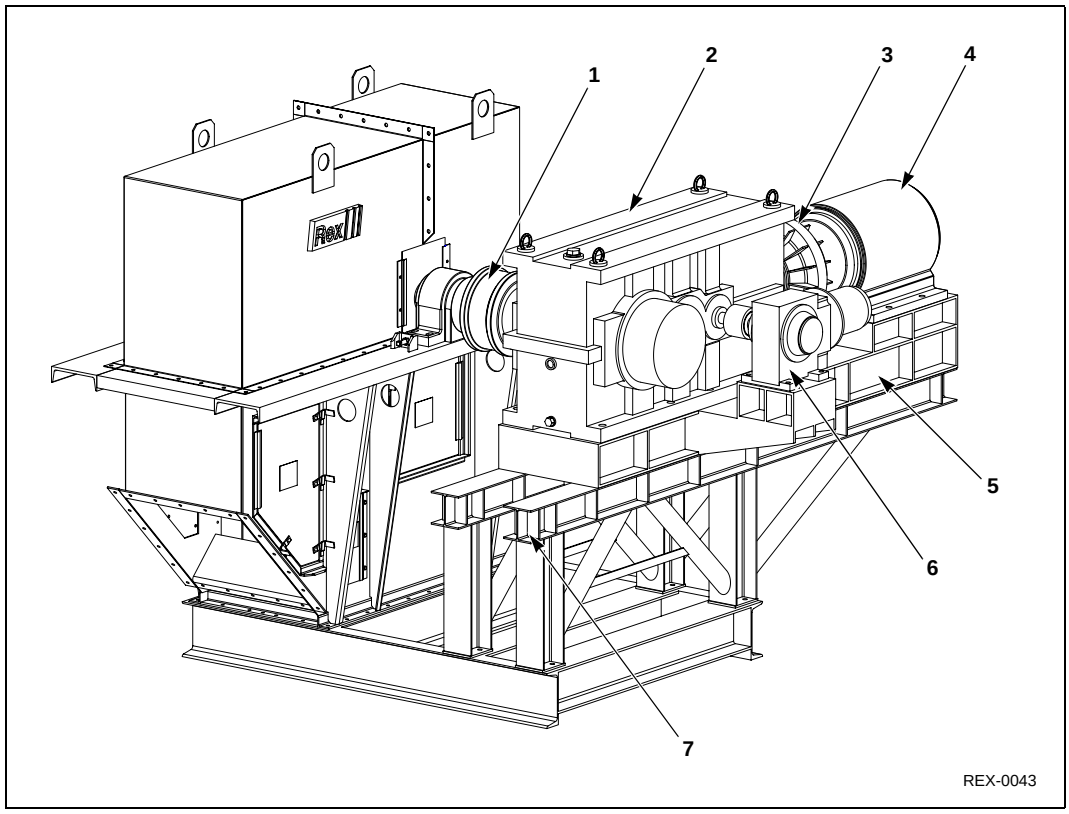


Figure 4-44: *Solid Shaft Mounted Drive*

*1 – Low speed coupling**
2 – Reducer – Type "R"
*3 – Coupling (fluid type shown)**
4 – Motor
5 – Bed plate
6 – Inching drive assembly – Optional
7 – Drive support

**Guards removed to show coupling arrangement*

Drive Unit Mounted On Elevator Casing (Chain Drive)

The following points should be followed when mounting a drive reducer supported by the elevator casings.

1. The head shaft must be level and head and foot shaft alignment complete, before

aligning the reducer to the head shaft. This includes alignment of head and foot shafts and traction wheels and/or sprockets.

Verify that the head shaft is in its final proper location before aligning the reducer to the head shaft. Adjusting the head shaft after aligning the reducer will require re-aligning the reducer a second time.

2. Reducer output shaft and the head shaft must be level and parallel to one another.
3. Both the driven sprocket mounted on the head shaft and the driver sprocket mounted on the drive unit must be in line. They must also be located according to the position and dimension given on the General Arrangement Drawing. See *Shaft and Sprocket or Shaft and Sheave Alignment, page 4-62* for detailed instructions on alignment.

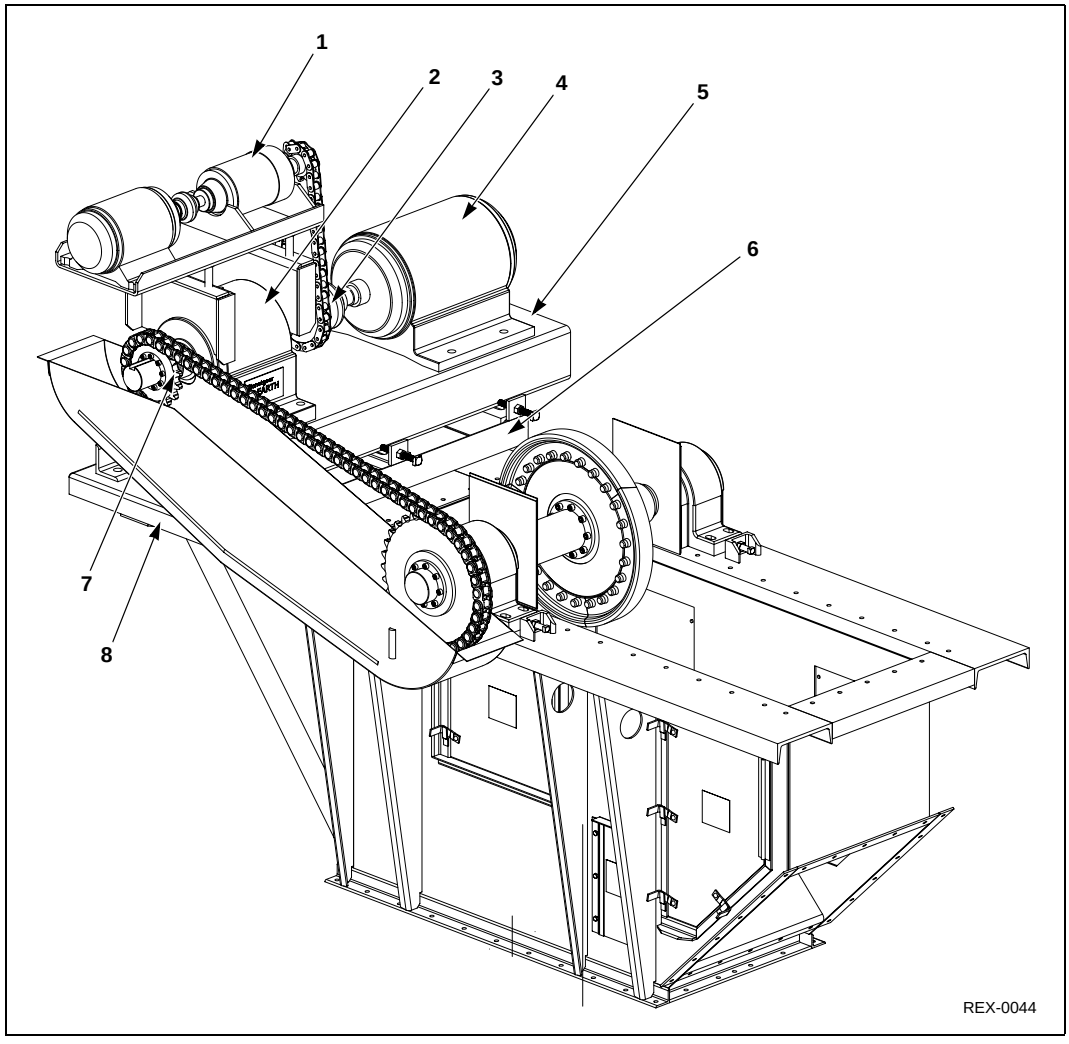


Figure 4-45: Drive Mounted on Elevator Casing (Chain Drive)

*1 – Inching drive – Optional**
2 – Main reducer
*3 – Coupling (elastomer type)**
4 – Motor
5 – Bed plate
6 – Slide base
*7 – Chain and sprocket assembly**

8 – Drive support

**Guards removed to show coupling arrangement*

Drive Unit Mounted Separate From Elevator

When an order covers standard elevator equipment and the elevator drive is located independently from the elevator casing, our engineering responsibilities will be defined as follows:

"No engineering or contingent responsibility is assumed for the elevator drive located independently on customer's building steel, building floors, walkways, etc. It is assumed that, in purchasing an individual elevator(s) with an independent drive support, full consideration has been given to thermal expansion and the dampening of vibration that may be detrimental to the drive machinery, elevator machinery, and/or to the structural supports."

Belt Driven Reducer Installation

The following points should be followed when installing a reducer which is belt driven.

1. Adjust motor so that its output shaft is parallel to the reducers input shaft.
2. Align sheaves using a straight edge. Slide sheaves into the proper position on the shafts and tighten setscrews. Do not drive sheaves on or off shafts.
3. The driven sheave mounted on the reducer and the driver sheave mounted on the motor unit must be in line. They must also be located according to the position and dimensions given on the drive assembly drawing. See *Shaft and Sprocket or Shaft and Sheave Alignment, page 4-62* for detailed instructions on alignment.
4. Adjust shaft centers of the motor and reducer so belts can be installed without force them over the grooves in the sheaves.
5. Install belts as a set; all belts should be a matched length.
6. Tighten belts by increasing the shaft centers of the motor and reducer until belts are taut.
7. Rotate belt and sheaves assembly to seat belts and retighten.
8. To set belt tension with a belt tension checker do the following:
   a. Measure the center distance between the drive and driven shafts.
   b. In general belts should be tightened so that there is 16 mm of deflection for every meter (1/64" of deflection for every inch) between shaft centers measured in step a.

Do not overtighten belts or damage to shaft bearing could result.

9. Make sure all guards are installed properly before operating.
10. Check and retighten sheaves after the first 8 hours of operation. Install guards before operating.
11. Check belt tension at least every 8 hours during the first two days of operation. During

the first two days of operation it is normal for belt tension to require readjustment. Install guards before operating

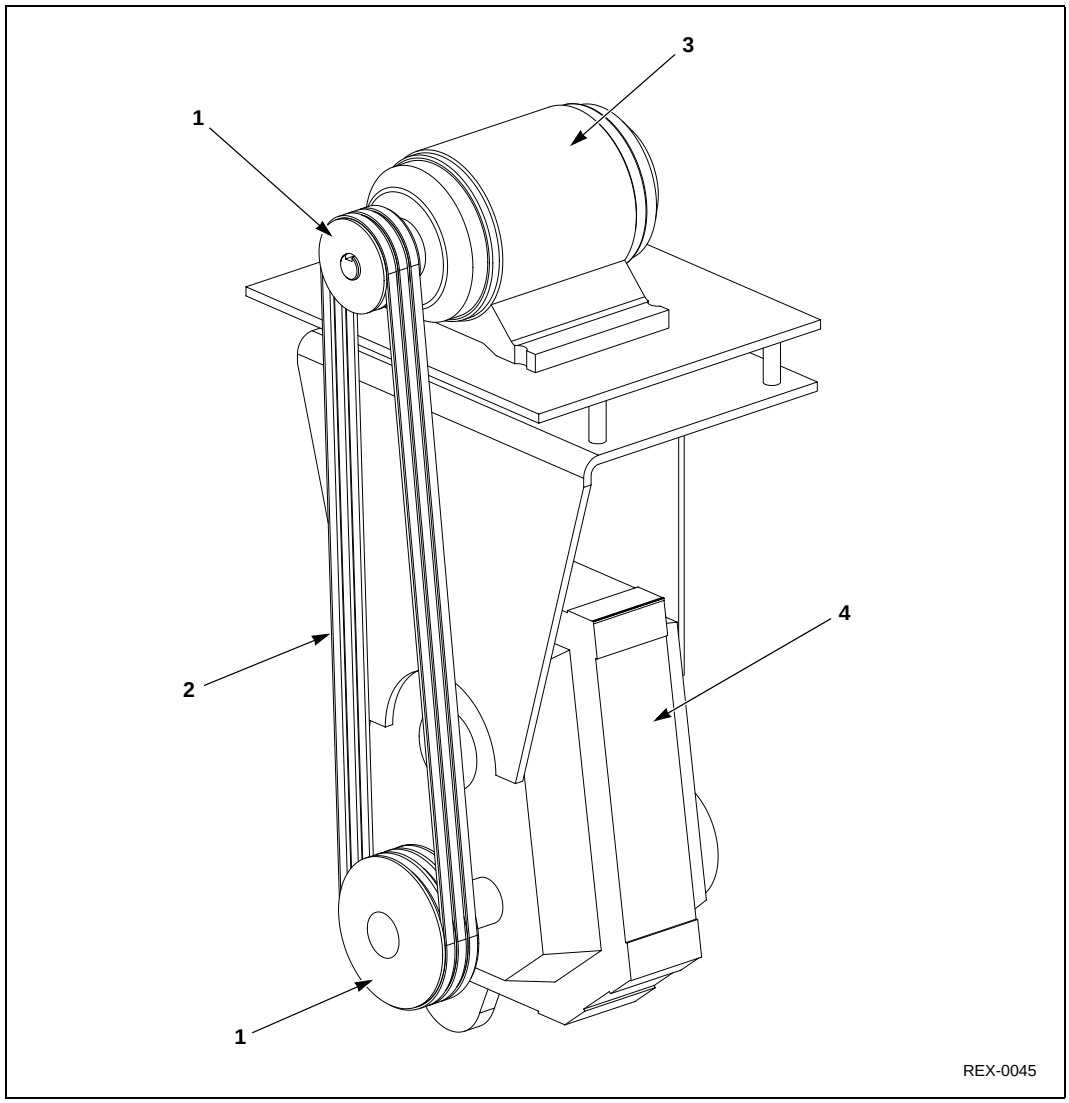


Figure 4-46: *Belt Driven Reducer*

*1 – Sheaves**
*2 – Belts**
3 – Motor
4 – Reducer

**Guards removed to show belts and sheaves*

Direct Driven Reducer Installation

The following points should be followed when installing a reducer which is direct driven.

1. Check and adjust end gap between motor output shaft and reducer input shaft.
2. Check and adjust angular and parallel tolerance to coupling manufacturer's specifications between motor output shaft and reducer input shaft.

3. Install coupling to manufacturer's specifications, tightening all hardware to the proper torque values.
4. Install all guarding before operating.

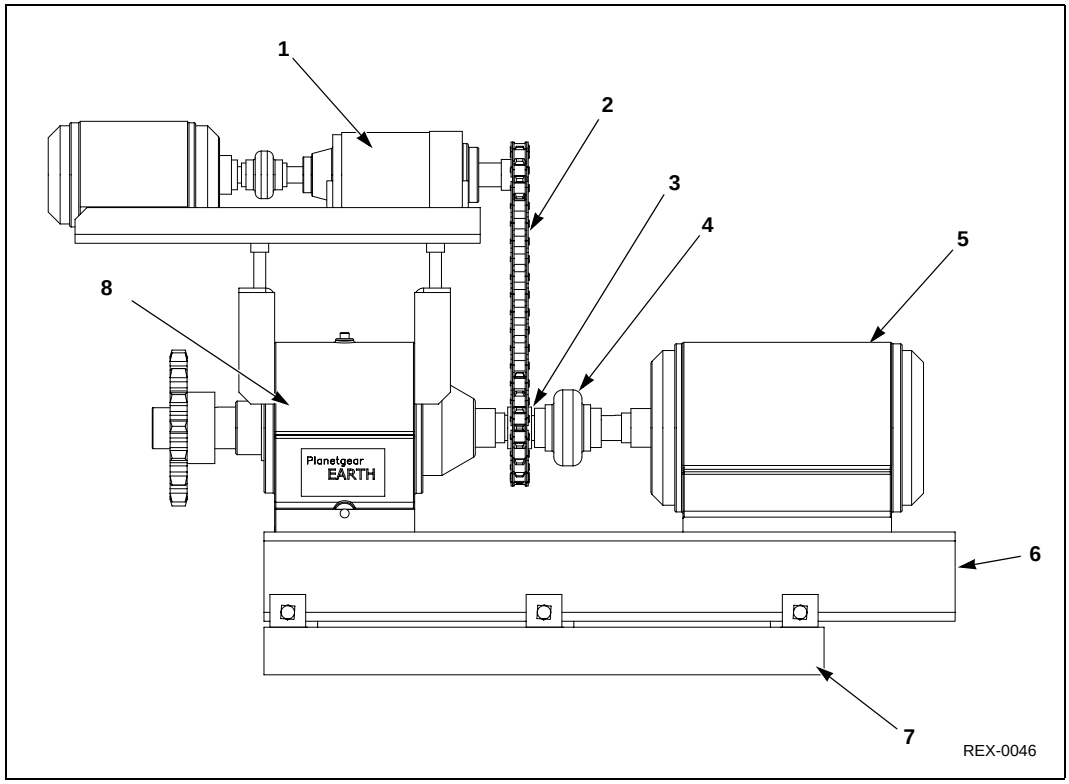


Figure 4-47: Direct Driven Reducer

1 – Inching drive – Optional
*2 – Drive chain – Inching drive option**
*3 – Clutch coupling and sprocket – Inching drive option**
*4 – High speed coupling (elastomer type shown)**
5 – Motor
6 – Bed plate
7 – Slide base
8 – Main reducer

**Guards removed to show componentry*

Shaft and Sprocket or Shaft and Sheave Alignment

Proper alignment of shafts and sprockets/sheaves is necessary for maximum wear life.

Misalignment of shaft and sprockets will cause:

a. Rapid chain and sprocket wear due to rubbing of chain parts against sides of sprocket teeth.
b. Rapid and excessive friction wear in chain joints from racking and twisting of chain.
c. Bearing failure.

Misalignment of shaft and sheaves will cause:

a. Rapid belt wear and failure.
b. Rapid sheave wear.
c. Bearing failure.
d. Belts jumping off sheaves.

To assure proper alignment, the following steps are necessary:

1. Carefully level the shafting to the same plane. Use machinist's level directly on shafts to set horizontal alignment. See *Figure 4-48*.

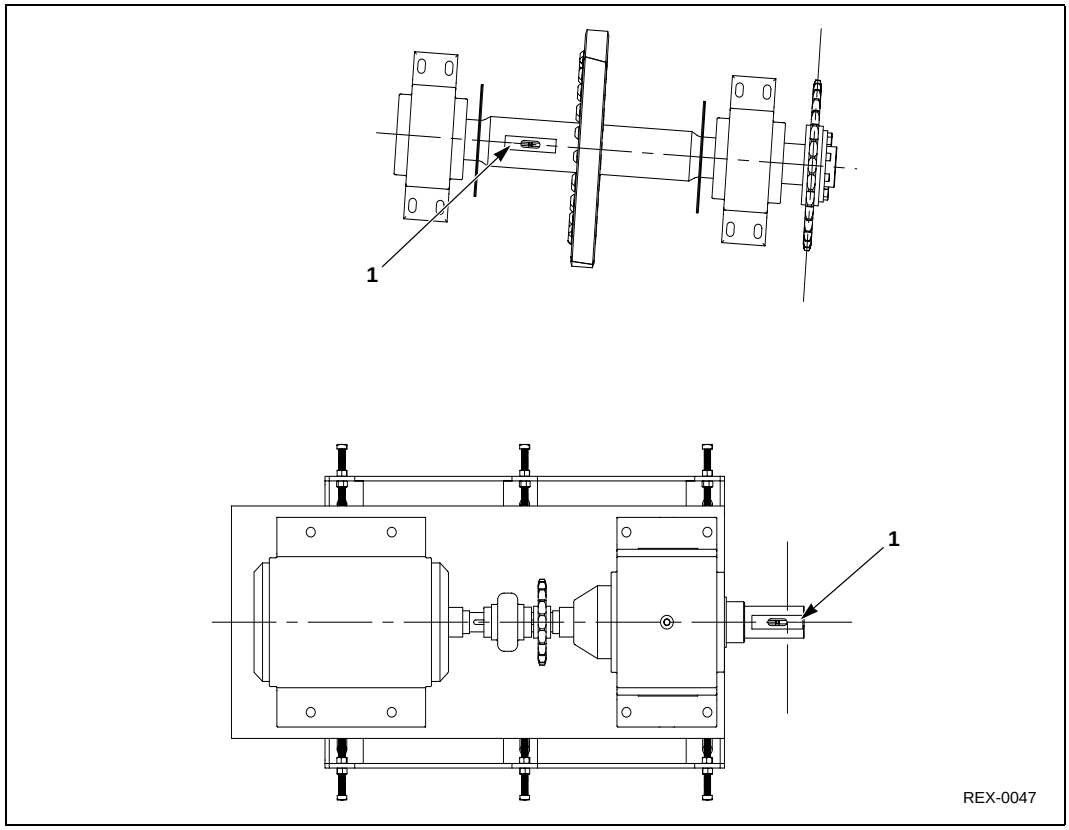


Figure 4-48: Level Shafts

1 – Level

2. Check that each sprocket or sheave is axially aligned (perpendicular or 90°) to its respective shaft. Axial alignment of the sprocket or sheave can be checked in a number of ways: rotating shaft and gauging OD of sprockets with fixed point on straight edge or a dial indicator, or by rotating a square along the shaft's axis and checking the sprocket or sheave sits perpendicular to the square. See *Figure 4-49*. Should a sprocket or sheave be out of axial alignment with the shaft correct the alignment by:

   a. For bored-to-size type sprockets or sheaves, loosen and reset hub setscrews.
   b. For taper keyed hub, loosen and reset Gib-head tapered key.
   c. For taper lock or compression type hubs, loosen and reset hub setscrews in accordance with manufacturer's instructions.

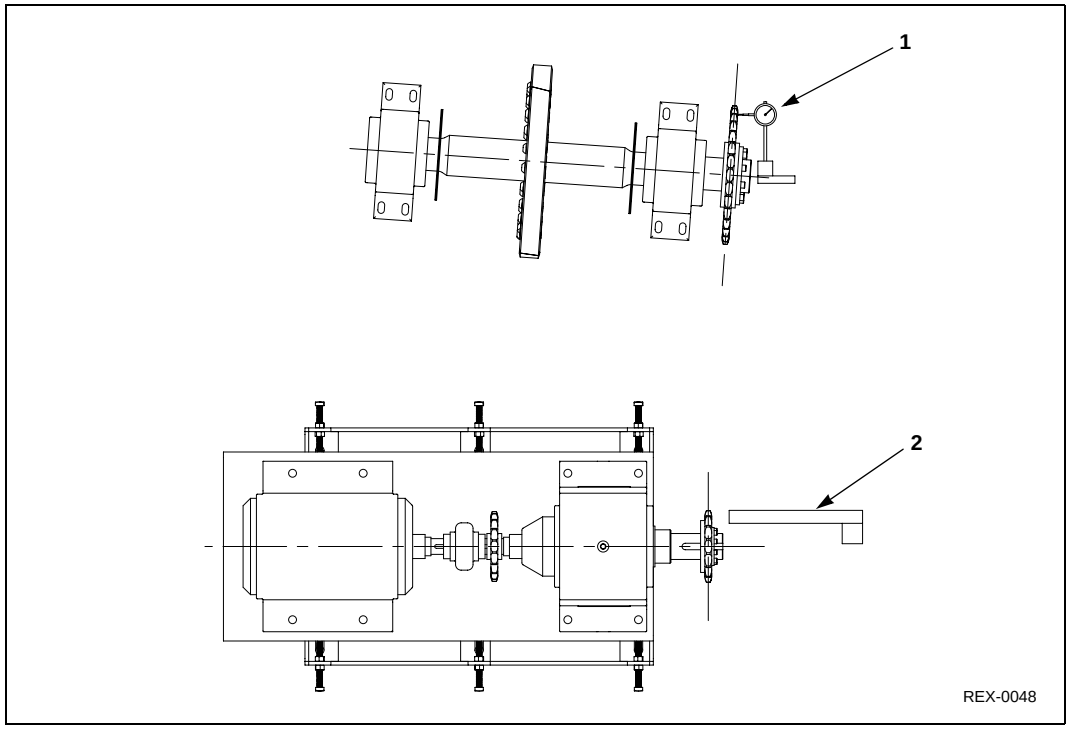


Figure 4-49: Axial Alignment Between Sprocket and Shaft or Sheave and Shaft

1 – Dial indicator
2 – Square

3. Adjust the shafts so that they are parallel by either method:

   a. Measuring the distance between the shafts in three places (at each end and somewhere in the middle) adjusting one or both shafts until all three areas measured are equal distance apart. See *Figure 4-50*.

   b. Placing a straight edge (or wire for long center distances) against the finished surface of a sprocket or sheave and adjusting shafts so that there is an equal gap (or no gap) across sprocket or sheave and straight edge or wire. Note: axial alignment in *Step 2* must be checked and/or corrected before using this procedure. Take care to hold straight edge against finished surface on side of sprocket. See *Figure 4-50*.

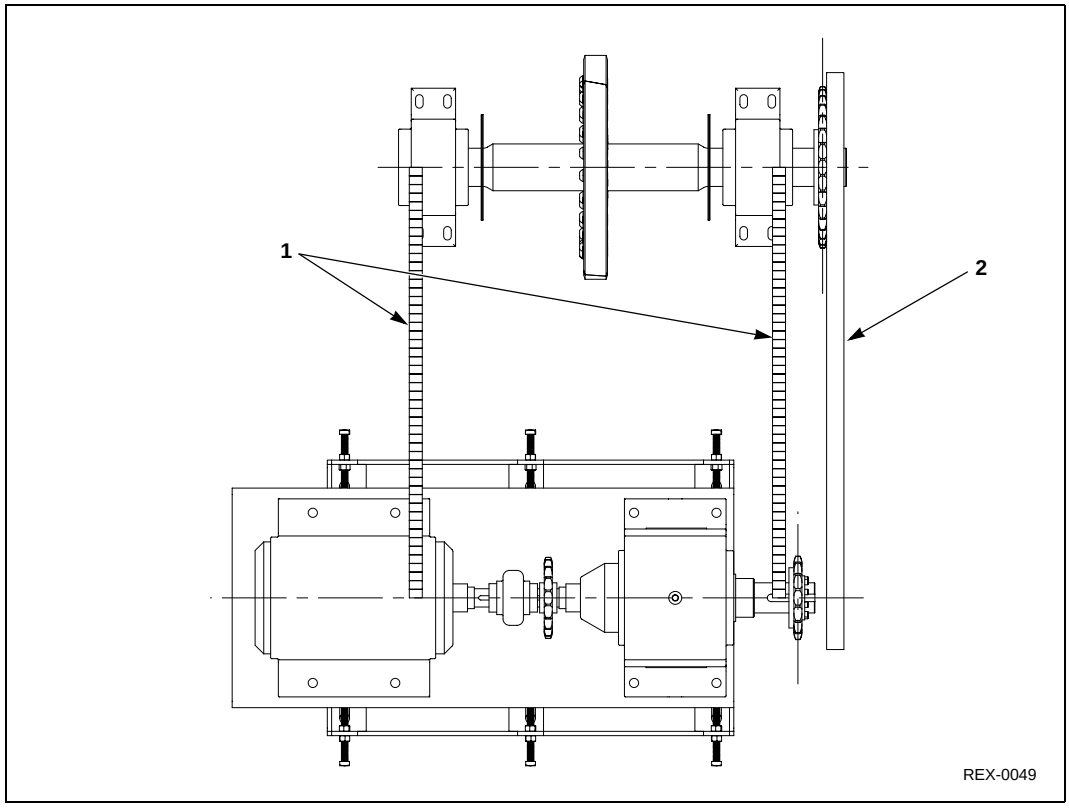


Figure 4-50: Setting Shafts Parallel

1 – Tape measure
2 – Straight edge

4. Check sprockets or sheaves are on a common centerline using a straight edge or wire. Check sprockets or sheaves are positioned upon the shafts as in accordance to dimensions established on engineering drawings. See *Figure 4-51*. If a sprocket or sheave must be moved to achieve a common center, make sure it is axially aligned with shaft as in *Step 2*.

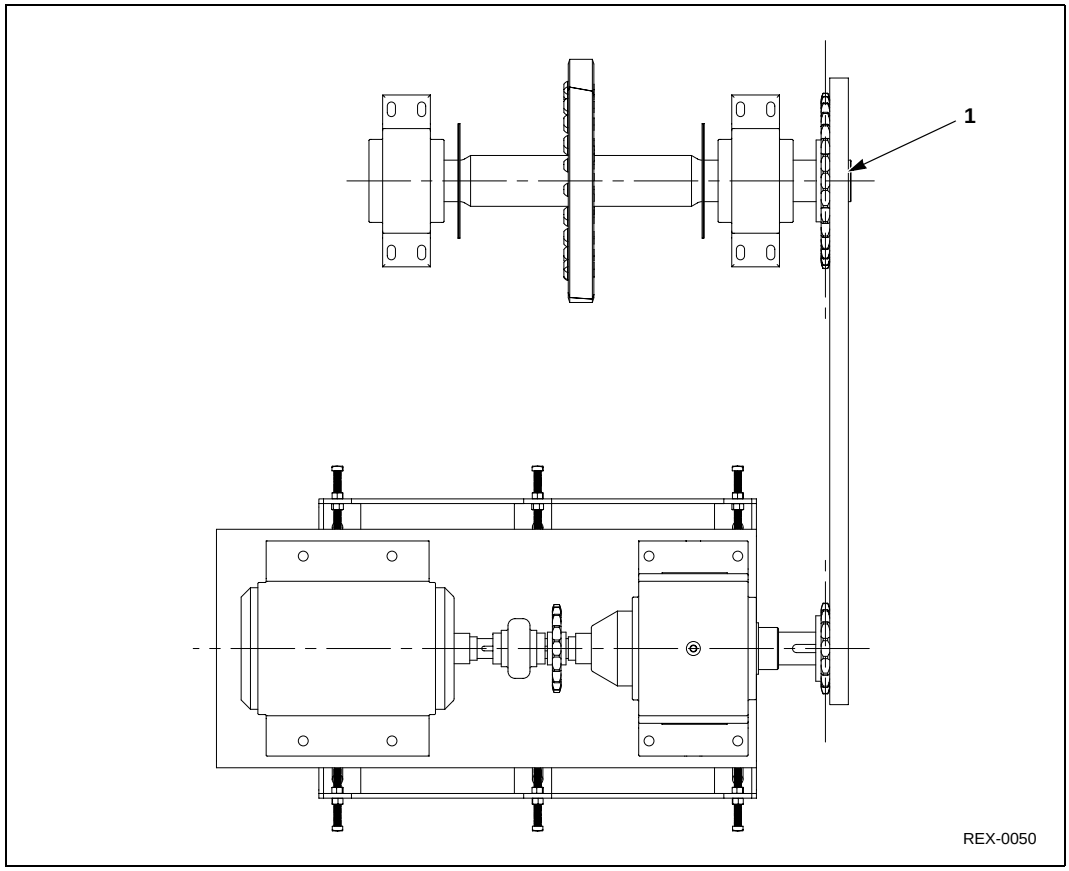


Figure 4-51: *Setting Sprockets or Sheaves on Common Centerline*

1 – Straight edge

Drive Chain Installation

Proper installation of power drive chains is particularly important. Perform the following items to install the drive chain.

1. Move one of the drive shafts towards the other to reduce the shafts' center distance and allow slack in the chain when placed over the sprockets.
2. Before placing chain on the sprockets make sure that the chain is oriented in the proper direction. Straight sidebar roller chain does not have a preferred direction. All steel offset sidebar drive chain with rollers should travel with the closed end forward. See *Figure 4-52*.

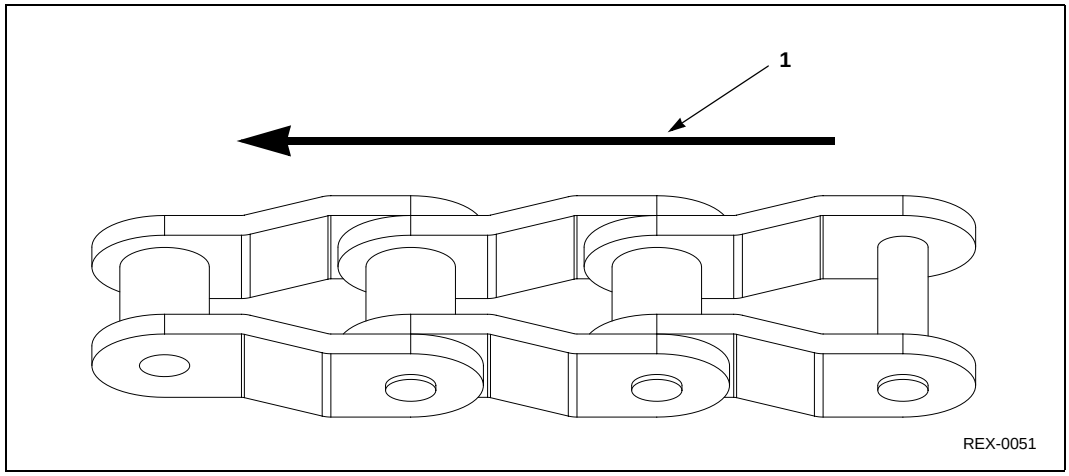


Figure 4-52: Steel Offset Sidebar Drive Chain Direction of Travel

1 – Direction of travel

STOP

Power drive chains must be operated in the proper direction to assure maximum wear life of both chain and sprockets.

3. Wrap chain around sprockets.
4. Use the sprockets to hold the chain together when connecting the chain strand. The sprocket teeth act as a wedge to facilitate forcing the links together against the weight of the chain. The sprocket teeth will help hold the links in position when inserting the pin. On larger drives it may be necessary to use a come-along to pull the loose ends of the strands together in order to insert chain pin.
5. ***Rexnord*** recommends using a ***Rex*** chain tool when connecting chain which utilizes press-fit pins.

If a hammer is to be used to drive the chain pins through the sidebars, always “back-up” the chain strand. The “back-up” should be as big or bigger than the hammer used to drive the pin.

6. Install pin-lock in hole of chain pin installed in *Step 5*, if chain utilizes them.
7. Check and adjust chain slack.

Chain Slack

The correct amount of slack is essential to the proper operation of the chain. Unlike belts, chain requires no initial tension and should not be tightened around the sprockets.

When chain is too tight, the working parts carry a much heavier load than is necessary and work much harder without delivering any more power than properly installed chain. This causes rapid chain wear because of increased pressures in the joints. In addition, this condition overloads and accelerates wear in the shaft bearings. See *Figure 4-53*.

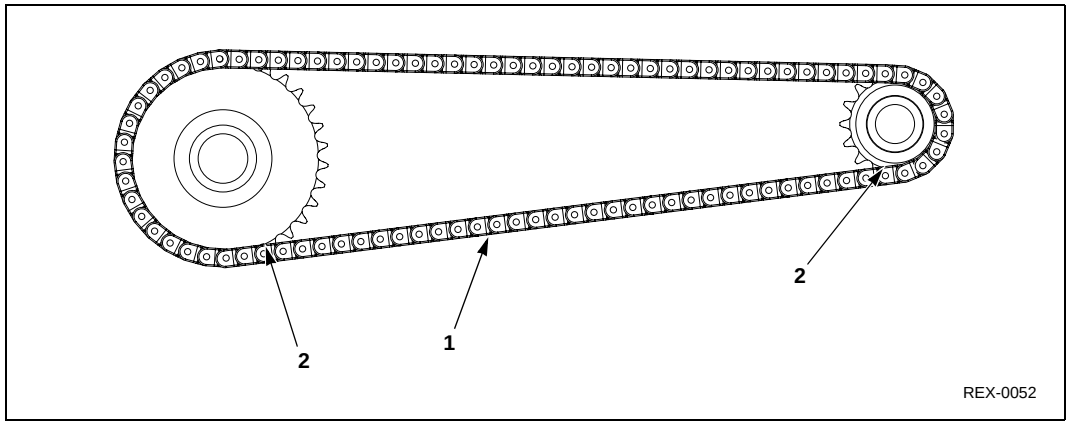


Figure 4-53: *Insufficient Slack, Binding*

1 – Insufficient slack in chain
2 – Chain binding on sprockets

Too much slack is also harmful. On long centers particularly, too much slack will cause vibration and chain flexure, reducing the life of the chain. On long centers, it is recommended that the slack strand be supported or taken up by idler sprockets or strip guides of hardwood or brass. The strip is simply a continuous support for the chain which prevents it from sagging too much. See *Figure 4-54*.

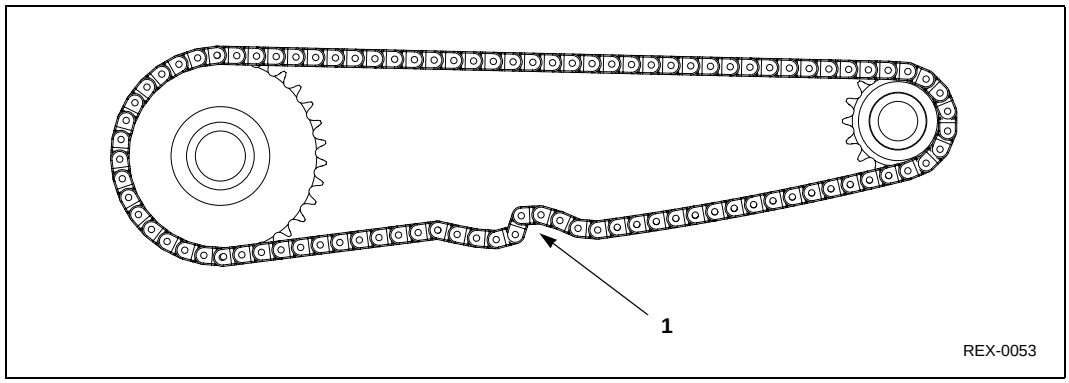


Figure 4-54: *Excessive Slack*

1 – Excessive slack in chain

Properly adjusted chain drives should permit the slack strand to flex three percent (3%) of the shafts center distance. As the chain wears and elongates, the chain slack should be readjusted when the slack strand flexes up to five percent (5%) of the shaft center distance. See *Figure 4-55*.

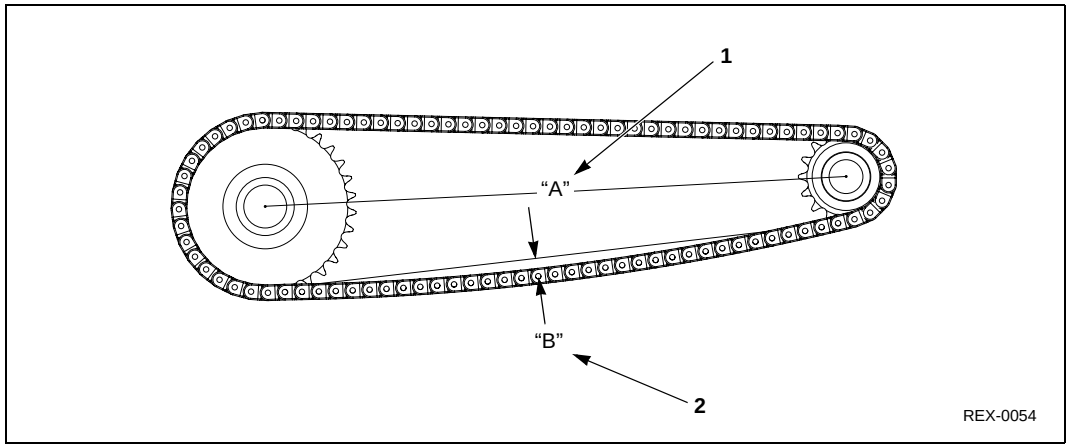


Figure 4-55: *Correct Slack Example*

1 – Shaft centers = "A" in millimeters or inches
2 – Slack in chain = "B" in millimeters or inches

Initially set slack to: Shaft centers "A" x 3% = minimum chain slack "B".

Readjust slack when: Shaft centers "A" x 5% = maximum chain slack "B".

Example:

Shaft Centers "A" = 1.5 m or 1500 mm

1500 mm x 0.03 = 45 mm

1500 mm x 0.05 = 75 mm

Initially adjust slack "B" to: 45 mm

Readjust slack "B" to 45 mm when equal to: 75 mm

When chain slack is excessive, adjustment can be made by moving the drive unit on the slide base. When drive unit is completely extended on the slide base, or if sprocket shafts are of fixed design, chain slack may be adjusted by removing one or more links.

The drive chain should be mounted with minimum number of chain links.

When a chain tightener is furnished, it should be adjusted periodically to maintain proper chain slack. Remove chain link(s) when tightener cannot be adjusted further and slack is still excessive.

Drive Chain Enclosure Installation

Proper installation of any drive chain enclosure is imperative to the safe and proper operation of the equipment they are to be installed on.

Enclosures that have been improperly installed and/or aligned will damage shafting, allow lubricants to leak and/or cause serious bodily injury

To insure proper installation of the drive chain enclosures use one of following procedures that is appropriate for the type of guard supplied:

a. Installation of oil tight chain guard.
b. Installation of non-freestanding non-oil tight chain guard.
c. Installation of free standing non-oil tight chain guard.

Installation of Oil-Tight Chain Guard

1. Calculate clearance between shaft and holes in drive chain enclosure. To calculate clearance, perform the following:
   a. Before opening the two halves of drive chain enclosure measure and record shaft opening diameters in enclosure.
   b. Find shaft diameters from either referencing manuals and drawings or by measuring shafts and recording diameters.
   c. Subtract the shaft diameters from the corresponding opening diameters in the drive chain enclosure. Divide the result by two and record this number. The recorded number is the gap that should be observed around the whole shaft and enclosure.
2. Open drive chain enclosure and remove contents.
3. Check contents* within enclosure, the following should be observed:

Quantity	Description
2	Neoprene impregnated cork seal 1/4” thick
1 roll	Split line seal rubber gasket 1/4” x 3/8”
1 roll	Rubber gasket with adhesive backing 1/8” x 1/2”
1	Site gage
1	Filler plug
1	Drain plug
* Contents listed for standard enclosures. Contents may vary in special circumstances	

4. Clean inside of guard, remove any dirt and debris.
5. Install neoprene impregnated cork shaft seal on shafts by twisting seal open as shown in *Figure 4-56*. Split in seal should be above shaft.

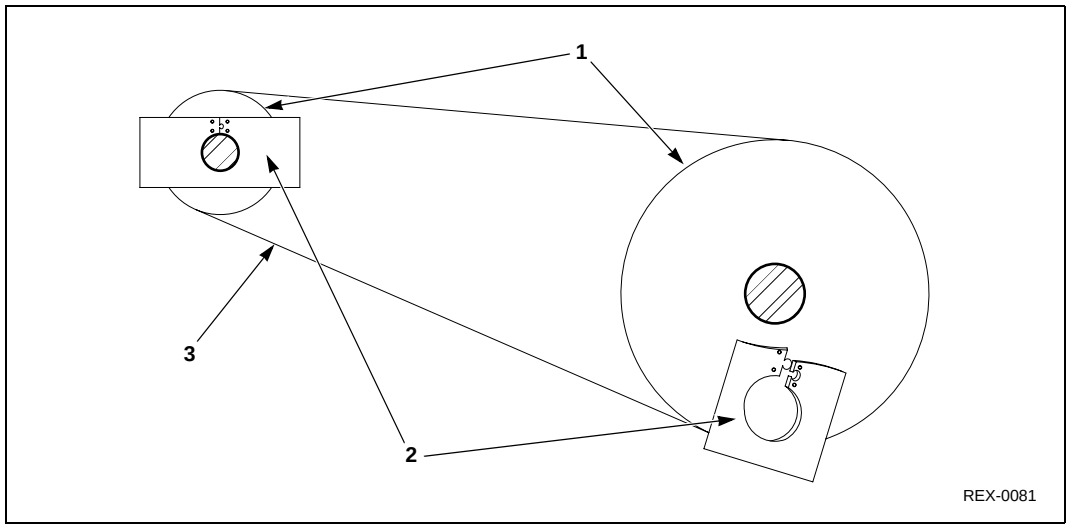


Figure 4-56: Installing Cork Seals on Shafts

1 – Sprockets
2 – Shaft seals
3 – Chain line

6. Raise lower half of casing into position while carefully guiding seals into the seal channels. The use of blocks and/or chain hoists may be necessary to hold and adjust lower casing in position. See *Figure 4-57* and *Figure 4-58*.

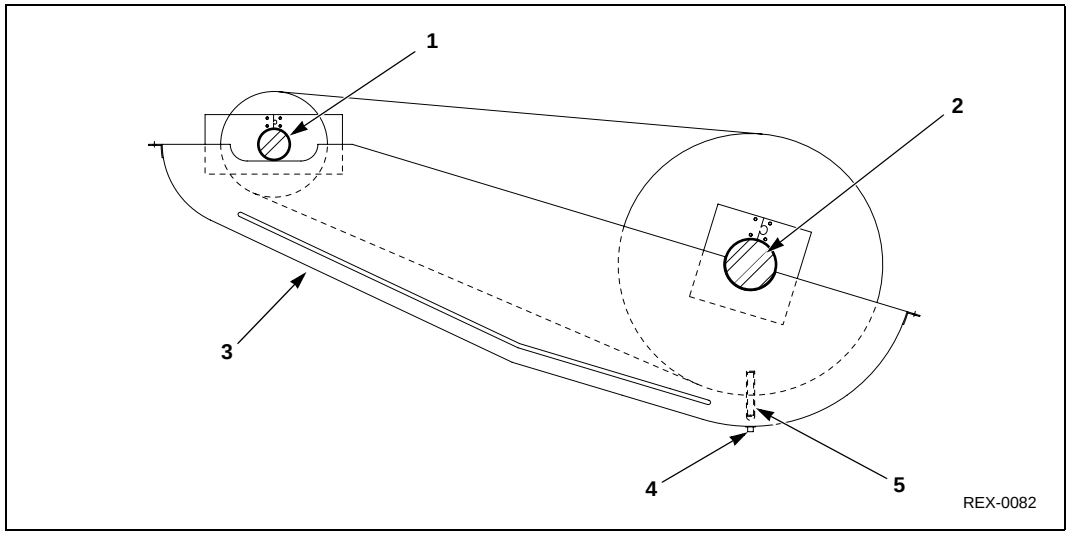


Figure 4-57: Installing Lower Half of Chain Guard

1 – Reducer shaft or take-up
2 – Fixed shaft
3 – Lower half of chain guard
4 – Drain plug
5 – Site gauge

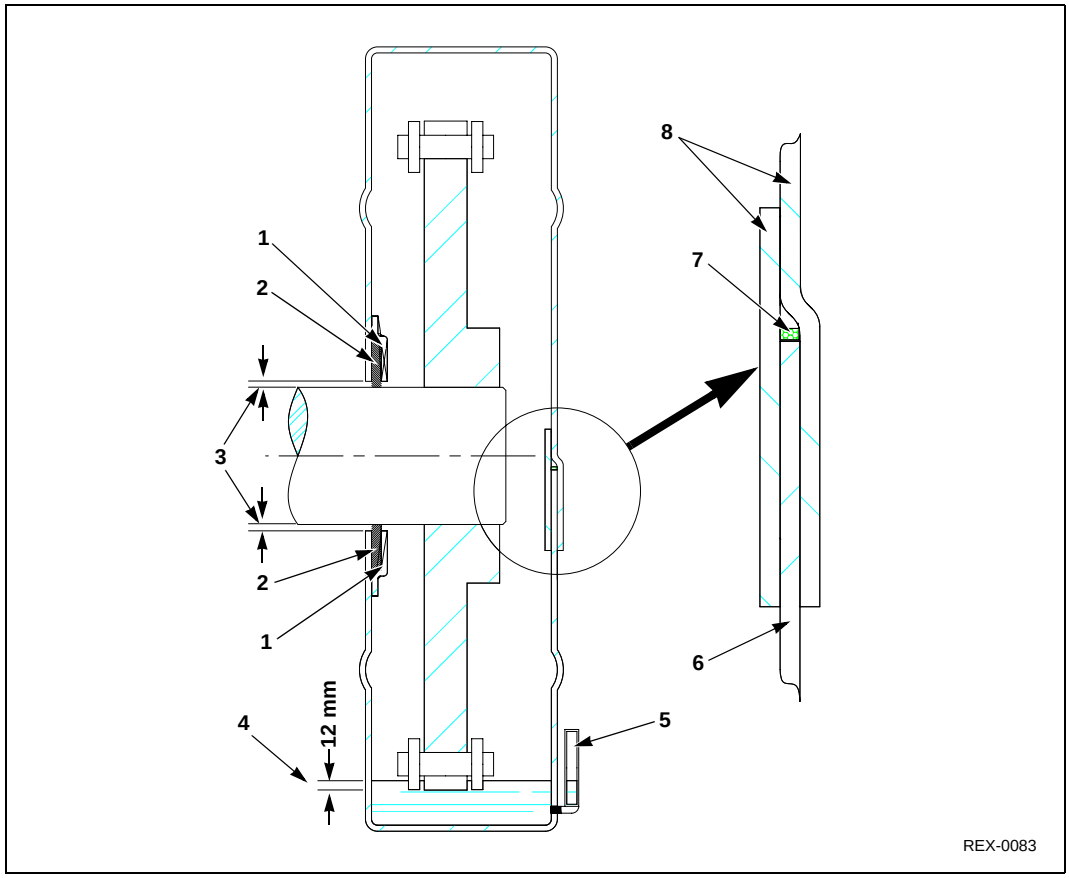


Figure 4-58: *Chain Guard Cross Section*

1 – Seal channel
2 – Neoprene impregnated cork seal 6.35 mm (1/4") thick
3 – Gap between casings and shaft
4 – Oil fill level (oil should be 12 mm (1/2") above lowest point on chain)
5 – Site gauge
6 – Lower half of casing
7 – Split line seal
8 – Upper half of casing

7. Adjust lower casing so that there is proper gap (as calculated in *Step 1*c) between casing and shaft.
8. Shift casing side to side to center hubs and sprockets within the sides of the casing enclosure.
9. Install permanent support under lower half of drive chain enclosure. See *Installation of Chain Guard Support Bracing, page 4-74* for detailed instructions.
10. Remove any foreign material or tools from bottom half of drive chain enclosure.
11. Install site gauge in side of lower drive chain enclosure. See *Figure 4-57*.
12. Install drain plug in bottom of drive chain enclosure. See *Figure 4-57*.
13. Fill lower casing with oil until lowest point of chain dips in oil approximately 12 mm (1/2"). See *Figure 4-58*.
14. Mark this oil level on the sight gauge by painting or by lightly scoring a line on it.

Mark a second line 6 mm (1/4”) below the first line. These lines indicate the high and low level in which the oil should be maintained.

15. Install split line seal material in groove of parting line if supplied. See *Figure 4-58*.
16. Lower the top half of casing into place starting with the large end first. Make sure the shaft seals are started into the seal channels inside the top casing before pushing the casings together.

In some cases it is easier to assemble the casing by starting at the smaller end.

17. Install bolts in the bolting clips at each end of the casing.
18. Make sure shafting does not make contact with guard at shaft openings. If contact is observed, re-adjust mounting brackets attached to lower half of guard to obtain proper clearance.

Damage to the head shaft and chain guard is imminent when contact occurs. Premature head shaft failure and guard leakage is likely to result.

19. Finish welding the mounting brackets to the guard and to the equipment housing.
20. Install oil fill plug in top of upper casing.
21. Install gasket material around inspection door opening if guard is so equipped.

Installation of Non-Freestanding Non-Oil-Tight Chain Guard

1. Calculate clearance between shaft and holes in drive chain enclosure. To calculate clearance, perform the following:
   a. Before opening the two halves of drive chain guard, measure and record shaft opening diameters in enclosure.
   b. Find shaft diameters from either referencing manuals and drawings or by measuring shafts and recording diameters.
   c. Subtract the shaft diameters from the corresponding opening diameters in the drive chain enclosure. Divide the result by two and record this number. The recorded number is the gap that should be observed around the whole shaft and enclosure.
2. Open drive chain enclosure and remove contents.
3. Clean inside of guard, remove any dirt and debris.
4. Raise lower half of casing into position. The use of blocks and/or chain falls may be necessary to hold and adjust lower casing in position.
5. Adjust lower casing so that there is proper gap (as calculated in *Step 1*c above) between casing and shaft.
6. Shift casing side to side to center hubs and sprockets within the sides of the casing enclosure.
7. Install permanent support under lower half of drive chain enclosure.
8. Remove any foreign material or tools from bottom half of drive chain enclosure.
9. Lower top half of casing into place starting the large end first. Note: in some cases it is

easier to assemble casing by starting at the smaller end.

10. Install bolts in the bolting clips at each end of the casing.
11. Make sure shafting does not make contact with guard at shaft openings. If contact is observed, re-adjust mounting brackets attached to lower half of guard to obtain proper clearance.

STOP

Damage to the head shaft and chain guard is imminent when contact occurs. Premature head shaft failure is likely to result.

Installation of Freestanding Non-Oil-Tight Chain Guard

1. Place guard over drive chain and sprockets.
2. Shift guard so shafts are located in center of shaft openings and hubs and sprockets are centered between sides of guard.
3. Mark floor at center of holes in bolting clip at each end of guard.
4. Remove guard from around drive chain and sprockets.
5. Prepare flooring for anchors at marks made in step *Step 3*.
6. Place guard around drive chain and sprockets and anchor to flooring.
7. Make sure shafting does not make contact with guard at shaft openings. If contact is observed, re-adjust guard by installing a shim between floor and guard mounting brackets to obtain proper clearance.

STOP

Damage to the head shaft and chain guard is imminent when contact occurs. Premature head shaft failure is likely to result.

Installation of Chain Guard Support Bracing

The chain guard support bracing supplied with a ***Rex*** Elevator (utilizing a chain guard) is custom designed to fit that particular ***Rex*** Elevator. Therefore, a custom drawing is supplied by ***Rexnord*** which provides the necessary instructions to install the support bracing properly. The chain guard instructions can be found on the “Chain Guard Support Assembly” drawing, under the tab labeled “Drawings”, within this ***Field Service Manual***.

Installation of Motion Sensor

The motion sensor is a device that detects motion of the chain and bucket assembly. The motion sensor will de-energize (trip) indicating a problem when the chain and bucket assembly is not traveling in the elevator at the proper rate of speed.

The motion sensor when de-energized or tripped, should perform the following two functions:

1. Warn operations personnel that there is a problem with the elevator that is causing the chain and bucket assembly to have stopped or is moving slower than normal.
2. Shut down elevator and all equipment “up stream” feeding the elevator.

STOP

Elevator must be shut down immediately upon receiving a signal from the motion sensor. Failure in shutting down elevator will result in extreme chain wear/damage and eventually chain failure.

See elevator’s General Arrangement Drawings for location or placement of motion sensing equipment.

For more information on the motion sensing equipment see the manufacturer’s literature under the tab labeled *Alarm/Switches*.

The motion sensing equipment that comes standard with ***Rex*** elevators is the ***Milltronics*** MFA-4 motion failure alarm. Other manufacturer’s motion sensing equipment are used in ***Rex*** elevators only when customer specifications require it.

In most cases the ***Milltronics*** motion sensing equipment supplied by ***Rexnord*** will consist of a main amplifier, preamp, and probe. In some cases the preamp may not be supplied because it is built into the probe.

All ***Milltronics*** motion sensing equipment probes are located in the lower head section of the elevator. The probe is located in the load end of the lower head unless site access or plant process dictates an alternative placement. The probe should be installed in the lower head so that there is a 50 mm (2") gap between the end of the probe and the end of the bucket lip. See *Figure 4-59*.

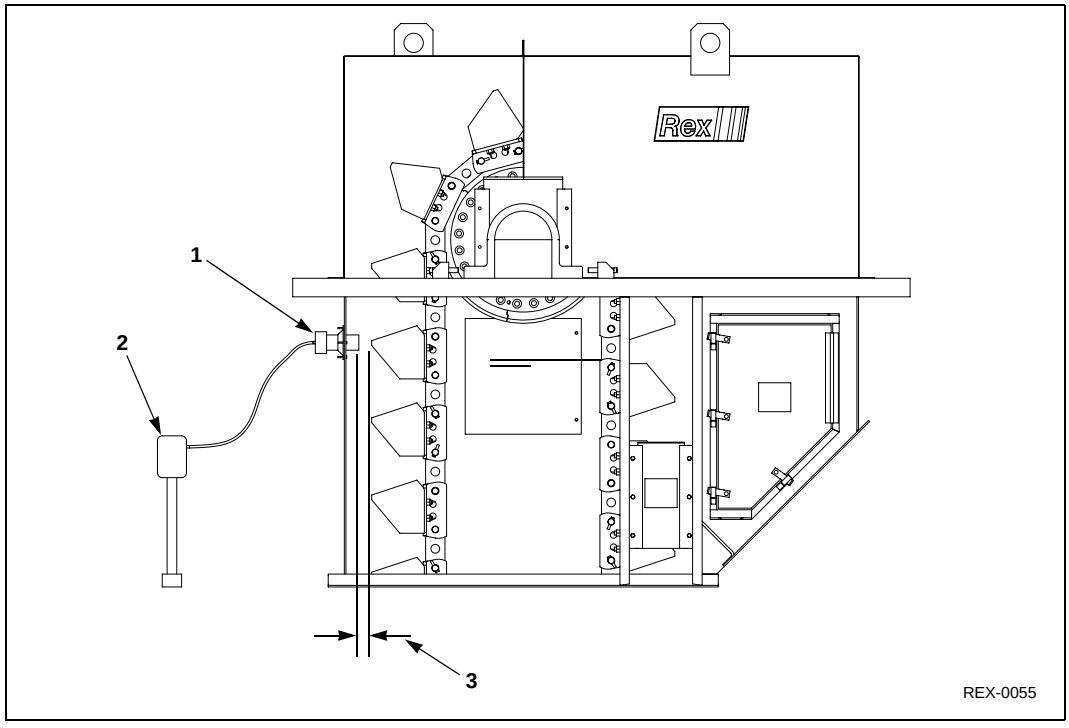


Figure 4-59: Motion Sensor – Setting Gap Between Probe and Buckets

1 – Probe
2 – Preamp

3 – Gap between bucket and probe – 50 mm (2")

Rexnord recommends that the preamp and main amplifier be mounted somewhere off the elevator. A preamp mounted to an elevator casing over time has a tendency to develop cracks in the electronic board.

Installation of Boot Flood Switch

A boot flood switch is a device that is activated when material has risen to a damaging and/or dangerous level in the elevator's boot section. The device when activated should perform the following functions:

1. Warn operations personnel that there is a build up of material in the boot section.
2. Activate a shut down sequence of all equipment "up stream" feeding the elevator.
3. Shut elevator off approximately 10–15 minutes after boot flood switch is activated.

Do not wire/program boot flood switch to immediately shut off the elevator, or equipment "down stream" being fed by elevator.

See elevator's General Arrangement Drawings for location or placement of the boot flood switch.

For more information on the Boot flood switch see the manufacturer's literature under the tab labeled *Alarm/Switches*.

The boot flood switch may be called out on the General Arrangement Drawings as a *Bindicator.* ***Rexnord*** has standardized on Bindicator's Model "A" Bindicator in our elevators. Other manufacturer's boot flood switches are used in ***Rex*** elevators, when customers specifications require it, these switches will be called out with the other manufacturer's name on the General Arrangement Drawings.

Installation Checklist I - Pre-Initial Operation

Customer:		Customer No:	
Installation:		***Rexnord*** No:	
Location:		Equipment:	
Date:		Service No:	
Report By:		Pages:	

Table 4-B: Pre-Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
1.	Foundation • Check concrete elevation. • Check anchor bolts for position and projection.		
2.	Boot Section • Place the boot section over the anchor bolts. Make sure the flanged inlet opening is facing the correct direction. • Level and plumb the boot section. Use a long carpenter's level to check the flanges, and plumb lines on the inside of the boot section to check the walls for plumb. Place shims under the bottom flange (of the boot) as required to level and plumb the boot. • Boot grouted in place.		
3.	Intermediate Casings • Install the intermediate casings in the order shown on ***Rexnord*** drawing titled *Erection Key.* • Make sure that all inspection doors are orientated in the correct position. • Make sure sealing compound is placed between all of the intermediate sections. • Each intermediate casing must be plumbed to a tolerance of 3 mm (1/8") maximum with respect to the boot section.		
4.	Lateral Support Bracing • Lateral support bracing and twin leg casing ties must be installed around or on the elevator intermediate casing as shown on the *Erection Key* drawing, before installing intermediate casings that are at higher elevations. • Do not weld lateral support bracing to elevator.		

Table 4-B: Pre-Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
5.	Platform, Platform Collars, Grating and Handrails • Install lower platform support collar tie. Check plumb. • Install platform, grating and handrails as shown on drawings in manual.		
6.	Lower Head Section • Install the lower head as shown on ***Rexnord*** drawing titled *Erection Key.* • Make sure that discharge end is orientated in the correct position. • Make sure sealing compound is placed between joint of lower head and intermediate section or platform collar. • The lower head must be plumbed to a tolerance of 6 mm (1/4”) maximum with respect to the boot section.		
7.	Upper Head Section • Head shaft dust seals are properly orientated. • Sealant is used between bolted flange connections.		
8.	Ladder and Safety Cage • Install ladder as shown on ***Rexnord*** ladder drawing in manual. • Ladder is securely fastened to elevator. • Ladder has been mounted so that it can move with elevator as it expands or contracts.		
9.	Hoist Frame • Assemble hoist frame as shown on ***Rexnord*** hoist frame drawings supplied in the manual. Make sure hoist frame is mounted to elevator in the proper orientation. • Make sure all hardware is properly tightened.		
10.	Take-up Assembly and Take-up Guides • Install take-up centrally within the boot section according to General Arrangement Drawings. • Make sure take-up moves freely within the take-up guides, and that the proper clearances have been established.		
11.	Head Shaft Installation • Head shaft is centralized within the lower head section. • A shim pack is installed under each bearing. • Head shaft is level within 0.25 mm/m (0.003 in/ft).		
12.	Head and Foot Shaft Alignment • Head and Foot shaft are parallel. • Centerline of the traction wheel and or sprocket of the head and foot shaft are aligned with each other.		

Table 4-B: Pre-Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
13.	Chain Assembly/Installation • Chain is orientated in the proper direction. • Use ***Linkmaster*** chain tool to assemble chain sections together. • Make sure chain joints flex freely. • Make sure proper amount of chain has been installed in elevator so tail shaft is located in proper position as stated in General Arrangement Drawings. • Make sure all pin-locks are installed in the chain pins.		
14.	Bucket Installation • Buckets orientated in the proper direction. • Buckets installed with only the hardware specified on General Arrangement Drawing. • Bearing plates were installed if called out on General Arrangement Drawings. • Bucket hardware tightened to the proper torque value specified in the bucket bolt torque chart of this manual.		
15.	Install Stop Blocks on Take-up Guides • Upper stop blocks are positioned 6–25 mm (1/4”–1”) from top of take-up. • Lower stop blocks positioned to stop take-up from driving buckets into bottom of boot. • Stop block mounting hardware is tight.		
16.	Peeler Lip installation • Rubber lip adjusted to make slight contact with bucket lip. • Mounting hardware is tight.		
17.	Backstop Installation • Assembled per manufacturer’s instructions. • Mounted on head shaft properly. • Oriented for the proper rotation. • Torque arm supported as shown on ***Rexnord*** drawings. • Lubrication has been installed in all required points. • All guarding is installed.		
18.	Drive Installation • All drive components lubricated per manufacturer’s instructions. • All couplings have been aligned and tightened per manufacturer’s specifications. • Backstop has been checked for proper rotation. • Motor rotation checked uncoupled. • All guarding is installed.		

Table 4-B: Pre-Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
19.	Hollow Shaft Mounted Drive • Head shaft and reducer hollow shaft cleaned properly. • Reducer positioned on head shaft properly. • Locking device between reducer and head shaft is tightened as specified by the manufacturer. • Torque arm installed properly. • All guarding is installed.		
20.	Solid Shaft Mounted Drive • Reducer output shaft is aligned with the head shaft to coupling manufacturer's specifications. • Low speed coupling is installed to manufacturer's specifications. • All guarding is installed.		
21.	Drive Mounted (Supported) on Elevator Casing • Reducer output shaft and head shaft are parallel. • Drive and driven sprockets are in alignment. • Drive chain is installed in the proper direction and has the proper slack. • All guarding is installed.		
22.	Belt Driven Installation • Shafts are parallel. • All drive sheaves are aligned and tightened properly. • Belts are all the same size and tensioned properly. • All guarding is installed.		
23.	Direct Driven Installation • End gap between motor and reducer is to drawing specification. • Coupling has been aligned to manufacturer's specifications. • Coupling has been mounted and tightened to manufacturer's specifications. • All guarding is installed.		
24.	Chain Driven Installation • Shafts are parallel. • Sprockets are aligned and tightened properly. • Drive chain is oriented in the proper direction. • Connecting pin has been installed properly and joint flexes freely. • Drive chain has been correctly tightened to allow proper slack. • All guarding is installed.		

Table 4-B: Pre-Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
25.	Chain and Belt Guarding • All guard mounting apparatus have been secured or tightened properly. • All seals have been installed where required. • Guard does not make contact with the shafting, sprockets, sheaves or other drive components. • Proper lubricant has been installed to the proper level where applicable. • Guard is free of all dirt and debris.		
26.	Motion Sensor • Gap between probe and bucket lip set at approximately 50 mm (2"). • Preamp and amplifier are mounted securely to something other than the elevator. • All wiring has been performed.		
27.	Boot Flood Switch • Boot flood switch mounted/orientated in the proper position. • Switch diaphragm returns back to original position after being depressed. • All wiring has been performed.		

Elevator Initial Operation

A very important and necessary part of installing a bucket elevator is placing it through a constantly monitored, eight (8) hour, no load initial operation.

Initial operation as stated above is part of installing an elevator and as such is the responsibility of the parities installing it to perform.

Before an elevator can be placed through initial operation, all proceeding instructions and items in the *Table 4-B, Pre-Initial Operation Checklist, page 4-77* must be completed and checked.

General Safety Precautions

Taking into consideration all of the physical aspects of the installation, any or all of the following safeguards are required to protect the operators or those working in the immediate area of the elevator.

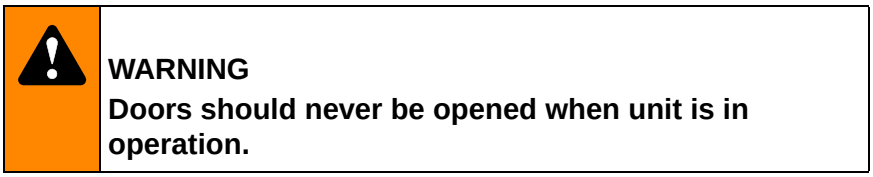
1. HOPPER GRATINGS — Open hoppers should be provided with protective grating to prevent contact with moving bucket line by personnel. Material in feed hopper must not be poked or pushed with any item.
2. GUARDS — For protection of operator and other persons in working area, purchaser should provide guards for all exposed equipment such as drives, gears, shafts, couplings, etc.
3. ELECTRICAL EQUIPMENT — Electrical equipment conforming to the ***National Electrical Code or the National Electrical Safety Code***, including requirements for the environment should be considered for the following functions:
   a. Overflow Devices: Electrical interlocks to warn personnel and shut off power whenever discharge of elevator is interrupted.
   b. Overload Protection: To shut off power whenever operation of elevator is stopped as a result of excessive material, foreign objects, excessively large lumps, etc.
   c. Zero Speed Protection: Devices such as motion sensors to shut off power in the event of any incident which might cause elevator to cease operating.
   d. Safety Shut Off Switch: With power lock-out provision at elevator drive.
   e. Emergency Stop Switches: Readily accessible wherever required and known to proper personnel.
   f. Electrical Interlocking: To shut down feeding conveyor whenever a receiving elevator stops.
   g. Signal Devices: To warn personnel of imminent start up of elevator, especially if started from a remote location.
4. WARNING LABELS — Warning Labels are positioned on the elevator at all inspection doors, cleanout doors, and access doors. Do not remove or obscure these labels. When painting the equipment, do not paint directly over the labels. Additional labels may be obtained by writing to: ***Rexnord Industries Incorporated***, ***Industrial Chain and Conveyor, 4800 W. Mitchell St., Milwaukee, WI 53214***, Attention: Engineering Services.

Operating Safety Instructions

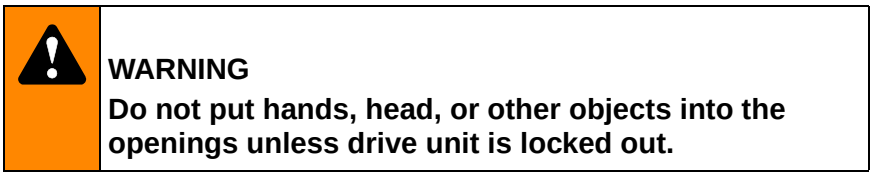
All personnel working on and around the elevator must be familiarized with the following safety instructions before the elevator can be placed in initial operation:

1. Be sure all debris, foreign objects and tools are removed from the elevator and adjacent areas.
2. All removable plates, doors, covers and guards are properly secured in place before operating elevator.

3. Doors, guards, removable plates and covers must never be opened or removed while elevator is in operation.



4. Elevator must be shut down and electrically locked out before removing any door, guard, removable plate or cover.
5. Do not place any parts of the body or other objects into an elevator until all moving parts have stopped, all power has been electrically locked out, and all potential stored or residual energy has been rendered safe.



6. Operation of interlocking controls, overflow or holdback devices, and safety controls must be checked out by qualified personnel who thoroughly understand the manner of operation and the function of every item of equipment. Auxiliary equipment feeding the elevator must be electrically interlocked with elevator to prevent boot flooding when elevator is not in operation.

WARNING

- **Do not remove or bypass interlocking controls, overflow, holdback devices, or safety controls.**
- **Should any item be found to malfunction, replace or repair before elevator is put into service.**
- **Lock out power before removing guards, access doors and covers.**
- **Remember to replace guards, access doors, and covers after completing repairs and before restoring power.**
- **Failure to follow these instructions may result in personal injury or property damage.**

Initial Operation Procedure

Perform the following steps to initially operate the elevator.

1. Check that all work in preceding instructions has been completed and all items have been checked off in *Table 4-B, Pre-Initial Operation Checklist, page 4-77*.
2. Check that all items have been addressed under *General Safety Precautions, page 4-82*.
3. Check that all personnel working on and around the elevator are familiarized with the *Operating Safety Instructions, page 4-83*.
4. Complete one revolution of the chain and bucket assembly by jogging the drive to check for proper assembly and clearances. Correct any deficiencies and jog elevator again before continuing to next step.
5. Operate the elevator for eight (8) hours under no load. During the eight (8) hour no-load period the elevator must be constantly monitored for the following:
   a. Loud or unusual noise
      — Chain and bucket assembly hitting casings, loading legs, peeler lip, etc.
      — Jingling noise from loose buckets
      — Chain jumping on traction wheels or sprockets (elevator and/or drive chain)
      — Head shaft assembly
      — Drive assembly
      — Take-up assembly
   b. Excess vibration
      — Head area
      — Drive unit
      — Boot area
   c. Overheating
      — Bearings
      — Drive unit
   d. Leakage of lubrication

— Drive Unit
— Chain guard
— Backstop

6. Periodically during the eight (8) hour no load operation, stop the elevator and check for the following:
   a. Evidence of contact or scrubbing between inside of chain sidebars and traction wheels or sprockets.
   b. Evidence of chain and bucket assembly contacting:
      — Loading legs
      — Steel portion of peeler lip assembly
      — Casings
7. Test the holdback device during initial operation. While the unit is operating, turn off the power and check the holding action of the device. It should grab immediately without allowing the chain and bucket assembly to reverse its direction of travel.
8. None of the above listed in *Step 5* through *Step 6* should be present if all installation instructions in this manual were followed. If any problems are found during the initial operation, shut down the elevator and correct them before completing the full 8 hour run.
9. While operating the elevator adjust the main amplifier of the ***Milltronics*** motion sensor to the normal operational speed of the elevator. Set the main amplifier so that it is checking for UNDERSPEED. Adjust only the “Start Delay and “Pulses Per Minute” potentiometers and the “Pulses Per Minute” jumper at this time, all other work on the ***Milltronics*** equipment must be performed while the elevator is off and all power is locked out. The manufacturer’s instructions can be found under the tab labeled *Alarm/ Switches*.

WARNING

- **Only adjust the “Start Delay” and “Pulses Per Minute” potentiometers and the “Pulses Per Minute” jumper on *Milltronics* equipment while elevator is in operation.**
- **All other work performed on the *Milltronics* equipment must be performed while the elevator is stopped and all power is locked out.**
- **See manufacturer’s instructions of non-*Milltronics* motion sensors on when and how to adjust equipment.**

Installation Checklist II - Initial Operation

Customer:		Customer No:	
Installation:		***Rexnord*** No:	
Location:		Equipment:	
Date:		Service No:	
Report By:		Pages:	

Table 4-C: Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
1.	All personnel working on and around the elevator are familiarized with all the safety instructions in the elevator manual before operation.		
2.	All debris, foreign objects and tools are removed from the elevator and adjacent areas before operating.		
3.	All doors, guards, removable plates and covers are properly secured in place before operating elevator.		
4.	Jog chain and bucket assembly for one complete revolution to check for proper assembly and clearance.		
5.	Operate elevator with No-Load for 8 hours.		
6.	During No-load operation check periodically for: • Loud or unusual noise. • Excessive vibration. • Overheating. • Leakage of lubrication.		
7.	Periodically stop and lock out elevator during the initial operation period and check for: • Contact or scrubbing between inside of chain sidebars and traction wheels or sprockets. • Evidence of contact between chain and bucket assembly and other elevator components.		
8.	Test holdback device during initial operation.		
9.	Adjust ***Milltronics*** main amplifier to normal operational speed of elevator.		

Table 4-C: Initial Operation Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
10.	Shut off and lock out elevator to correct any deficiencies observed during initial operation inspection, before completing the rest of the eight (8) hour run.		

Required Elevator Installation Follow-up Work

A very important and necessary part of installing a bucket elevator is performing the Assembly Follow-up Work.

Assembly Follow-up Work as stated above is part of installing an elevator and as such is the responsibility of the parities installing it to perform.

STOP

Before the assembly follow-up work can be performed on an elevator, all proceeding instructions and items in the *Table 4-B, Pre-Initial Operation Checklist, page 4-77* and *Table 4-C, Initial Operation Checklist, page 4-86* must be completed and checked.

Elevator must be shut off and all power locked out before starting any work on the elevator.

Correct any deficiencies that were observed during the initial operating period of the elevator.

Open doors and covers of the elevator and perform a thorough inspection. Inspect the following areas as instructed below

WARNING

Guards, doors, and covers must be securely fastened after completing inspections and work before unlocking power and operating equipment.

Elevator Housing, Platforms and Hoist Frame

1. Inspect for loose or missing hardware throughout the whole elevator.
2. Inspect for holes and damage that may have been caused from interference between the chain and bucket assembly caused from misalignment, loose bucket etc.
3. Inspect for loose or shifted grating, secure as shown in General Arrangement Drawings.

Chain and Bucket Assembly

Initially, joints in new chain tend to be stiff and in turn may not hang completely straight. During the initial operation the chain joints tend to loosen up and cause the chain to hang straighter thus making the chain to appear to have grown.

1. Check take-up height to dimensions in elevator's General Arrangement Drawings. If take-up assembly is located near or below the lowest dimension on the drawings, it may be necessary to remove a few pitches of chain and a bucket.
2. Retighten all bucket mounting hardware to the proper torque value. See *Table 4–A, Bucket Bolt Torque Chart, page 4-41*.
3. Prick punch bucket hardware directly behind the nut with a chisel or prick punch to distort threads. Prick punching hardware is recommended but tack welding nut to bolt

to distort the threads is acceptable. See *Figure 4-28*.

STOP

If tack welding nut to bolt, DO NOT OVER WELD or hardware failure will result. Welding ground must be connected to bucket, to prevent arcing through mechanical components.

4. Inspect chain and bucket assembly for damage from interference. If damage is found, isolate the area where interference has taken place and correct the deficiencies.
5. Inspect inside of chain sidebars and outside of traction wheels or sprockets for evidence of heavy contact or scrubbing between the components. If heavy contact is observed check shafting alignment as instructed under *Aligning Head and Foot Shaft, page 4-18*.

Buckets that were installed using Huck fasteners require no fastener retightening or prick punching.

Take-up Assembly

1. Visually inspect take-up assembly for movement or shifting of components. If anything has shifted, properly position shifted component(s) and check shafting alignment as instructed under *Aligning Head and Foot Shaft, page 4-18*.
2. Inspect all mounting hardware in the take-up assembly for tightness; this includes stop blocks, ***Rex NI-HARD*** bearings, body, traction wheels or sprockets, and take-up guides.
3. Check position of upper stop blocks for proper gap between stop blocks and take-up frame. Properly adjust the stop blocks. See *Installing Stop Blocks on Take-up Assembly, page 4-51*.

Head Assembly

1. Visually inspect head shaft assembly for movement or shifting of components. If anything has shifted, properly position shifted component(s) and check shafting alignment. See *Aligning Head and Foot Shaft, page 4-18*.

If head shaft is shifted to align shafting, drive unit must be realigned to the head shaft unless drive unit utilizes a hollow shaft reducer. Head shaft adjustment may also require the torque arm to be shifted on drives that utilize the component.

2. Inspect adjustment of rubber peeler lip. Evidence of slight bucket contact should be observed in the rubber peeler lip if properly adjusted. Replace rubber peeler lip if damaged due to improper adjustment.

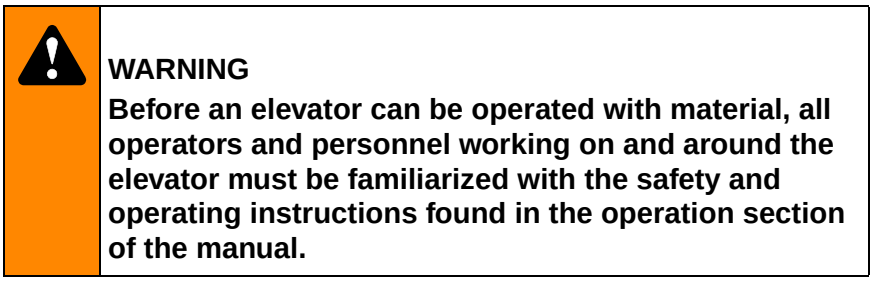
Drive Unit

1. Inspect all drive components for proper lubrication levels and/or leaks.
2. Visually inspect drive for moved or shifted component(s). If any components have shifted, properly position shifted component(s) and recheck all drive alignments.

3. Check tightness of all components utilizing set screws.
4. Inspect inside of drive chain sidebars and outside of drive sprockets for evidence of heavy contact or scrubbing between the components. If heavy contact is observed check sprocket and shaft alignment. See *Shaft and Sprocket or Shaft and Sheave Alignment, page 4-62*.
5. Inspect belts and sheaves for excessive wear due to misalignment or improper belt tension. See *Shaft and Sprocket or Shaft and Sheave Alignment, page 4-62* and *Belt Driven Reducer Installation, page 4-60*.

Operation

After completing all inspections, the necessary work above, and *Installation Checklist III - Required Installation Follow-up*, the elevator is ready to be operated with material.



Installation Checklist III - Required Installation Follow-up

Customer:		Customer No:	
Installation:		***Rexnord*** No:	
Location:		Equipment:	
Date:		Service No:	
Report By:		Pages:	

Table 4-D: Required Installation Follow-up Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
1.	Lock out all power to elevator before starting any work.		
2.	Correct any deficiencies that were noted during the initial operation of the elevator.		
3.	Housing, platforms and hoist frame: • Inspect for loose or missing hardware. • Inspect for holes or damage. • Inspect for loose or shifted grating.		
4.	Chain and Bucket Assembly • Compare take-up height to drawing dimension to see if the proper amount of chain is installed in the elevator. • Retighten all bucket mounting hardware to the proper torque value. • Prick punch bucket hardware. • Inspect chain and buckets for damage from interference. • Inspect inside of chain side bars and outside of traction wheels or sprockets for evidence of heavy contact or scrubbing between the components.		
5.	Take-up Assembly • Inspect for movement or shifting of components. • All mounting hardware is properly tightened. • Proper gap between take-up frame and upper stop blocks.		
6.	Head Assembly • Inspect for movement or shifting of components. • Inspect adjustment of rubber peeler lip.		

Table 4-D: Required Installation Follow-up Checklist

Item No.	Checkpoint Description	Completion Date	Checked By
7.	Drive Unit • Inspect all components for proper lubrication levels and/or leaks. • Inspect for moved or shifted components. • Check all set screws for tightness. • Inspect inside of drive chain sidebars and outside of drive sprockets for evidence of heavy contact or scrubbing between the components. • Inspect belts and sheaves for excessive wear due to misalignment or improper belt tension.		

Operating Criteria

Proper elevator operation starts with the operator(s) knowing the following design criteria of the elevator:

1. Material elevator is designed to handle including:
   a. Type of material
   b. Maximum and minimum lump size of material
   c. Maximum and minimum density of material
   d. Maximum moisture content of material
2. Bucket volumetric capacity
3. Normal operating capacity

This information can be found in the application specifications box on the elevator's General Arrangement Drawing titled ***Specification Sheet***.

Elevators handle material volumetrically, not by weight. This means that to handle the normal operating capacity, the elevator must be fed material within its design criteria, and at a uniform rate.

Successful operation of any elevator is dependent on controlled feed. Material must be fed into an elevator at a controlled rate, within it's rated capacity, or the boot will flood and the elevator will eventually stall.

Under normal operating conditions, and to obtain the capacity specified, the buckets should only be filled to the percentage of water level full stated on the General Arrangement Drawing titled ***Specification Sheet***.

Do not load buckets to the extent that material spills back down into the boot section. The boot must not be allowed to pile up with spilled material.

Bucket elevators that are surge or batch fed are prone to rapid component wear and will not handle the rated elevator design capacity.

Changing the material, material size, or material density from the design criteria can cause the following:

- Less capacity
- Elevator Flooding
- Rapid component wear, damage or failure
- Uneven loading

Rex buckets are designed to travel at a speed and capacity adaptable to the type of material specified in the design criteria.

Do not make any changes in material, material size, capacity, moisture content, or speed of travel, without first consulting ***Rexnord Industries Incorporated***.

Start-up

Before starting any elevator, check for the following:

- All debris, foreign objects and tools are removed from the elevator and adjacent areas.
- All guards are in place on chain drives, couplings, and all moving or rotating parts.
- All removable plates and inspection doors are properly secured in place.
- All safety devices are working properly.
- Auxiliary equipment feeding the elevator are electrically interlocked with elevator to prevent boot flooding when elevator is not in operation.
- Elevator buckets are empty.

Elevators should always be STARTED with buckets empty.
Starting under load places undue strain on chain and drive machinery.

WARNING

- **Guards, access doors, and covers must be securely fastened before operating this equipment.**
- **Lock out power before removing guards, access doors and covers.**
- **Remember to replace guards, access doors, and covers before restoring power.**
- **Do not remove or bypass interlocking controls, overflow, or holdback devices, or safety controls.**
- **Should any item be found to malfunction, replace or repair before elevator is put into service.**
- **Doors should never be opened when unit is in operation.**
- **Do not put hands, head, or other objects into the openings unless drive unit is electrically locked out.**
- **Failure to follow these instructions may result in personal injury or property damage**

Start-up and Operating Procedure

The operator(s) should become familiar with all aspects of the construction and normal operating conditions of the equipment. Thereby, immediately recognizing an abnormal situation or operating condition before serious damage occurs.

Perform the following instructions to startup and operate a bucket elevator:

1. Start equipment being fed by elevator prior to starting elevator.
2. Start bucket elevator and allow elevator to come up to full operating speed before applying load (material).
3. Start equipment which feeds elevator after elevator is up to full operating speed.

4. Apply load at a controlled rate within the capacity of the elevator.
5. Respond appropriately to any and all signals and alarms initiating from the elevator.
6. Periodically inspect elevator for the following during operation:
   - — Loud or unusual noise
   - — Excessive vibration
   - — Bearings or drive overheating
   - — Material leakage
7. Keep a record of all operating hours placed on elevator for maintenance purposes.
8. Record/log all problems and/or alarms experienced with the elevator.
9. Should a stoppage occur in the elevator for any reason, see the following: *Motion Sensor Alarm, page 5-4* and *Boot Flood Alarm, page 5-3*.

Shutdown Procedure

1. Shut off all feed to the elevator.
2. Always allow the elevator to operate until all buckets are empty. This is especially imperative on elevators that are not furnished with a backstop, since any material left in the buckets will empty into and flood the boot section.

Elevators should always be STARTED with buckets empty. Starting under load places undue strain on chain and drive machinery. Therefore, it is imperative to allow all buckets TO EMPTY BEFORE STOPPING elevator.

3. Shutdown power to elevator.

Boot Flood Alarm

The boot flood alarm warns the operator that material has risen to a damaging and/or dangerous level in the elevator's boot section.

Allowing material to build up any higher within the elevator would cause tremendous strain on the machinery and will eventually cause machinery failure and/or the elevator to stall.

When the Bindicator or boot flood switch is activated, perform the following procedure immediately:

1. Shut off all feed to the elevator.
2. Allow elevator to operate for approximately 10-15 minutes without feed to give the elevator a chance to clean itself out.
3. Shutdown elevator and lock out power sources.
4. Remove boot access doors or back plate using caution in the event material has built up sufficiently to create a hazard to personnel.
5. Empty excessive material in boot section and buckets.

6. Inspect elevator and adjacent equipment and chuting for cause of alarm.
7. Correct any and all problems associated with the alarm.
8. Replace all access doors, plates, and guards.

Motion Sensor Alarm

The motion sensor alarm warns the operator that the chain and bucket assembly is not traveling at the proper rate of speed.

Rapid wear and failure will result from excessive slippage or a complete stoppage of the chain and bucket assembly.

When the ***Milltronics*** or motion sensor switch is activated, perform the following procedure immediately:

1. The elevator and equipment feeding the elevator must be shutdown immediately.
2. Lockout all power sources to the elevator.
3. Remove boot access doors or back plate using caution in the event material has built up sufficiently to create a hazard to personnel.
4. Inspect elevator for the cause of the alarm.
5. Correct any and all problems associated with the alarm.
6. Replace all access doors, plates, and guards.

Preventative Maintenance Program

A Preventative Maintenance Program should be established as soon as the elevator has been placed into operation. Your Preventative Maintenance Program should include regular inspections of the elevator on a periodic basis.

Rexnord has established the following preventative maintenance program to be used as a basis in establishing your Plant Preventative Maintenance Program. The preventative maintenance program outlined here by ***Rexnord*** is the minimum amount of checks that it expects of a plant to be performed during the life of the elevator. Particular conditions at your plant may dictate a more frequent schedule.

The preventative maintenance program outlined by ***Rexnord*** has been broken into two checklists, *Table 6–A, Monthly Inspection Checklist (approximately 700 Hours), page 6-2* and *Table 6-B, Annual Inspection Checklist (approximately 8000 Hours), page 6-5*. The two checklists are structured so that they can be photocopied and used out in the field while inspecting the elevator.

Rexnord recommends that a binder be setup to accommodate the monthly and annual inspection reports so good maintenance records are available to use in predicting when components will require replacement and help in the trouble shooting process if a problem should arise with the elevator.

Preventative Maintenance Checklist I - Monthly Inspection

Customer:		Customer No:	
Installation:		***Rexnord*** No:	
Location:		Equipment:	
Date:		Service No:	
Report By:		Pages:	

Table 6–A: Monthly Inspection Checklist (approximately 700 Hours)

Item No.	Checkpoint Description	Remarks	Date Repaired
1.	Rubber Peeler Lip • Replace rubber peeler lip if not intact or is heavily worn. • Adjust rubber peeler lip so buckets just touch it during operation.		
2.	Buckets • Inspect buckets for marks or damage caused by interference. • Replace any missing or loose mounting hardware. Tighten all replaced hardware to proper torque values. • Repair or replace any damaged and/or worn buckets.		
3.	Chain Assembly • Check all sidebars and bushing ODs for uneven or deep wear patterns. • Check insides of block links for heavy wear patterns from traction wheel or sprocket. • Check for missing pin-locks or cotters.		
4.	Segmental Traction Wheels or Sprockets • Inspect for loose or missing mounting hardware. • Inspect for excessive wear on sides. • Inspect traction wheel to see if worn to, or past wear indicator. • Inspect sprockets for hooked, cracked or broken teeth.		
5.	Pillow Block Bearings • Check temperature of housing. • Check housing for cracks and damaged seals. • Check for unusual noise. • Check for proper lubrication. • Clean away excessive material built up around bearing/seals. • Bolts are properly secured.		
6.	***NI-HARD*** Bearings • Inspect block and sleeve for damage.		

Table 6–A: Monthly Inspection Checklist (approximately 700 Hours)

Item No.	Checkpoint Description	Remarks	Date Repaired
7.	Take-up Frame, Take-up Guides and Stop Blocks • Ensure that take-up frame moves freely up and down take-up guides. • Inspect take-up frame and take-up guides for wear and damage. • Check and adjust position of upper stop blocks. • Check all stop blocks' mounting hardware is tight.		
8.	Backstop • Backstop has not moved axially on shaft. • Breather plugs are clean. • Backstop is lubricated per manufacturer's instructions. • No lubrication leaks present. • Check for unusual noise, vibration or excessive heat. • All guarding is installed and fastened securely.		
9.	Drive Unit (including motor) • All drive components lubricated per manufacturer's instructions. • Drive base torque arm or mounting bolts are all secure. • No unusual noise, vibration or excessive heat coming from any of the components. • No lubrication leaking from any of the components. • Breather plug is clean and clear. • All guarding is installed and fastened securely.		
10.	Drive chain and sprockets • Check drive chain for proper slack. • Inspect sprockets for hooked, cracked or broken teeth. • All guarding is installed and fastened securely.		
11.	Drive belt(s) and sheaves • Belt(s) are in good shape and are properly tensioned. • No evidence of misalignment between sheaves. • Sheaves are not damaged or worn. • No oil or grease on belt(s) or sheaves. • All guarding is installed and fastened securely.		
12.	Chain and Belting Guarding • All guard mounting apparatus have been secured or tightened properly. • No leaks around seals. • Guard does not make contact with the shafting, sprockets, sheaves or other drive components. • Lubrication is to the proper level were applicable. • Guard is free of all dirt and debris.		

Table 6–A: Monthly Inspection Checklist (approximately 700 Hours)

Item No.	Checkpoint Description	Remarks	Date Repaired
13.	Boot Section: • Inspect for material leakage around doors and loading chute. • Inspect for structural damage, holes, corrosion, and interferences. • Inspect any liner plates and or loading legs. • Remove all material that has built up on the bottom and sides.		
14.	Platform, Grating, Handrails, Ladder, Safety Cage and Hoist Frame: • Check all are clean of debris and material. • Check for loose hardware, damage and corrosion.		

Preventative Maintenance Checklist II - Annual Inspection

Customer:		Customer No:	
Installation:		***Rexnord*** No:	
Location:		Equipment:	
Date:		Service No:	
Report By:		Pages:	

Table 6-B: Annual Inspection Checklist (approximately 8000 Hours)

Item No.	Checkpoint Description	Remarks	Date Repaired
1.	Rubber Peeler Lip • Replace rubber peeler lip if not intact or is heavily worn. • Adjust rubber peeler lip so buckets just touch it during operation.		
2.	Buckets • Remove any material built-up on buckets • Inspect buckets for marks or damage caused by interference. • Replace any missing or loose mounting hardware. Tighten all replaced hardware to proper torque values properly. • Repair or replace any damaged and/or worn buckets.		
3.	Chain Assembly • Check all sidebars and bushing ODs for uneven or deep wear patterns. • Check insides of block links for heavy wear patterns from traction wheel or sprocket. • Check for missing pin-locks or cotters. • Check and record chain wear by performing yearly chain inspection outlined in maintenance section.		
4.	Segmental Traction Wheels or Sprockets • Inspect for loose or missing mounting hardware. • Inspect for excessive wear on sides. • Inspect traction wheel to see if worn to, or past wear indicator. • Inspect sprockets for hooked, cracked or broken teeth.		

Table 6-B: Annual Inspection Checklist (approximately 8000 Hours)

Item No.	Checkpoint Description	Remarks	Date Repaired
5.	Pillow Block Bearings • Check temperature of housing. • Check housing for cracks and damaged seals. • Check for unusual noise. • Check for proper lubrication. • Clean away excessive material built up around bearing/seals. • Bolts are properly secured.		
6.	***NI-HARD*** bearings • Measure wall thickness at top of bearing block; Thickness 3 mm (1/4”) or less replace complete bearing. • Inspect block and sleeve for damage.		
7.	Head Shaft and Body (ies) • Check body(ies) is/are positioned properly on shaft - No movement axially. • Check that all set screws, locking devices, keys, and hardware securing body(ies), driven sprocket, backstop, etc. are in good condition, properly seated and tight.		
8.	Foot Shaft and Body(ies) • Check body(ies) is/are positioned properly on shaft - No movement axially. • Check that all set screws, locking devices, keys, and hardware securing body(ies) are in good condition, properly seated and tight.		
9.	Take-up Frame, Take-up Guides and Stop Blocks • Ensure that take-up frame moves freely up and down take-up guides. • Inspect take-up frame and take-up guides for wear and damage. • Check and adjust position of upper stop blocks. • Check all stop blocks’ mounting hardware is tight.		
10.	Backstop • Check torque arm is supported properly - all bolts holding bracket or stirrup holding end of torque arm are secure. • Backstop has not moved axially on shaft. • Breather plugs are clean. • Backstop is lubricated per manufacturer’s instructions. • No lubrication leaks present. • Check for unusual noise, vibration or excessive heat. • All guarding is installed and fastened securely.		

Table 6-B: Annual Inspection Checklist (approximately 8000 Hours)

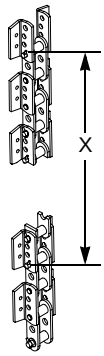
Item No.	Checkpoint Description	Remarks	Date Repaired
11.	Drive Unit (including motor) • All drive components lubricated per manufacturer's instructions. • Drive base torque arm and mounting bolts are all secured. • No unusual noise, vibration or excessive heat coming from any of the components. • No lubrication leaking from any of the components. • Breather plug is clean and clear. • All guarding is installed and fastened securely.		
12.	Drive chain and sprockets • Check chain and sprockets for evidence of misalignment. • Check drive chain for proper slack. • Check chain for missing pin-locks or cotters. • Inspect sprockets for hooked, cracked or broken teeth. • All guarding is installed and fastened securely.		
13.	Drive belt(s) and sheaves • Belt(s) are in good shape and are properly tensioned. • No evidence of misalignment between sheaves. • Sheaves are not damaged or worn. • No oil or grease on belt(s) or sheaves. • No interference between guard and sheaves or belts. • All guarding is installed and fastened securely.		
14.	Chain and Belt Guarding • All guard mounting apparatus have been secured or tightened properly. • No leaks around seals. • Guard does not make contact with the shafting, sprockets, sheaves or other drive components. • Lubrication is to the proper level were applicable. • Guard is free of all dirt and debris.		
15.	Motion Sensor • Motion probe in good condition - not been damaged. • Gap between probe and bucket lip set at approximately 50 mm (2"). • Preamp and amplifier are mounted securely. • Wiring is in good shape. • Motion sensor is adjusted properly to operating speed of equipment. • All interlocks work properly when the switch is activated.		

Table 6-B: Annual Inspection Checklist (approximately 8000 Hours)

Item No.	Checkpoint Description	Remarks	Date Repaired
16.	Boot Flood Switch • Boot flood switch mounted securely. • Diaphragm is in good shape. • Switch diaphragm returns back to original position after being depressed - switch moves freely. • Wiring is in good shape. • Interlocks work properly when the switch is activated.		
17.	Foundation: • Check grout, concrete, and/or steel, supporting base of elevator is in good condition. • Check nuts on anchor bolts for tightness. • Check area around foundation is clean of debris and material.		
18.	Boot Section: • Inspect for material leakage around doors and loading chute. • Inspect for structural damage, holes, corrosion, and interferences. • Inspect any liner plates and or loading legs. • Remove all material that has built up on the bottom and sides.		
19.	Intermediate Casings and Collars: • Inspect for material leakage around all casing flanges, inspection doors and panels. • Inspect for structural damage, holes, and corrosion. • Remove all material that has built up on the sides.		
20.	Lateral Support Bracing • Inspect lateral support for cracked welds and loose or missing hardware. • Inspect bracing for proper gap around casings for expansion. • Make sure gap between bracing and casing is free of debris and material.		
21.	Upper and Lower Head Sections: • Inspect for material leakage around doors flanges, discharge chute, and shaft seals. • Inspect for structural damage, holes, and corrosion.		
22.	Platform, Grating, Handrails, Ladder, Safety Cage and Hoist Frame: • Check all are clean of debris and material. • Check for loose hardware, damage and corrosion.		

Chain Elongation Measurements Worksheet

Equipment:		Location:	
Customer No:		***Rexnord*** No:	
Report By:		Date:	



Chain No.: _____ Chain Type: _____

Date Installed: _____ Hours in Operation: _____

Refer to *Table 7–A, Chain Elongation Measurements, page 7-6* to fill out the following:

Number of pitches (X) to measure across: _____

Length of (X) number of new chain pitches: _____

Maximum wear length of (X) number of chain pitches: _____

Measure chain length in three separate areas of each chain strand! Record measurements below.

	1st Chain strand measurements		*2nd Chain Strand measurements
1st			
2nd			
3rd			
			***This column is not required for single strand elevators**

Table 6-C: Actual Chain Measurements

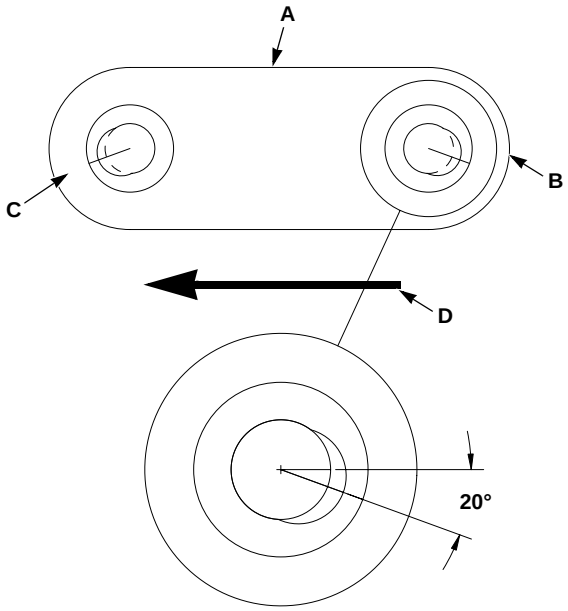
If chain measurements equal or exceeds maximum wear length of (X) number of chain pitches, measure the chain pins and bushings as follows.

Maintenance Note

When chain elongation measurement is at maximum, plan replacement schedule. Measuring chain pins and bushings will help in determining the time frame for replacement.

Chain Elongation Pin and Bushing Measurements Worksheet

Equipment:		Location:	
Customer No:		***Rexnord*** No:	
Report By:		Date:	



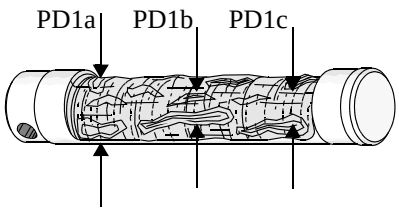
A Block Link

B Trailing End

C Leading End

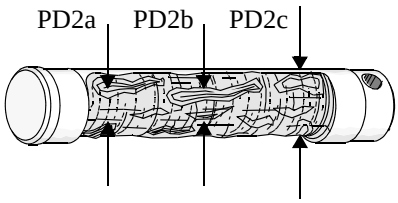
D Direction Of Travel

Measure Leading Pin Diameter - (PD1)



PD1a	PD1b	PD1c

Measure Trailing Pin Diameter - (PD2)



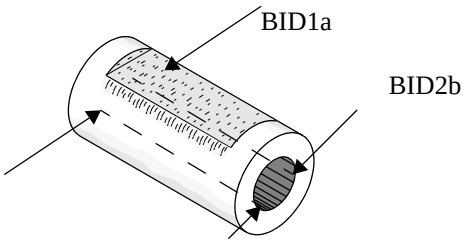
PD2a	PD2b	PD2c

Refer to *Table 7-B, page 7-7* in the Maintenance section to fill out the following:

New Pin Diameter _____

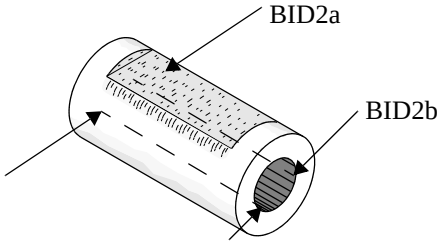
Maximum Pin Diameter Wear _____

Measure Leading Bushing Inside diameter- (BID1)



BID1a	BID1b

Measure Trailing Bushing Inside diameter- (BID2)



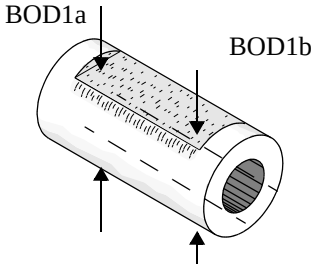
BID2a	BID2b

Refer to *Table 7-B, Maximum Wear Measurements Of Pin OD & Bushing ID, page 7-7* to fill out the following:

New Bushing ID _____

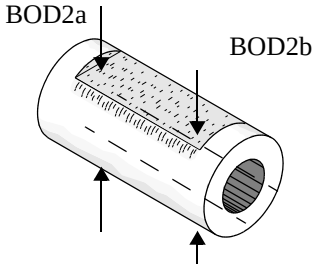
Maximum Bushing ID Wear _____

Measure Leading Bushing outside diameter- (BOD1)



BOD1a	BOD1b

Measure Trailing Bushing outside diameter- (BOD2)



BOD2a	BOD2b

Refer to *Table 7-C, Maximum Wear Of Bushing OD, page 7-8* to fill out the following:

New Bushing OD _____

Maximum Bushing OD Wear _____

Rubber Peeler Lip Adjustment

The adjustable rubber peeler lip in ***Rex*** elevators is an expendable item and must be inspected at least once a month.

The rubber lip is designed with slotted mounting holes so it can be adjusted as the rubber wears around the bucket area. The rubber lip requires replacement if it is ripped or all of the travel in the slotted holes has been used. For replacement, use #50-60 Durometer live rubber.

For replacement or adjustment instructions see *Installing/Adjusting Rubber Peeler Lip, page 4-52*.

Bucket Inspection

Buckets, due to the function they perform must be periodically inspected.

Buckets observed to be worn or damaged must be repaired or replaced.

Accelerated wear and/or damage to the buckets is caused in a number of ways, some examples are:

- Improper material (type, size, temperature, moisture content) fed into elevator.
- Elevator is fed too much material or is back legging, forcing buckets to dig material from boot.
- Foreign objects introduced into the elevator (tramp iron, tools, etc.).
- Improper operation of elevator.
- Interference with other parts/components of the elevator.
- Corrosive materials.

Buckets can be inspected in any of three areas of the elevator, at the boot section; at the head section; or the three door intermediate section if the elevator is so equipped. In general, bucket inspection is easiest at the three door intermediate section.

The following work should be performed when inspecting buckets:

1. Remove any material build-up from buckets.
2. Replace any loose or missing bucket mounting hardware. Tighten hardware to the proper torque value found in *Table 4–A, Bucket Bolt Torque Chart, page 4-41*.
3. Inspect buckets for signs of interference with other elevator components. Inspect, isolate, and repair problem causing interference.
4. Repair or replace any missing, damaged, cracked, or worn buckets.

An elevator bucket is constantly being loaded (stressed) and unloaded (unstressed), or stress cycled. Over many years of operation the buckets will start to fatigue and crack. The following illustration depicts the most likely areas in which a bucket will crack.

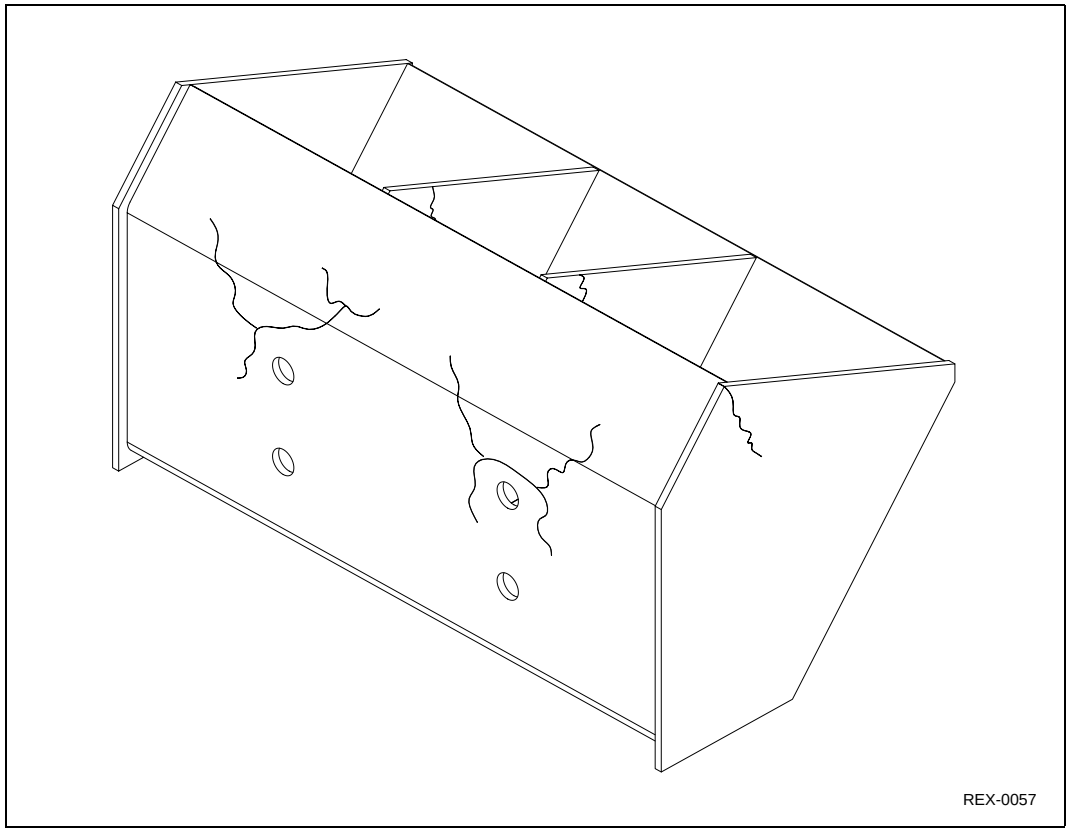


Figure 7-1: *Bucket Fatigue Cracks Example*

Replace any buckets that are cracked as shown above. If a large portion of the elevators' buckets are cracked, arrange to replace all buckets within the elevator at the earliest convenience.

STOP

Buckets routinely required to dig material from the boot section due to improper operation of the elevator, are prone to premature bucket cracking similar to the diagram above. ***Rexnord*** will not warranty buckets that have failed due to improper operation of the elevator.

Bucket Removal and Replacement

The following instructions are to be used to remove buckets from a chain assembly or when replacing a few damaged or worn buckets. See *Bucket Installation, page 4-41* when installing buckets into an elevator that has been re-chained.

Buckets can be removed and/or replaced in any of three areas of the elevator, at the boot section; at the head section; or the three door intermediate section if the elevator is so equipped. In general, bucket installation is easiest at the three door intermediate section.

WARNING

Always block chain before entering elevator. Unbalanced chain strands can start to rotate in elevator and serious injury or death can result.

1. Remove buckets by cutting the mounting hardware holding the buckets to the chain. A torch or chisel may be used to cut hardware. When cutting with a torch do not gouge chain or buckets.

STOP

When removing bucket mounting hardware with a torch do not induce heat into chain and/or gouge chain or buckets.

STOP

Never save mounting hardware for reuse. Always install new mounting hardware to mount buckets in an elevator. The use of old hardware to mount buckets will result in failure and damage to elevator. Old hardware is fatigued due to operation, and can not be properly tightened due to prick punching of threads.

2. Install buckets in the elevator noting proper orientation. Always use new mounting hardware to mount bucket to chain.
3. Tighten bucket to the proper torque value listed in *Table 4–A, Bucket Bolt Torque Chart, page 4-41*.
4. Mark the back of replacement buckets so that they can be retightened and prick punched after 8 hours of operation.

Keep chain strands balanced, always remove and replace a worn or damaged bucket before moving on to the next.

Chain Assembly Inspection

Rex elevator chains are applied in an elevator at loads below their fatigue limit to assure that breakage is not a factor during their normal wear life. However, the following will accelerate wear or cause the chain to fail before the normal wear life can be achieved:

- Excessive traction wheel slippage due to overload or jamming of foreign material.
- Misalignment of elevator.
- Boot flooding.
- Grinding or heating of chain pins or sidebar holes to ease assembly.
- Improper chain assembly.
- Installing new chain on worn/used traction wheels or sprockets.

An elevator chain failure can be very costly to repair due to downtime, expense, damage, and chain replacement therefore, every effort should be made to regularly inspect and maintain the chain.

There are several types of inspections that should be made throughout the chain's service life.

— Monthly visual inspections

— Annual visual inspection and non-destructive inspections

— Three year thorough analysis of a two pitch sample of the chain

Monthly Chain Inspection

Visually inspect the elevator chain at least once a month for the following:

1. Check chain pins for missing cotters. Replace any cotters that are missing.
2. Check inside block links for unequal wear from traction wheel or sprocket. Heavy wear on the inside of the side block is usually an indication of misalignment.
3. Check the outside diameter of all bushings for uneven or deep wear patterns and for small areas of chain that appear to have had the bushings ground or plastic flow of surface material (appears "melted"). Uneven or deep wear occurs when the wear life of a sprocket has been exceeded or worn traction wheels and sprockets have been used on new chain. If only a small section of chain bushings appear to be ground or "melted", the chain and bucket assembly was stalled and the traction wheel was left to spin on one section of chain.
4. Visually inspect clearance between each set of inner and outer sidebars. Excessive clearance suggests pin fracture. Remove pins where excessive clearance indicates pin fracture. If more than two fractured pins are found, replace the entire chain at earliest convenience.
5. Correct/repair any and all problems observed during the inspection before placing elevator back into operation.

Annual Chain Inspection

Chain elongation (stretch) is the result of wear between the chain pins and bushings as they articulate over traction wheels and/or sprockets. ***Rexnord*** case hardens the outside of the chain pins and all surfaces of the chain bushings to combat this wear and to maximize the life of the chain. When the hardened case of the pins and/or bushings has been worn through, the wear rate drastically accelerates and chain failure will shortly follow.

Due to the case hardening of the pins and bushings, wear is consistent and chain life is predictable. Chain life is predicted by measuring chain elongation and recording the measurements with the number of hours the chain has been in operation, and comparing it with tabulated data found within this manual.

By measuring and recording chain elongation and total operational time and comparing it with tabulated data within this manual, chain life can be predicted allowing chain to be replaced before failure occurs.

Chain wear should be measured and recorded at least once a year. More frequent wear measurements maybe required/beneficial in determining the proper time to replace the chain as it gets closer to the end of its wear life.

1. Perform *Monthly Chain Inspection, page 7-4*.

2. Check chain parts for fatigue.
   a. **Pins**: Hammer test all pins for soundness. Replace all fractured pins. If more than two fractured pins are found, replace the entire chain at earliest convenience.
   b. **Sidebars:** Visually inspect all sidebars at pin and bushing holes for cracks. Remove links which have cracked sidebars and replace. However; if more than three links have cracking at pin and/or bushing holes, schedule immediate replacement of chain.
   c. **Attachments:** Visually inspect the bend line of all attachments. Replace any attachments with cracks.
3. Measure chain wear by performing the following Procedures.

Procedure No. 1 - Measuring Overall Length of "X" Number of Chain Pitches

1. Accurately measure and record a length of chain (number of pitches shown in *Table 7-B, page 7-7*) as shown in *Figure 7-2*. Take at least three measurements in different areas of the chain assembly; record each value.
2. Compare measured values with corresponding chain figures given in *Table 7–A, page 7-6*.
3. If chain has elongated more than maximum wear value in *Table 7–A, page 7-6*, proceed to *Procedure No. 2 - Measuring OD of Chain Pins and ID of Chain Bushings, page 7-6*.

To accurately measure chain, always start and finish tape measure on same end of pin, cotter end to cotter end as shown in *Figure 7-2* or from head end to head end (not shown). Make sure when measuring from cotter end that the end of the tape is on the chain pin and not caught on the pin-lock or cotter.

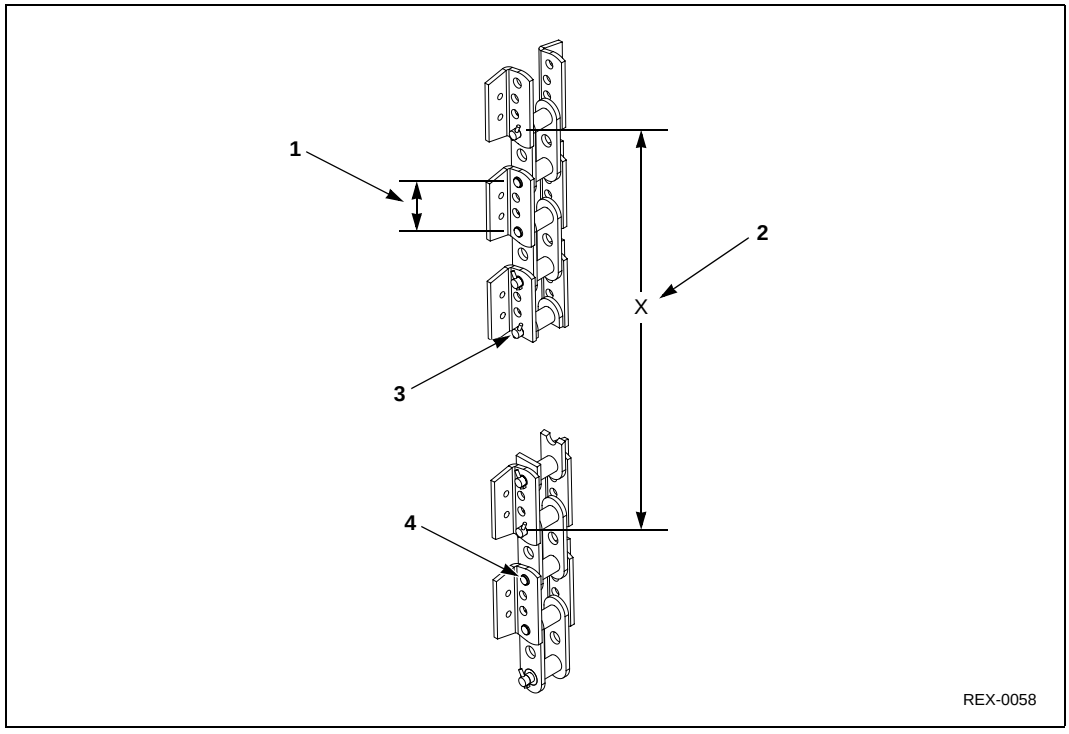


Figure 7-2: Measuring Chain Elongation

1 – One pitch of chain
2 – Length of chain between set number of chain pitches
3 – Cotter end of chain pin
4 – Head end of chain pin

Chain Number	Number of Pitches	Length			
		Unworn		Maximum Wear	
		mm	inches	mm	inches
ER-111	16	1934.46	76.16	1992.50	78.44
ES-833	12	1828.80	72.00	1874.52	73.80
ER-856	12	1828.80	72.00	1874.52	73.80
SJM or ER-857	12	1828.80	72.00	1874.52	73.80
SJM or ER-859	12	1828.80	72.00	1874.52	73.80
SJM or ER-864	12	2133.60	84.00	2180.54	85.85
SJM or ER-956	12	1828.80	72.00	1874.52	73.80
SJM or ER-958	12	1828.80	72.00	1874.52	73.80
ER-979	12	1828.80	72.00	1874.52	73.80
SJM or ER-984	12	2133.60	84.00	2180.54	85.85
ER-1084	12	2133.60	84.00	2180.54	85.85

Table 7–A: Chain Elongation Measurements

Procedure No. 2 - Measuring OD of Chain Pins and ID of Chain Bushings

1. Randomly remove 4 to 5 pins from chain assembly.
2. Measure and record the pin's outside diameter (OD) and bushing's inside diameter (ID) Measure pins and bushings at heaviest wear areas. See *Figure 7-3*, *Figure 7-4* and *Chain Wear Analysis, page 7-9*
3. Compare measured values with the corresponding dimensions listed in *Table 7-B, page 7-7*.

As stated earlier, the wear rate of the pins and bushings drastically accelerates when they are worn through the hardened case. The following limits recorded in *Table 7-B, page 7-7* reflects the maximum wear allowable in the pins and/or bushings before chain requires replacement.

Chain Number	Pin OD				Bushing ID			
	Unworn		Maximum Wear		Unworn		Maximum Wear	
	mm	inches	mm	inches	mm	inches	mm	inches
ER-111	19.05	0.750	16.51	0.650	19.56	0.770	21.21	0.835
ES-833	19.05	0.750	16.51	0.650	19.56	0.770	21.21	0.835
ER-856	25.40	1.000	21.91	0.865	26.04	1.025	28.22	1.111
SJM or ER-857	25.40	1.000	21.91	0.865	26.04	1.025	28.22	1.111
SJM or ER-859	31.75	1.250	27.81	1.095	32.26	1.275	35.56	1.400
SJM or ER-864	31.75	1.250	27.81	1.095	32.26	1.275	35.56	1.400
SJM or ER-956	25.40	1.000	21.91	0.865	26.04	1.025	28.22	1.111
SJM or ER-958	28.27	1.113	24.89	0.980	29.16	1.150	31.39	1.236
ER-979	34.92	1.375	30.86	1.215	35.48	1.400	38.74	1.525
SJM or ER-984	34.92	1.375	30.86	1.215	35.48	1.400	38.74	1.525
ER1084	41.27	1.625	35.941	1.415	41.91	1.650	45.085	1.775

Table 7-B: Maximum Wear Measurements Of Pin OD & Bushing ID

Each judgement should be based upon projected wear to predict replacement of the entire chain before wear exceeds the values given above. More frequent inspections may be required if wear is approaching the limits listed in *Table 7-B, page 7-7*.

If wear of pins and bushings meet or exceed the levels shown in *Table 7-B, page 7-7*, chain should be replaced during the next shutdown, assuming the shutdown will take place within three months after the measurements were taken.

Bushing Outside diameter (OD) should be inspected for signs of rapid wear due to sprocket scrubbing or traction wheel slippage. Measure the Bushing OD and compare the measurement with the dimensions listed in *Table 7-C, page 7-8*.

Chain Number	Bushing OD			
	Unworn		Maximum Wear	
	mm	inches	mm	inches
ER-111	36.576	1.440	34.036	1.340
ES-833	36.576	1.440	34.036	1.340
ER-856	44.450	1.750	41.148	1.620
SJM or ER-857	44.450	1.750	41.148	1.620
SJM or ER-859	60.325	2.375	55.499	2.185
SJM or ER-864	60.325	2.375	55.499	2.185
SJM or ER-956	44.450	1.750	41.148	1.620
SJM or ER-958	50.800	2.000	47.498	1.870
ER-979	63.500	2.500	58.674	2.310
SJM or ER-984	63.500	2.500	58.674	2.310
ER1084	72.390	2.850	67.564	2.660

Table 7-C: Maximum Wear Of Bushing OD

If OD wear exceeds values given *Table 7-C, page 7-8*, exposure of the pin may be imminent requiring immediate replacement of chain.

Operation of elevator with exposed chain pins will result in chain failure.

Three Year Chain Analysis (Program) Inspection

After any new elevator chain has operated for approximately three years, a representative sample of the worn chain should be removed from the elevator and submitted to ***Rexnord*** for analysis.

Rexnord will perform destructive and nondestructive tests to the chain sample to analyze its wear, heat treatment and chain construction.

A technical report will be made and sent to customer by ***Rexnord*** with recommendations that advises when the chain should be replaced and/or if corrective action is required to improve chain and/or elevator performance.

A good time to get a representative chain sample from an elevator is when the following two conditions exist:

- The chain has been in operation for at least three years.
- The take-up assembly requires adjustment within the boot section due to chain elongation.

When the two conditions above are met the chain links removed from the elevator to adjust the take-up's height can be sent into ***Rexnord*** for analysis, eliminating the need for replacement links.

To have ***Rexnord*** analyze a chain sample perform the following:

1. Remove a two pitch representative sample of chain from the elevator by non

destructive means. Set aside the chain sample and the two chain pins removed from chain assembly to remove the two pitch sample.

STOP

Do not remove chain sample from elevator by cutting chain with a torch. Damage will occur to chain assembly left in the elevator and to the chain sample. Due to inaccurate results, ***Rexnord*** will not perform an analysis on chain that appears to have been removed from elevator improperly.

2. Install new (replacement) links in chain assembly to replace worn sample if needed and/or connect carrying and return strands of chain.
3. Contact ***Rexnord Industrial Chain & Conveyor*** for a return material authorization number (RMA) and shipping instructions for chain sample.
4. Ship the two pitch chain sample and the two chain pins set aside in *Step 1*, along with chain history and total hours in operation.
5. Perform any corrective work on elevator as advised in ***Rexnord*** chain analysis report sent back to customer.

Chain Wear Analysis

The following chain analysis information is provided to help maintenance personnel identify normal and abnormal chain wear.

*A few of the more common problems observed in elevators are illustrated, for more information on chain analysis contact **Rexnord**.*

Chain Pins

Normal chain pin wear occurs during articulation of the chain around the traction wheel. A chain pin handling a dry abrasive material will normally wear similar to *Figure 7-3*.

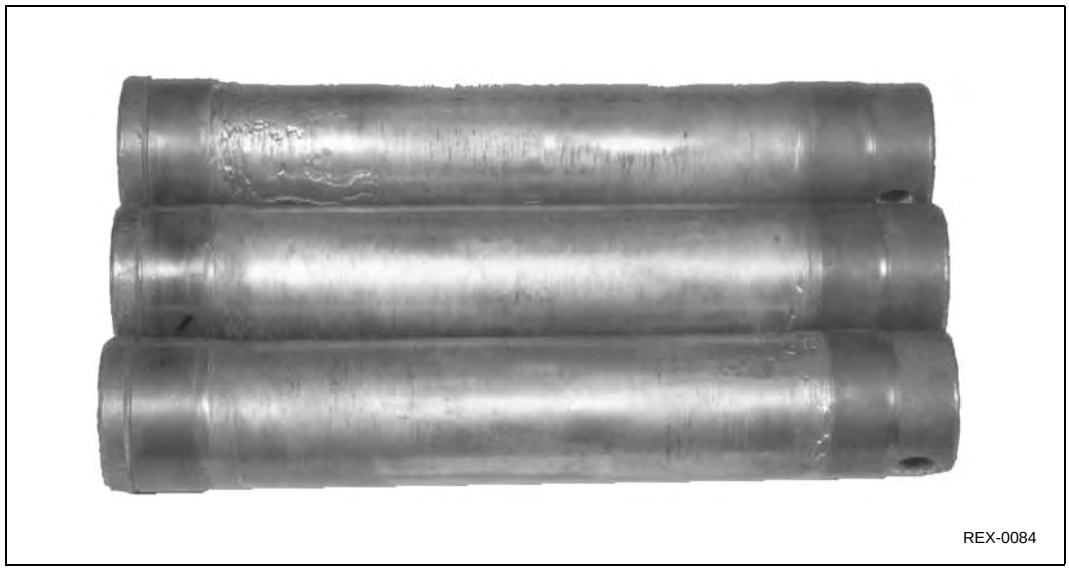


Figure 7-3: Pins With Normal Pin Wear

When taking wear measurements of Outside Diameter of pin for the annual chain

inspection, always measure the pin at the chain joint bearing surface, rotating tool until the maximum wear area is read.

Dry cavitation is erosion of the chain joint bearing surfaces similar to *Figure 7-4*.

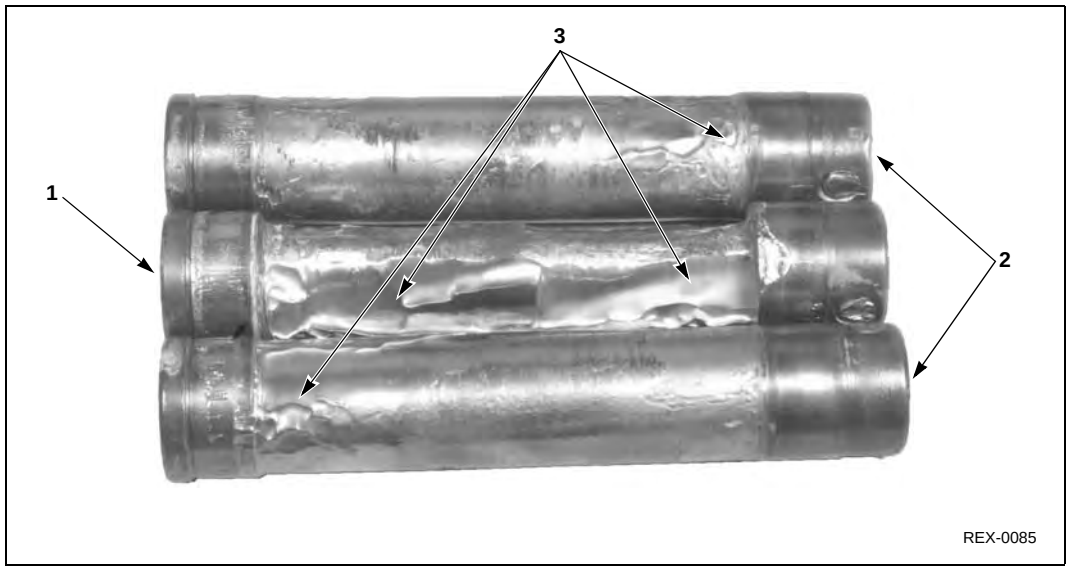


Figure 7-4: Pins Worn by Dry Cavitation

1 – Leading pin
2 – Trailing pins
3 – Areas heavily worn by dry cavitation

Dry cavitation greatly decreases the life of the chain. Dry cavitation is not normal chain wear, but is often observed in elevator chains that are operated regularly with a flooded boot, in powdery abrasive material.

The dry cavitation cycle starts when the boot is flooded with material and the conveyed material enters the chain joint (between the chain bushing and pin). When the chain moves up the carrying side of the elevator, the working force in the chain joint increases, which compresses and forces flow of the material out of the joint. Extremely high wear occurs when the material is forced out of the chain joint. As chain joints wear more material can penetrate the joint in the relaxed state in the boot which accelerates the process.

To eliminate dry cavitation from occurring in an elevator the chain must not be operated through the material being conveyed (eliminate boot flooding). Operation and maintenance personnel must work together to isolate the reason(s) why the boot section is flooding with material and correct the problem(s).

If dry cavitation can not be eliminated because of a design or operation problem that can't be changed, contact ***Rexnord Industrial Chain & Conveyor*** for other options.

Chain Bushings

Normal wear of the inside diameter of the chain bushing occurs during articulation of the chain around the traction wheel. A chain handing a dry abrasive material will normally wear the inside diameter of the bushing similar to *Figure 7-5*.

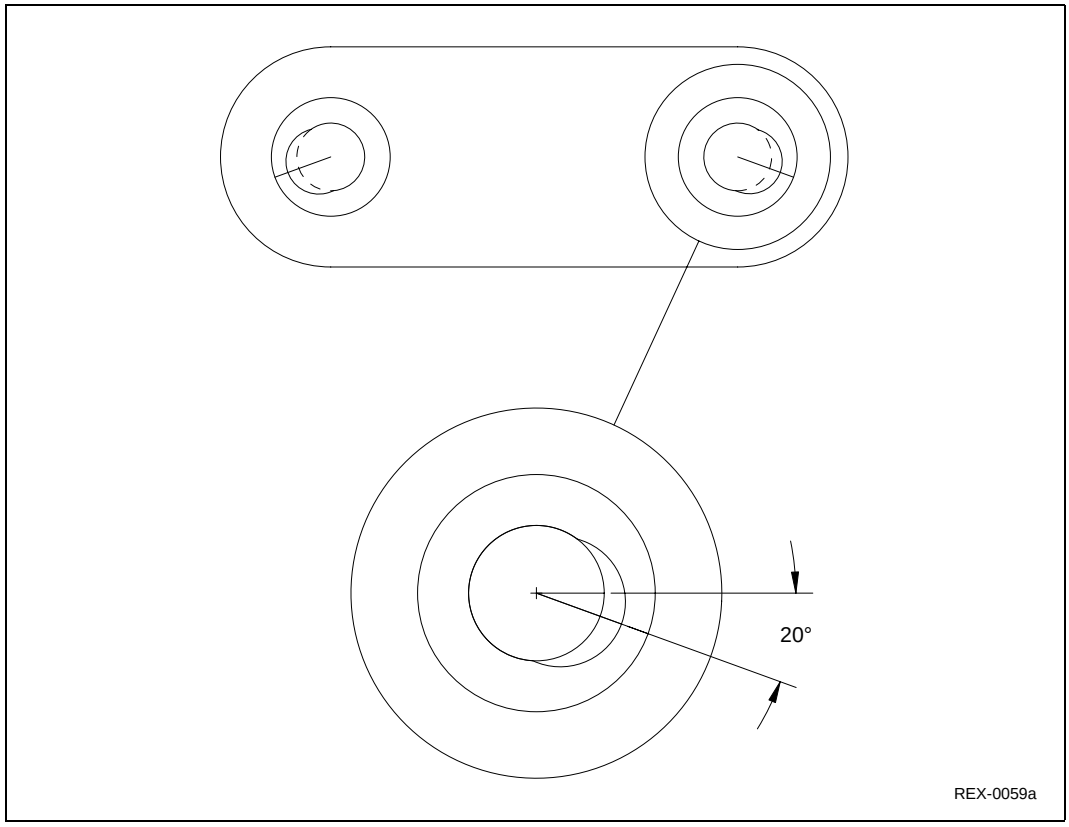


Figure 7-5: Normal Bushing Wear, Inside Diameter

The inside diameter of the bushing does not wear along the chain pitch line but rather below it at about 20° depending on the traction wheel or sprocket diameter.

Keep in mind, when measuring inside diameter of bushing as directed in the annual chain inspection, to rotate measuring tool approximately 20° from the chain pitch line to get an accurate wear reading.

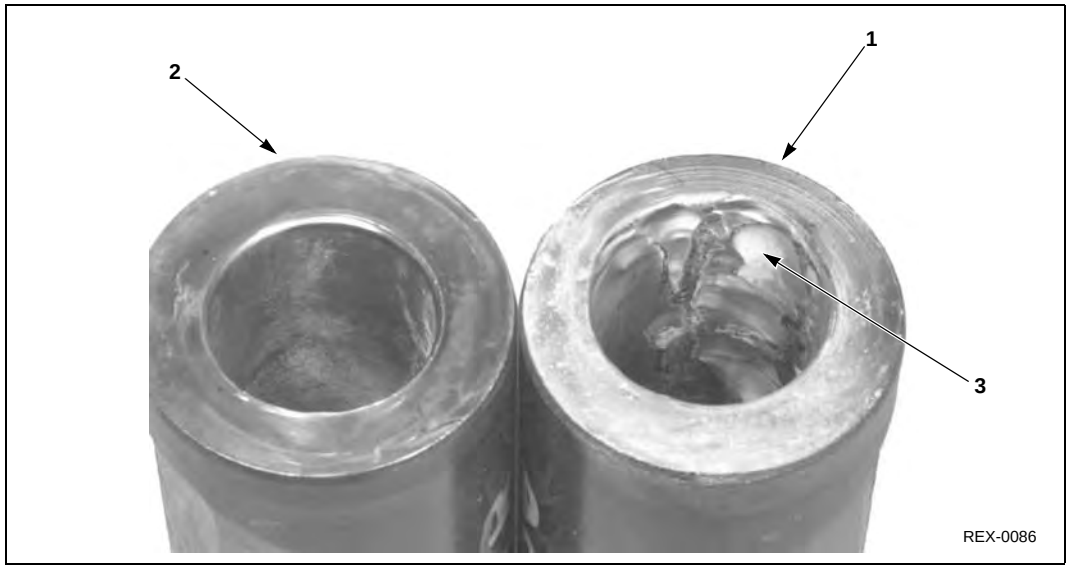


Figure 7-6: Bushing IDs Worn by Dry Cavitation

1 – Leading bushing

2 – Trailing bushing
3 – Heavy wear in bushing ID due to dry cavitation

Normal bushing wear on the outside diameter (OD) occurs due to the interaction with the traction wheels and/or sprockets.

The leading bushing of a block link always wears more/faster than the trailing bushing. The leading bushing wears more because, it contacts the traction wheel or sprocket first, rotating against it as the chain goes from a straight line to an arc.

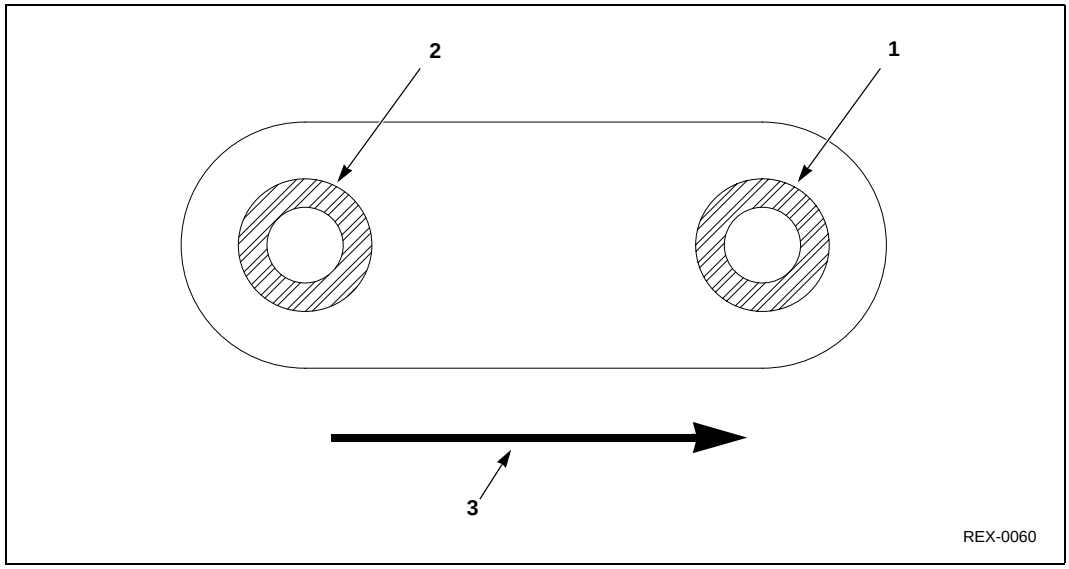


Figure 7-7: Block Link

1 – Leading bushing
2 – Trailing bushing
3 – Direction of chain travel

Bushing wear on the outside diameter does not effect chain elongation. It also does not effect chain strength unless the bushing is worn through the hard face surface and traction wheel or sprocket is allowed to make contact with the chain pin.

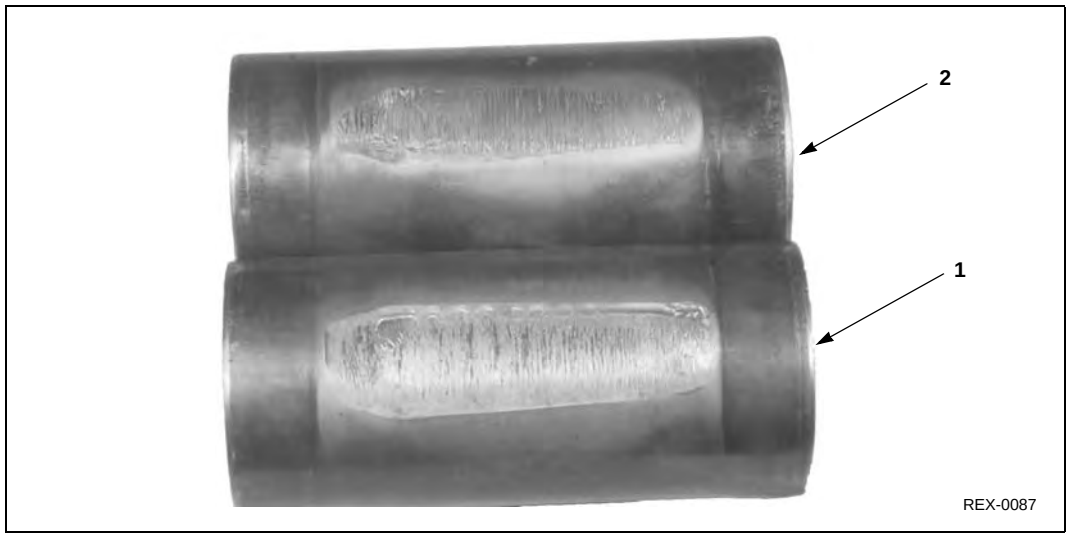


Figure 7-8: Bushing ODs With Normal Wear From Traction Wheel

1 – Leading bushing

2 – Trailing bushing

Figure 7-9: Bushing ODs With Normal Wear From Sprocket

1 – Leading bushing
2 – Trailing bushing

STOP

Operation of elevator with exposed chain pins will result in chain failure. If pins are exposed schedule immediate replacement of chain.

Installing Replacement Chain in Elevator

Replacement chain can be installed in an elevator in a number of ways. The best way depends on the location and access to the elevator.

Rexnord recommends when at all possible, replacement chain be installed through the boot section of the elevator and pulled through the elevator with the old chain strand, on double chain strand elevators in which each bucket is connected to two chain strands the buckets must be removed before the procedure can be followed. In many cases it is easier to remove the buckets from the old chain on single chain strand elevators also. The procedure below covers how to pull new chain into the elevator with the old chain and bucket assembly.

If the old chain and bucket assembly has been removed from the elevator prior to installing the replacement chain follow the procedure *Installing Chain in an Elevator, page 4-27*.

When there is minimal access to the boot section it is possible to install the replacement chain at the head end of the elevator, but the old chain and bucket assembly will need to be removed prior to installing the new chain.

Installation Note

For instructions on installing chain sections at the head end of the elevator follow the directions found in the *Installation* chapter of the manual for the following topics:

- *Pre-assembling Chain and Buckets, page 4-37*
- *Rigging and Lifting Pre-assembled Chain and Buckets, page 4-39*

- *Installing Pre-assembled Chain and Buckets, page 4-41*

Before starting to install elevator chain, the take-up should be positioned at its upper end of travel to provide for maximum adjustment. To accomplish this, tie off the take-up to the lifting beam assembled in the top of the boot section. See *Figure 4-11: Cutaway of Boot – Positioning/Setting Take-up and Guides, page 4-14*.

Customers or contractors planning on pre assembling buckets to chain prior to chain installation must read *Pre-assembling Chain and Buckets, page 4-37* before proceeding. ***Rexnord*** recommends that chain be installed in the elevator first before installing buckets.

To install replacement chain in an elevator, perform the following steps:

1. Secure the old chain and bucket assembly in the elevator so that it can not rotate in the elevator.
2. At the boot section, use a ***Linkmaster*** chain tool to remove a chain pin and separate the return and carrying runs of the chain. Do not separate the chain with the use of a torch. A good chain end is needed so the new chain can be attached later.
3. Two replacement chain sections (shipping lengths) should be connected together just outside the end door under the loading chute in the boot section. To avoid twisting or bending, no more than six meters (twenty feet) of chain should be connected together outside of the elevator during installation. Be sure to orient the chain sections in the proper direction before assembling.

Make sure all chain joints flex freely. This is especially important on double strand elevators were the chain attachments on one chain strand must be aligned and level with the other strand, so the buckets will hang straight/level in the elevator. See *Chain Assembly, page 4-22* for more information.

4. Connect the two replacement chain sections assembled in *Step 3* to the carrying run end of the old chain and bucket assembly at the boot section. Use a ***Linkmaster*** chain tool to install the chain pin. Make sure that the new replacement chain is oriented the same as the old chain.
5. Connect a line between what ever is to be used to pull the old chain and bucket assembly out of the elevator and to the return end of the old chain. Pull the old chain and bucket assembly out of the elevator while pulling new chain into the elevator. Remove the rigging used to secure the old chain and bucket assembly in *Step 1* before pulling chain and bucket assembly. The old chain and bucket assembly pulled from the elevator can be cut off outside the elevator and the line reattached to the remaining chain and bucket assembly in the elevator if space is at a premium.
6. Pull the new replacement chain into the elevator until approximately 1.5 meters (5 ft.) of it is still outside the elevator casing. Be sure that the chain is oriented properly. See the General Arrangement Drawings located under the tab labeled “Drawings” for proper orientation.

Do not feed the chain into the elevator on its side. Prevent the possibility of twist by feeding it in the manner shown in *Figure 4-17: Lifting Chain, page 4-22*.

7. Connect two more shipping sections of replacement chain approximately 6 meters (20 ft) to the end of the replacement chain still outside the boot section.
8. Pull attached replacement chain into the elevator by pulling old chain and bucket assembly out, leaving approximately 1.5 meters (5ft) of replacement chain outside the elevator.
9. Keep performing *Step 7* and *Step 8* until all of the new replacement chain is installed in the elevator.

WARNING
On double chain strand elevators install one chain strand complete before installing the second strand; so no work time is spent under rigged chain. Falling chain can cause personal injury or death.

10. Connect the chain strand halves at the boot section. Hold the chain securely with rigging before proceeding to connect halves. Use a come-along or a chain fall to draw the chain ends together. Install the chain pin using a ***Linkmaster*** chain tool or equivalent. See *Chain Assembly, page 4-22* and *Linkmaster Chain Tools, page 4-26* for more information.
11. Lower the take-up onto the chain making sure the traction wheel(s) or sprocket(s) is/ are positioned on the chain properly.
12. Check the elevator's General Arrangement Drawing for proper height of the foot shaft. The center of the foot shaft should be located within the take-up measurement given on the drawing. The foot shaft should be positioned as close to the upper limit of the take-up measurement as possible without going above. It may be necessary to remove a two-pitch section of chain to achieve the proper foot shaft setting.
13. Remove all rigging used to support the chain before proceeding onto bucket installation.

Installation Note

Rexnord *may ship extra chain with the elevator, it is the contractor's responsibility to install the correct amount of chain to properly position foot shaft as indicated in the General Arrangement Drawings located under the tab labeled "Drawings".*

STOP

Do not mount buckets to the chain until the chain has been completely installed and all connections made in the elevator.

Pre-assembled Chain and Bucket Assemblies

Rexnord provides the option of having the buckets mounted to the chain when purchasing replacement chain and buckets. The buckets can be mounted to the chain with either nuts and bolts or Huck fasteners.

This option is available for elevators with buckets mounted on a single strand of chain only!

STOP

Do not order buckets pre fastened to the chain unless the chain and bucket assemblies will be installed at the head end of the elevator with a crane.

STOP

Buckets designed to be installed on two strands of chain must never be pre-assembled to chain.

STOP

Removal of the old chain and bucket assembly from elevator must be completed before the new pre-assembled chain can be installed. The old chain and bucket strand can not be used to drag in new pre-assembled chain and bucket assemblies at the boot as provided instruction suggests when installing new chain section (without buckets connected).

STOP

Dragging pre-assembled chain and buckets will damage the components. Always move pre-assembled chain and bucket assemblies with a crane and always install them at the head end.

Pre-assembled chain and bucket assemblies from ***Rexnord*** are crated flat with the bucket lips down as shown in *Figure 4-26: Pre-assembling Chain and Bucket Assemblies, page 4-39*. Each crate will contain one or more assemblies. The assemblies will be stacked on top of each other, separated with a sub floor to allow each assembly to lie flat.

For ease of transporting and to safe guard against damage, keep assemblies crated until they are ready to be installed. Unopened crates can be easily moved around the job site with a forklift.

Before opening crated assemblies:

- Move crates in an area where the crane operator can easily view and pick up assemblies without dragging them.
- Make sure crate is oriented properly so bucket lips are facing down as shown in *Figure 4-26: Pre-assembling Chain and Bucket Assemblies, page 4-39*.

For instructions on installing pre-assembled chain and buckets see *Rigging and Lifting Pre-assembled Chain and Buckets, page 4-39* and *Installing Pre-assembled Chain and Buckets, page 4-41*.

Head Shaft Assembly Removal and Replacement

Head Shaft Removal

To remove the head shaft perform the following:

1. Remove the upper head section.
2. Remove approximately 8 to 10 buckets from the chain around the head wheel so chain can be easily supported and disconnected.
3. Remove the upper stop blocks and lift the take-up assembly to its upper end of travel.

Use the take-up lifting beam located inside the top of the boot section to rig from and lift the take-up.

4. Install structural beams across the bearing channels of the lower head section to support the chain. See *Figure 4-21: Preparing Elevator For Chain Installation, page 4-29*.

It is up to the customer/contractor to determine the structural beam size needed to support the chain and how to attach/support it on the elevator.

See Elevator's General Arrangement Drawings for the weight of the chain and buckets

5. Support the chain strand(s) from the beams installed in *Step 4* on the chain's return and carrying runs using come-alongs and/or chain hoists so chain strand(s) can be disconnected.
6. At the head section, use a ***Linkmaster*** chain tool to remove a chain pin (from each chain strand) and separate the return and carrying runs of the chain. Wrap loose ends of chain over beam supporting chain so they are out of the way and can be easily wrapped around segmental rim later. Do not separate the chain with the use of a torch.
7. Disconnect drive from shaft. Remove or disconnect direct connected or shaft mounted drive from the shaft following the manufacturer's instructions or on chain driven units, remove the upper half of the chain guard and separate the drive chain by removing a chain pin.
8. Disconnect the external backstop from the elevator if equipped.
9. Loosen and remove the bearing mounting bolts.
10. Place slings around head shaft and lift out of elevator. Save any shims that were under bearing blocks. Keep the shims from each side separated.

See Elevator's General Arrangement Drawings for the weight of the head shaft assembly.

Head Shaft Replacement

To install the head shaft perform the following:

1. Lift/place head shaft assembly on lower head.
2. Follow the instructions given under *Head Shaft Installation, page 4-15* and *Aligning Head and Foot Shaft, page 4-18*.
3. Wrap loose ends of chain strand(s) back over the traction wheel or sprocket making sure chain is properly seated on the rim.
4. Reconnect the return and carrying runs of the chain strand(s) by using a ***Linkmaster*** chain tool to install the chain pin(s). See *Chain Assembly, page 4-22* for information on installing chain pins into chain sections.
5. Release the tension from the equipment used to support the chain and remove it from the head section of the elevator.
6. Reinstall the upper head section. See *Upper Head Section, page 4-10*.

Foot Shaft Assembly Removal and Replacement

In most cases the foot shaft is only removed from an elevator when the ***NI-HARD*** bearings are replaced. To remove or replace the foot shaft follow the procedure given in *NI-HARD Bearing Replacement, page 7-37*.

Assembling Components to a Shaft

When assembling components onto a shaft, always locate the components by measuring/referencing one end of the shaft only (on a head shaft locate all components from the drive end). See *Figure 7-10*.

STOP

Always reference one end of a shaft only to locate all shaft assembly components to the shaft. Locating components on a shaft using both ends of the shaft or by measuring from one mounted component to another will result in improperly positioned components and operational problems.

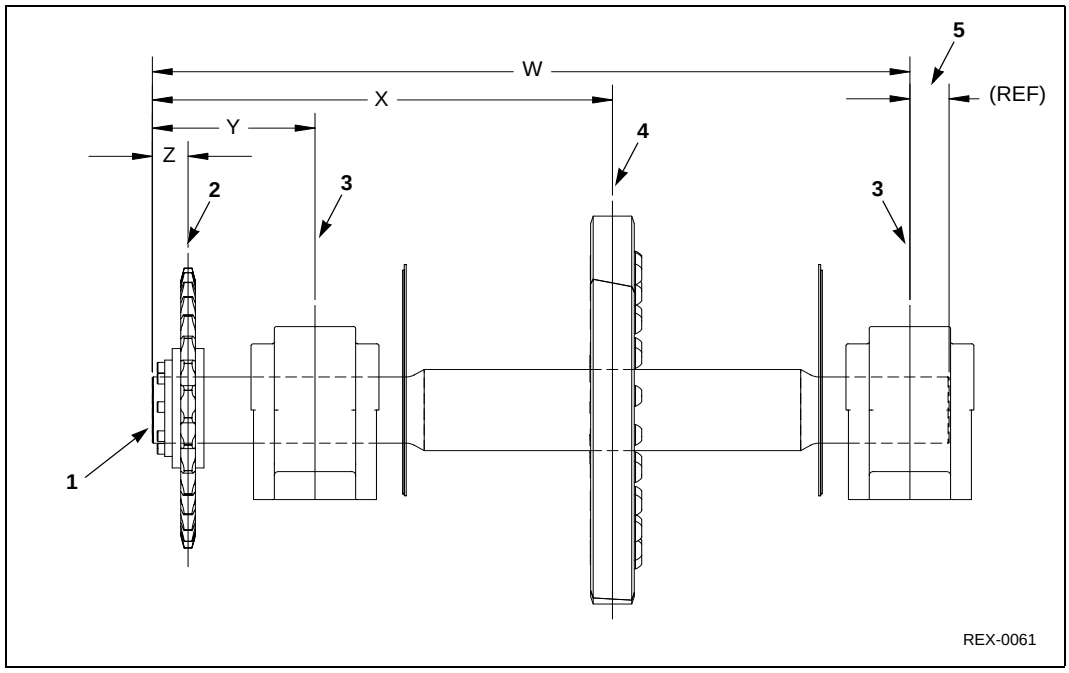


Figure 7-10: Head Shaft Assembly

1 – Set and locate all components by measuring from this end of shaft
2 – Centerline of driven sprocket
3 – Centerline of bearing
4 – Centerline of sprocket or traction wheel
5 – Reference dimension – Do not use to locate components

In most cases it is easier to install the component that is located furthest from the end of the shaft being measured from first, then installing the next furthest component, and the next, until all the components are mounted.

Components which make up a shaft assembly can be mounted to a shaft in a number of ways. Make sure to install the components onto the shaft properly, using the manufacturer's instructions.

a. **Locking assemblies or Taper bushing** should be installed per the manufacturer's instructions.
b. **Gib head tapered keys** used to mount components to shafts must be properly fitted by experienced personnel. Do not drive a Gib head tapered key without first properly fitting it.
c. **Straight keys** should be checked for fit by experienced personnel before being installed. Any set screws or other hardware used to hold a key must be tightened to the proper torque values specified by the manufacturer of the component.

Never weld on shaft. Welding components to a shaft or repairing a shaft by welding will result in shaft failure.

Segmental Traction Wheels or Sprockets

Rex segmental traction wheels and/or sprockets are supplied on ***Rex*** elevators for ease in maintenance. In general the working face (area which makes contact with the chain) of a traction wheel or sprocket will wear out and require its replacement, but the hub should never wear or require replacement. Because of this, a complete ***Rex*** traction wheel or sprocket consists of two main components, a segmented traction wheel rim or segmented sprocket rim (working face) and a body (hub).

The traction wheel or sprocket rim is split into three or more sections which can be easily mounted or unmounted from the body. By splitting the traction wheel or sprocket into two components, a traction wheel or sprocket can be replaced without the need to remove the bearings and disturb the shafting alignment.

The body consists of the hub and a machined area in which to fasten the segmental traction wheel or sprocket. The body is available with either a solid or split hub. Generally, since the hub will never have to be replaced, solid hubs are used on new installations, while the split hub is more convenient for replacement installations. For most situations, ***Rexnord*** recommends using bodies with solid hubs over split hubs.

Segmental rim traction wheels and sprockets are initially fastened with Huck fasteners. The Huck fasteners are tightened with a special hydraulic tool that eliminates initial run-in and retightening operations required of other fasteners used to hold the segmental rims to the body.

The bodies are held in place on a shaft in a number of ways, locking assemblies, Gib head tapered keys or straight keys with set screws. In general, new installations will have bodies that are held to the shaft with a locking assembly.

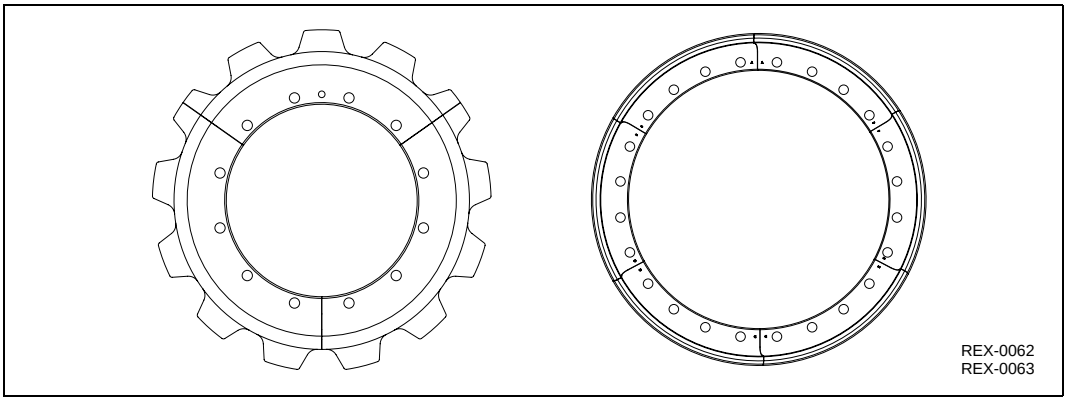


Figure 7-11: *Segmental Rim Sprocket and Traction Wheel*

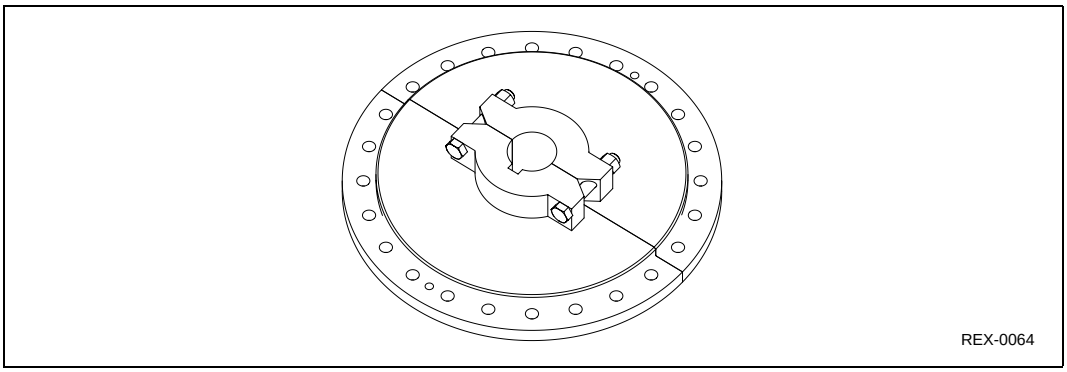


Figure 7-12: *Split Hub*

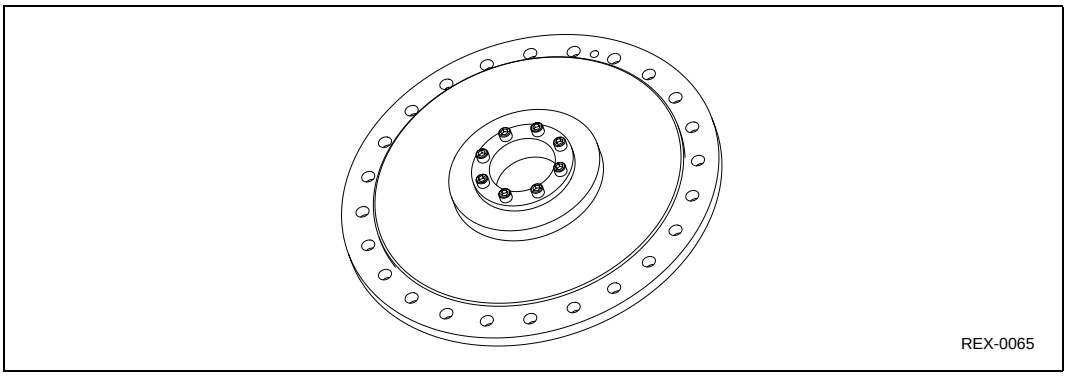


Figure 7-13: *Solid Hub With Locking Assembly*

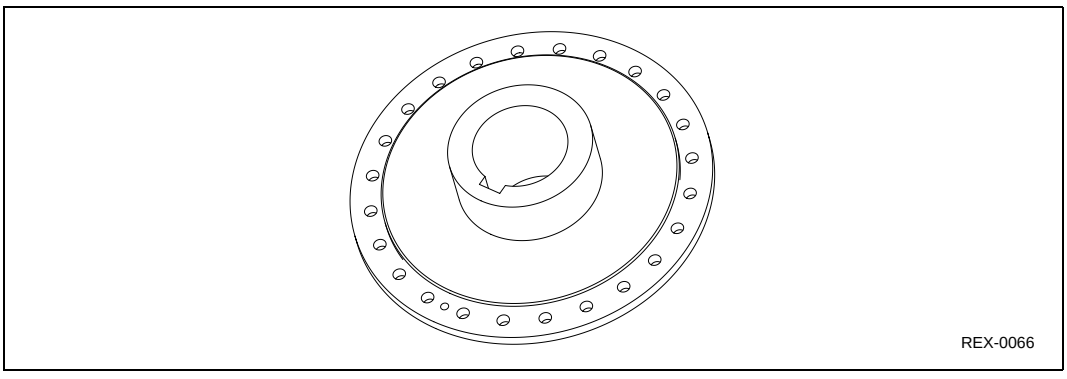


Figure 7-14: *Solid Hub With Tapered Keyway*

STOP

A traction wheel(s) or sprocket(s) located on the head shaft must be changed every time a new chain is installed in the elevator or accelerated wear will result in both the chain and the traction wheel(s) or sprocket(s), decreasing the service life.

Rexnord recommends a traction wheel(s) or sprocket(s) located on the foot shaft be replaced at the least, every other time the chain is replaced.

STOP

DO NOT LUBRICATE A TRACTION WHEEL.

Segmental Traction Wheel or Sprocket Inspection

Inspect Traction wheels and sprockets on a monthly basis.

The working face of a ***Rex*** traction wheel is hardened to extended the service life of the component. See *Figure 7-15*. The hardened surface of the traction wheel is approximately 3 mm (1/8”) deep. When the hardened surface is worn off, the traction wheel must be replaced or rapid wear and failure will be eminent.

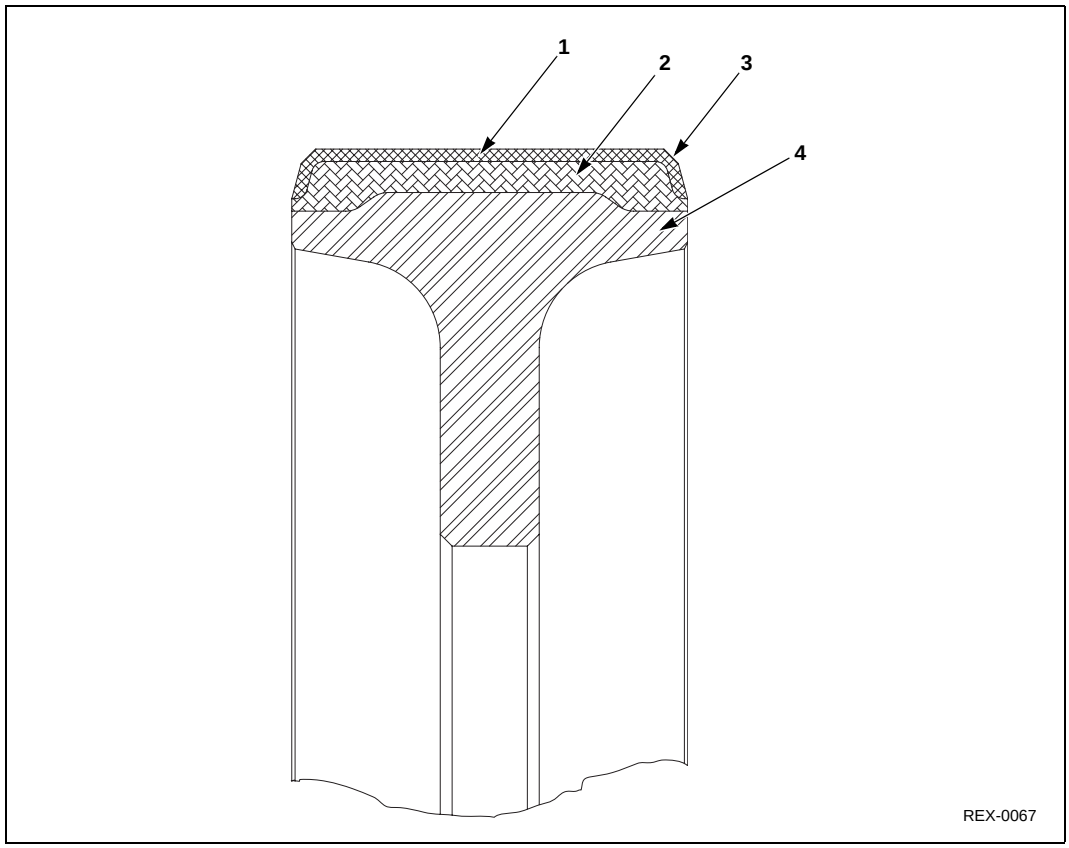


Figure 7-15: Traction Wheel Cross Section

1 – Working surface – Very hard – 3 mm (1/8”) thick
2 – Hard material
3 – Bevel – Wear indicator

4 – Un-heat treated zone material

The working face of a sprocket like a traction wheel is hardened to extended the service life of the component. See *Figure 7-16*. The hardened surface of the sprocket is approximately 3 mm (1/8”) deep. When the hardened surface is worn off, the sprocket must be replaced or rapid wear and failure will be eminent.

When a sprocket starts to show a worn “hooked” tooth pocket, the hardened surface has been depleted and the sprocket must be replaced.

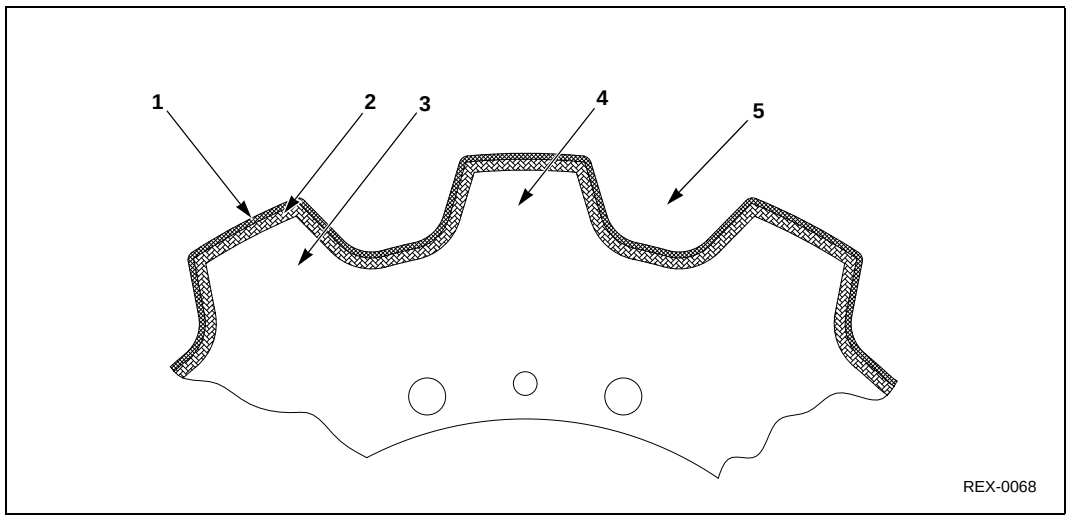


Figure 7-16: Sprocket

1 – Working face – Very hard – 3mm (1/8”) thick
2 – Hard material
3 – Un-heat treated zone material
4 – Sprocket tooth
5 – Sprocket pocket

When inspecting traction wheels and/or sprockets check for the following:

- Excessive wear on the side of traction wheel or sprocket; indicating in many cases misalignment.
- Loose or missing segmental mounting hardware.
- Evidence of body wobbling on the shaft.
- Loose bolts in locking assembly or loose set screws.
- Items specific to Traction wheels (Replace traction wheel rim if any of the following are found):
  a. Rim working face is worn close or past indicator on the side of the traction wheel.
  b. Flat spots on working face of rim.
  c. Evidence of spalling on rim face.
  d. Big chunks broken out of rim face. Note: Small chips missing at the end of segments is normal; traction wheel does not require replacement.
- Items specific to Sprockets (Replace sprocket if any of the following are found):
  a. Tooth wear indicated by “hooking” in the pockets.
  b. Broken or cracked teeth.

Segmental Traction Wheel or Sprocket Replacement Kit

Replacement segmental rim traction wheels or sprockets are sold/supplied as a kit. The kit includes the segmental rim and the Grade 5 fasteners (bolts, nuts, and washers) used to mount them onto the body. See *Figure 7-17* or *Figure 7-18*.

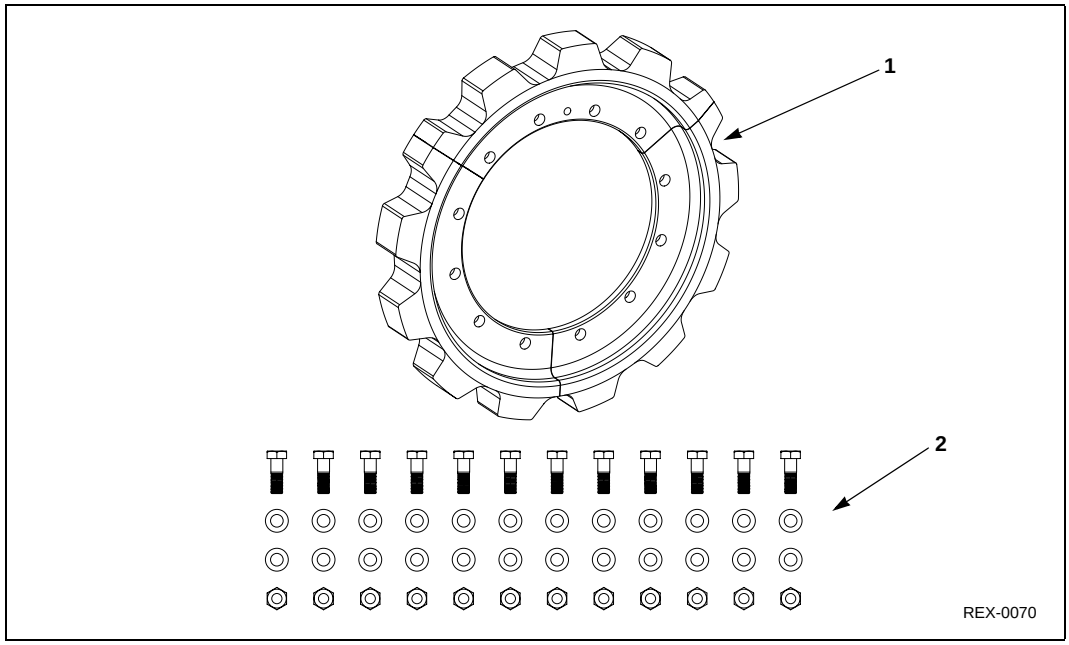


Figure 7-17: Segmental Sprocket Replacement Kit Shown With Standard Fastener Package

1 – Segmental sprocket rim
2 – Hardware kit – Bolts, washers, nuts

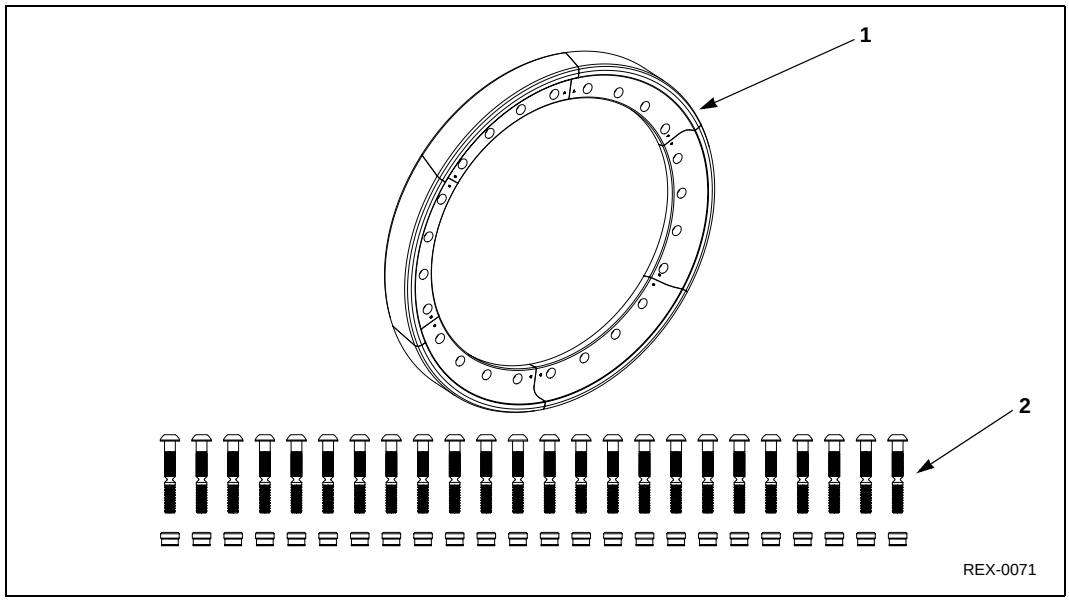


Figure 7-18: Segmental Traction Wheel Replacement Kit Shown With Optional Huck Fasteners

1 – Segmental traction wheel rim
2 – Optional Huck fastener kit – Huck bolts, collars

Upon customer request, ***Rexnord*** will substitute and supply Huck fasteners for the bolts and nuts.

Huck fasteners are used initially to fasten a segmental rim to a body from ***Rexnord****.*

Maintenance Notes

Always keep the segments, of a segmental rim traction wheel or sprocket kit tied together, so segments from one rim are not mixed with another. Segmental rims are cut into segments randomly, however segments of one rim may be very close in size (length) to another rim and therefore not easily rematched.

To provide for ease in replacement of a segmental rim, one rim segment is always fabricated to be a little longer than the others. Using a three segment rim as an example, two of the segments will be very close in length, but the third will be longer. By providing this arrangement, the longer section of the old sprocket can be removed and replaced with one of the shorter segments from the new rim avoiding any wedging and binding of the segments. ***The longer segment of the new rim will always be installed last.***

Segmental Traction Wheel(s) or Sprocket(s) Kit Installation

A segmental rim traction wheel or sprocket must be replaced in its entirety. New segments of a segmental rim must not be installed among used segments or segments from another new rim.

Because the size (outside diameter) of segmental rims varies slightly, the rim segments must be installed in a specific order. To ensure segments are installed properly the segments of a rim are match marked and one segment drilled with a pilot hole. See *Figure 7-19*.

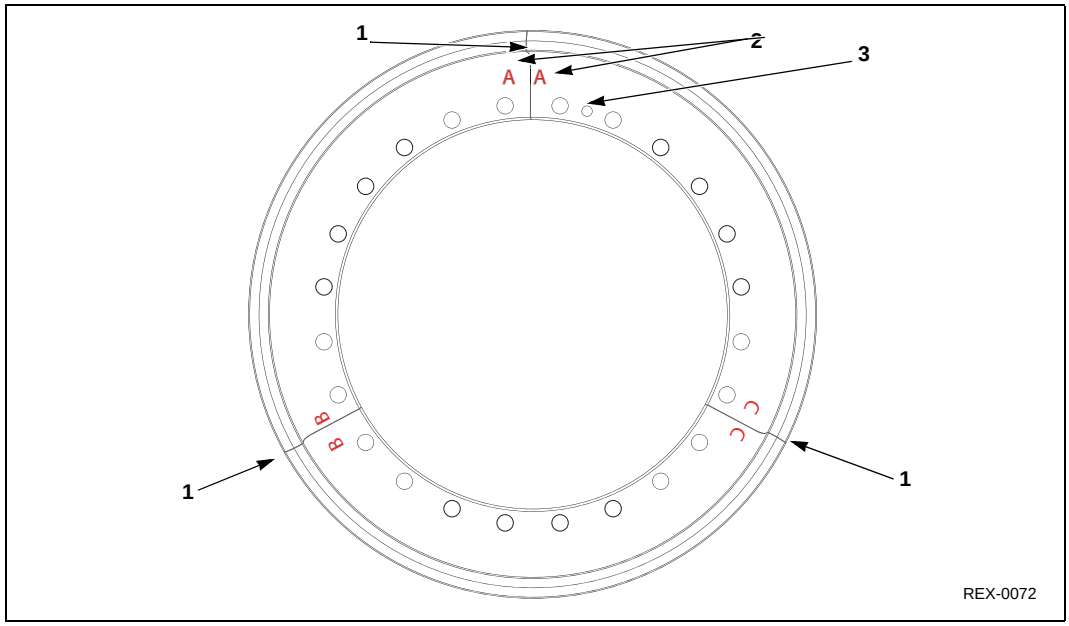


Figure 7-19: Matchmark Sequence

1 – Segmental splits
2 – Matchmarks – On one side only
3 – Pilot hole

STOP

New segmental rim assemblies must be installed as a unit, in its entirety. Each rim segment will be lettered for identification purposes.

The traction wheels or sprockets on a dual strand elevator shaft must be replaced in pairs. Failure to replace both segmental rims located on one shaft will result in uneven chain loads, excessive chain and segmental rim wear, and chain failure.

When installing new traction wheel or sprocket rims on a dual strand elevator shaft, the matchmark/trademark side of each rim must face the same shaft end and the pilot hole in each rim must be directly across from each other. Also the bolt or huck fasteners used to mount the rim to the body must be oriented so the head is against the body flange. See *Figure 7-20*.

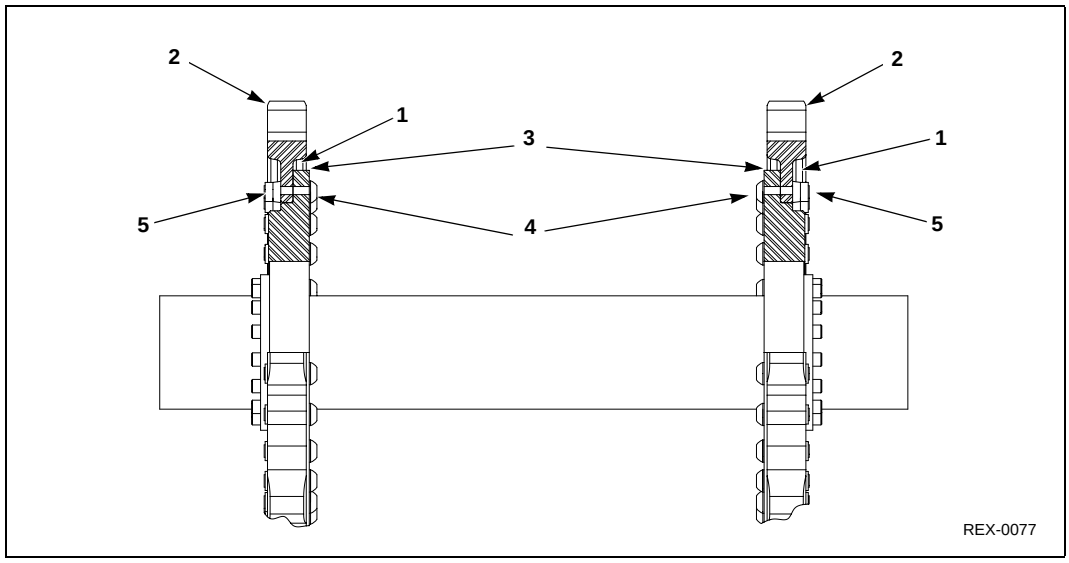


Figure 7-20: Orienting Matchmarks and Trademark to Same End of Shaft

1 – Trademark and matchmark side of split rims facing same end of shaft
2 – Segmental rim
3 – Body flange
4 – Huck bolt
5 – Huck collar

Both ***Rex*** bodies and the segmental rims have a pilot hole. ***Rexnord*** initially assembles the rims and bodies with the pilot holes aligned. Upon replacement of the segmental rims (following proper replacement procedures) the pilot hole between the rim and the body may not be aligned, but on dual chain strand elevators the pilot holes in the segmental rims must be aligned with one another.

STOP

It is imperative that the pilot holes in segmental rims on dual chain strand elevators are properly aligned as well as having the trademark/matchmark letters face the same shaft end.

Before installing replacement segmental rim traction wheel(s) or sprocket(s), it is imperative that the mating (machined) surfaces of the rim flange and the body be free of all foreign materials. The mating surfaces must be cleaned of all materials like grease, oil,

paint, rust preventative coatings, and metallic burrs to insure a good mating of the contact surfaces prior to installation of the fasteners.

Maintenance Note

If Huck fasteners are used to hold replacement segmental rims to bodies: Substitute bolts and nuts for Huck fasteners while installing replacement segmental rims. After all the segments of the replacement rim are in place and spaced evenly around the body, replace the bolts with the Huck fasteners.

The fasteners required for each set of rims must be either Grade 5 or ASTM Grade 325 heat treated fasteners.

Bolt Diameter	Torque Value	
Inches	Nm	ft lb.
5/8	244	180
3/4	433	320
1	962	710

Table 7-D: Segmental Traction Wheel or Sprocket Mounting Bolt Torque Table

It is imperative that the torque value of the segmental rim bolts, as indicated above, be achieved after the new rims are installed (use grade 5 bolts or ASTM grade 325 only).

Installation of Segmental Rims On Foot Shaft

1. Open doors on the sides of the boot section.
2. Remove the upper stop blocks and lift the take-up assembly to its upper end of travel. Use the take-up lifting beam located inside the top of the boot section to rig from and lift the take-up.
3. Cut fasteners holding old rim(s) to body(ies). Cut fasteners from the rim side of the joint so body is not damaged.
4. Bolt the new rim segment with a pilot hole to the body, making sure the pilot hole in the rim and the body are aligned. Snug the mounting bolts at this time.

It is critical that the pilot hole in the segmental rims of a dual chain strand elevator are aligned with one another.

5. Bolt the remainder of the new rim segments to the body, making sure the matchmarks are oriented properly. On dual chain strand elevators make sure the matchmarks of both segmental rims are oriented so they can be seen from one end of the shaft. See *Figure 7-20*.
6. Adjust the segments on the body so that the gap between the segments is even.
7. Tighten the bolts to the proper torque value listed in *Table 7-D, page 7-26* or replace bolts and nuts with Huck fasteners at this time.

8. Lower the take-up onto the chain making sure it engages the chain properly.
9. Remove all equipment used to support the take-up.
10. Reinstall the upper stop blocks into the take-up guides. See *Installing Stop Blocks on Take-up Assembly, page 4-51* for installation and setting instructions.
11. Retighten the segmental rim mounting bolts to the proper torque value in *Table 7-D, page 7-26* after operating the elevator with or without material for 100 hours. After retightening the bolts, prick punch or tack weld the bolt directly beneath the nut. Omit this step if Huck fasteners were used to mount the segmental rims.

If tack welding nut to bolt, DO NOT OVER WELD or hardware failure will result.

Installation of Segmental Rims on Head Shaft by Breaking Chain

1. Perform *Step 1* through *Step 6* under *Head Shaft Removal, page 7-16*
2. Cut fasteners holding old rim(s) to body(ies). Cut fasteners from the rim side of the joint so body is not damaged.
3. Bolt the new rim segment with a pilot hole to the body, making sure the pilot hole in the rim and the body are aligned. Snug the mounting bolts at this time.

It is critical that the pilot hole in the segmental rims of a dual chain strand elevator are aligned.

4. Bolt the remainder of the new rim segments to the body, making sure the matchmarks are oriented properly. On dual chain strand elevators make sure the matchmarks of both segmental rims are oriented so they can be seen from one end of the shaft. See *Figure 7-20: Orienting Matchmarks and Trademark to Same End of Shaft, page 7-25*.
5. Adjust the segments on the body so that the gap between the segments is even.
6. Tighten the bolts to the proper torque value listed in *Table 7-D, page 7-26* or replace bolts and nuts with Huck fasteners at this time.
7. Wrap loose ends of chain strand(s) back over the traction wheel or sprocket making sure chain is properly seated on the rim.
8. Reconnect the return and carrying runs of the chain strand(s) by use of a ***Linkmaster*** chain tool to install the chain pin(s). See *Chain Assembly, page 4-22* for information on installing chain pins into chain sections.
9. Release the tension from the equipment used to support the chain and remove it from the head section of the elevator.
10. Lower take-up and reinstall stop blocks.
11. Reinstall the upper head section. See *Upper Head Section, page 4-10*.
12. Retighten the segmental rim mounting bolts to the proper torque value in *Table 7-D,*

page 7-26 after operating the elevator with or without material for 100 hours. After retightening the bolts, prick punch or tack weld the bolt directly beneath the nut. Omit this step if Huck fasteners were used to mount the segmental rims.

STOP

If tack welding nut to bolt, DO NOT OVER WELD or hardware failure will result.

Installing Segmental Rims On Head Shaft, Without Breaking/Removing Chain

The following procedure can only be used to replace segmental rims on elevators that have inching drives or where there is no inching drive, the input shaft of the reducer can be rotated by hand.

STOP

Never perform the following procedure using the main drive motor or damage to the elevator will result.

There are four subroutines under this procedure. Each subroutine is written for replacing rims with a certain number of segments. The proper subroutine to follow depends on the number of segments in the new rim and the number of segments in the old rim. Count the number of segments, and plug the subroutine that matches the number of segments each rim incorporates into the procedure below.

The following procedure is to be used with all the subroutines found below it:

1. Remove the upper head section.
2. Rotate the elevator with the inching drive or by rotating the input shaft of the main reducer by hand so the rim segment stated for removal in the subroutine step being followed is located under the head shaft and is not engaged with the chain.
3. Remove the first old segment(s) listed in the subroutine by cutting the fasteners holding old rim(s) to body(ies). Cut the fasteners from the old segment(s) and the old segments in proceeding step, from the rim side of the joint so the body is not damaged.
4. Bolt the new rim segment(s) specified in the subroutine in the area(s) where the old segment(s) was/were removed. Initially bolt the new rim segments to the body, do not use Huck fasteners. Snug the mounting bolts at this time. On dual chain strand elevators make sure the matchmark markings are the same (example AB, AB) and the matchmarks face the same end of the shaft on the new segment installed on each body Also make sure the corresponding ends, teeth and/or pilot holes of each segment are aligned with the other.

STOP

It is critical that the pilot hole in the segmental rims of a dual chain strand elevator are aligned with one another.

5. Perform steps 2–4 of this procedure for each step in the subroutine being followed (until all the segments of the new rim(s) are installed).
6. Check/adjust the segments on the body(ies) so that the gap between the segments is even.

7. Tighten the bolts to the proper torque value listed in *Table 7-D, page 7-26* or replace bolts and nuts with Huck fasteners at this time.
8. Reinstall the upper head section. See *Upper Head Section, page 4-10*.
9. Retighten the segmental rim mounting bolts to the proper torque value in *Table 7-D, page 7-26* after operating the elevator with or without material for 100 hours. After retightening the bolts, prick punch or tack weld the bolt directly beneath the nut. Omit this step if Huck fasteners were used to mount the segmental rims.

If tack welding nut to bolt, DO NOT OVER WELD or hardware failure will result.

Subroutine for Replacing 3 Piece Segmental Rim with a New 3 Piece Segmental Rim

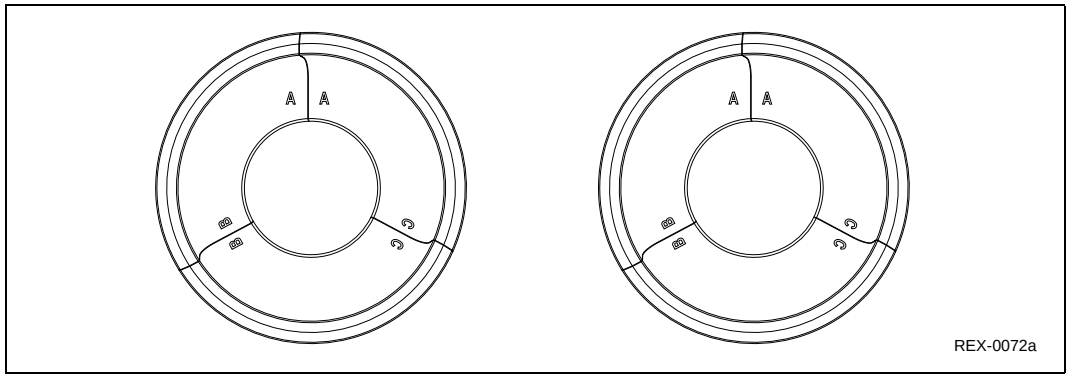


Figure 7-21

1. Remove old segment BC and replace it with new segment CA.
2. Remove old segment CA and replace it with new segment AB.
3. Remove old segment AB and replace it with new segment BC.

Subroutine for Replacing 3 Piece Segmental Rim with a New 4 Piece Segmental Rim

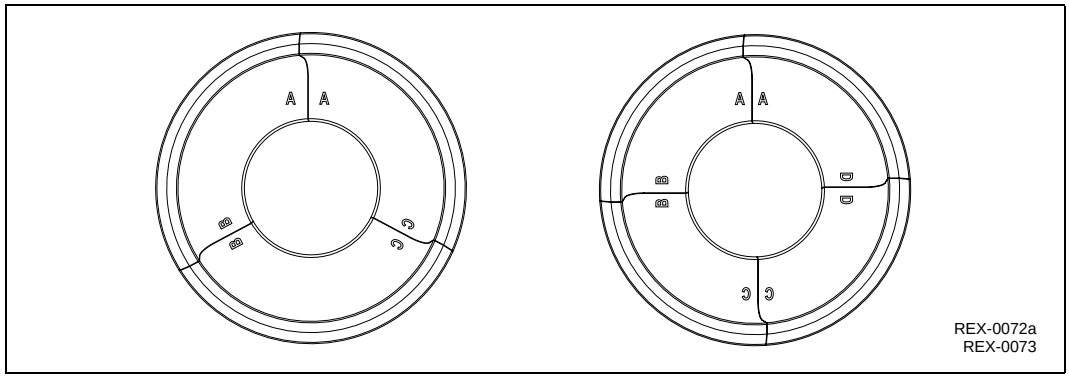


Figure 7-22

1. Remove old segment BC and replace it with new segment CD. Segment CD is much smaller than the old segment, so install segment CD so there are 2 empty holes on one end of the segment and 3 empty holes on the other end.
2. Remove old segment CA and replace it with new segment DA. Butt the “D” ends of

new segments CD and DA together.

3. Remove old segment AB and replace it with new segments AB and BC, keeping the matchmarks of the new segments in sequence.

Subroutine for Replacing 3 Piece Segmental Rim with a New 6 Piece Segmental Rim

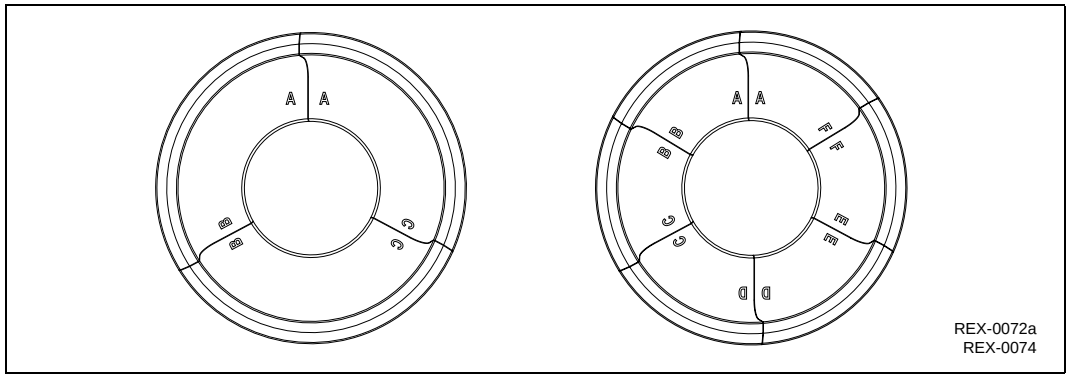


Figure 7-23

1. Remove old segment BC and replace it with new segments FA and AB, butting “A” ends together.
2. Remove old segment CA and replace it with new segment BC and CD. Butt the “C” ends of new segments BC and CD together.
3. Remove old segment AB and replace it with new segments DE and EF, keeping the matchmarks of the new segments in sequence.

Subroutine for Replacing 6 Piece Segmental Rim with a New 6 Piece Segmental Rim

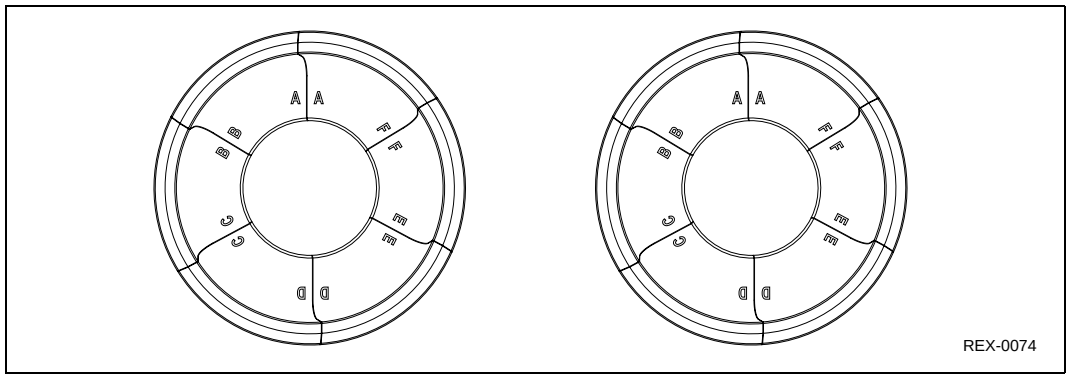


Figure 7-24

1. Remove old segment FA and AB and install new segment FA centrally in the open space.
2. Remove old segment BC and replace it with new segment AB.
3. Remove old segment CD and replace it with new segment BC.
4. Remove old segment DE and replace it with new segment CD.
5. Remove old segment EF and replace it with new segments DE and EF.

Mounting a Segmental Rim Body to Head or Foot Shaft

Bodies are held in place on a shaft in a number of ways, locking assemblies, gib head taper keys or straight keys with a set screws. In general, new installations will have bodies that are held to the shaft with a locking assembly.

Procedure to install a body onto a shaft.

1. Refer to the shaft assembly drawing before installing a body onto a shaft.
2. Slide the body onto the shaft. Orient the body onto shaft as shown on the shaft assembly drawing.

Maintenance Note

It may be easier to correctly position the body on the shaft with the segmental rim mounted to the body, since the locating dimensions on the drawing refer to the center of the segmental rim.

3. Properly position body onto shaft by measuring from the end of the shaft to center of segmental rim.
4. Lock body onto shaft by what ever means it was designed or supplied with.
   a. **Locking assemblies** should be installed per the manufacturer's instructions.
   b. **Gib head tapered keys** used to mount bodies to shafts must be properly fitted by experienced personnel. Do not drive a gib head tapered key without first properly fitting it.
   c. **Straight keys** should be checked for fit by experienced personnel before being installed. After a straight key is installed in a body tighten the set screws to the proper torque value listed in *Table 7-E, page 7-31*.

Setscrew Size	Torque Value	
	Nm	ft lb.
5/8"	130	95
3/4"	180	133

Table 7-E: Hub Setscrew Torque Table

Aligning Bodies Mounted with Locking Assemblies On Double Chain Strand Elevator

On double chain strand elevators only, the bodies must be aligned on the shaft. The bodies used with segmental sprockets require alignment so the sprocket teeth are synchronized (timed) to provide equal pull on both strands of chain. The bodies used with segmental traction wheels also require alignment so a segmental traction wheel set can be aligned properly. Segmental traction wheels are fabricated in matched sets to control run out and "roundness", if the sets are not aligned properly disproportionate tensions and uncontrollable tracking of the chain strands will result.

Although two procedures to align the bodies are provided below, ***Rexnord*** recommends that the first procedure (without segment rims mounted) be used. The first procedure must be used for bodies that will have segmental traction wheels attached.

To align bodies on a shaft, the following equipment is required.

a. Level with an accuracy of 0.1 mm/M or 0.005 in/ft.

Maintenance Note

When checking the level of the shaft and the round stock, the use of a level that is graduated to allow the user to take readings in "millimeters per meter", or "inches per foot", is recommended. Machinists', Mechanics' or Precision levels are such levels with the recommended graduations. Because of limited space around shafting area it is recommended using one of the levels listed above with an approximate length of 150–200 mm (6"–8").

b. Cold finished machined round stock with a length that is a little longer than the sprocket gauge width. Diameter of round stock:
   - — Aligning bodies without segmental rims attached, 5/8", 3/4", or 1" diameter depending on mounting hole size in body. (Rim mounting bolt holes are always in inch dimensions)
   - — Aligning bodies with segmental rims attached, approximately 50 mm (2") diameter.

c. Miscellaneous mechanics tools.

Procedure to Align Bodies without Segmental Rims Installed

1. The bodies and locking assemblies should be oriented, mounted and positioned properly on the shaft as shown on the elevator's Shaft Assembly Drawing. Once the bodies are positioned properly on the shaft, lock one of the bodies to the shaft following the locking assembly manufacturer's installation instructions. The other body should be left loose.
2. The bearings should be properly positioned and mounted securely on the shaft according to the manufacturer's instructions.
3. Level head shaft within ±0.8000 mm/M (≈0.010 in/ft).
4. Rotate loose body so that the pilot hole in that body lines up with the pilot hole in the fixed body.
5. Insert the round stock through the corresponding rim mounting holes of both bodies.
6. Place the mechanics level on the round stock and check for level. Check level with round stock installed in different mounting holes along the bodies.
7. Adjust and tighten down the locking assembly of the loose body so a level reading is obtained through any of the mounting holes between the two bodies.
8. Install Segmental rims. See *Segmental Traction Wheel(s) or Sprocket(s) Kit Installation, page 7-24*. For installation procedure follow steps 7–10 and 15 of procedure *Installation of Segmental Rims on Head Shaft by Breaking Chain, page 7-27*.

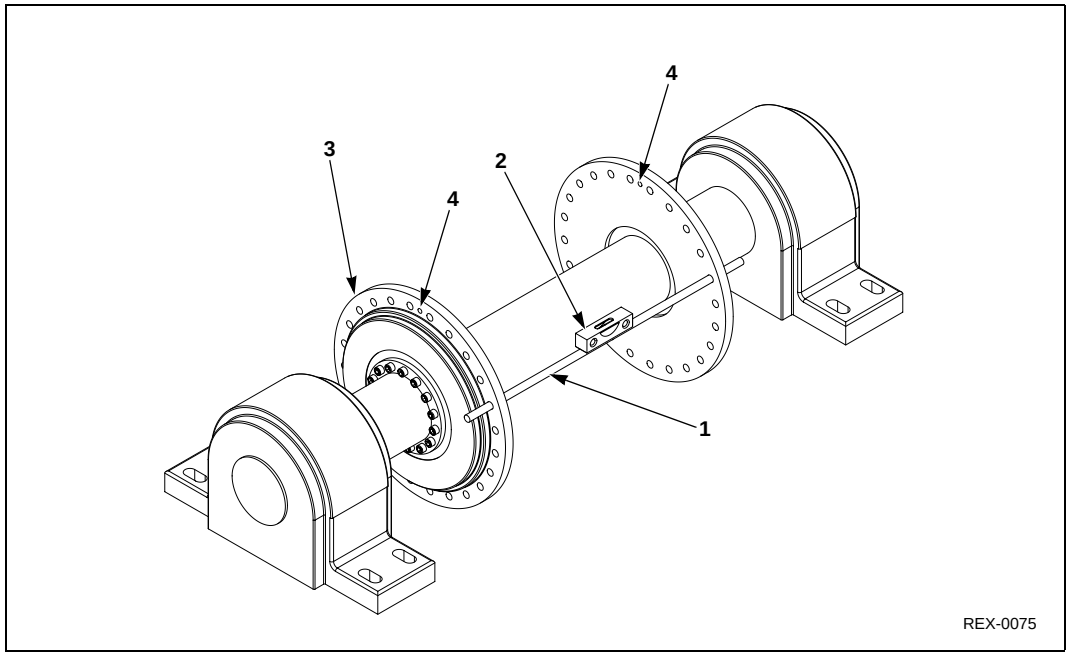


Figure 7-25: Aligning Segmental Rim Bodies on Shaft

1 – Round stock
2 – Level
3 – Segmental rim body
4 – Pilot hole

Aligning Bodies with Segmental Rim Sprockets Installed

STOP

This procedure can be used with segmental sprockets only. Never align bodies with segmental traction wheels attached to the bodies

*If the segmental rims are bolted onto the bodies **Rexnord** recommends removing the rims from the bodies and align the bodies using the procedure outlined above (Procedure to Align Bodies without Segmental Rims Installed).*

1. The bodies and locking assemblies should be oriented, mounted and positioned properly on the shaft as shown on the elevator's shaft assembly drawing. Once the bodies are positioned properly on the shaft, lock one of the bodies to the shaft following the locking assembly manufacturer's installation instructions. The other body should be left loose.
2. The bearings should be properly positioned, and mounted securely on the shaft according to the manufacturer's instructions.
3. Level head shaft within ± 0.8333 mm/M (≈ 0.010 in/ft).
4. Check that the pilot hole in each rim is aligned with the pilot hole in the body to which it is mounted. If the pilot holes are in alignment perform *Step a*, if the pilot holes are not aligned perform *Step b*.

   a. Rotate the loose body so that the pilot hole in that body and rim line up with the

pilot hole in the fixed body and rim. Go to *Step 5*.

b. Rotate the loose body so that the pilot hole in the segmental rim lines up with the pilot hole in the rim mounted to the fixed body. Go to *Step 5*.

5. Place the round stock into the horizontal sprocket tooth pockets of both corresponding segments, tight against the working face radius.
6. Place the mechanics level on the round stock and check for level. Record level.
7. Perform steps *Step 5* and *Step 6* in other tooth pockets around the sprockets, adjusting the loose body so that the best overall level readings can be obtained around the sprockets.
8. Tighten down the locking assembly of the loose body in the position that gave the best overall level reading results.

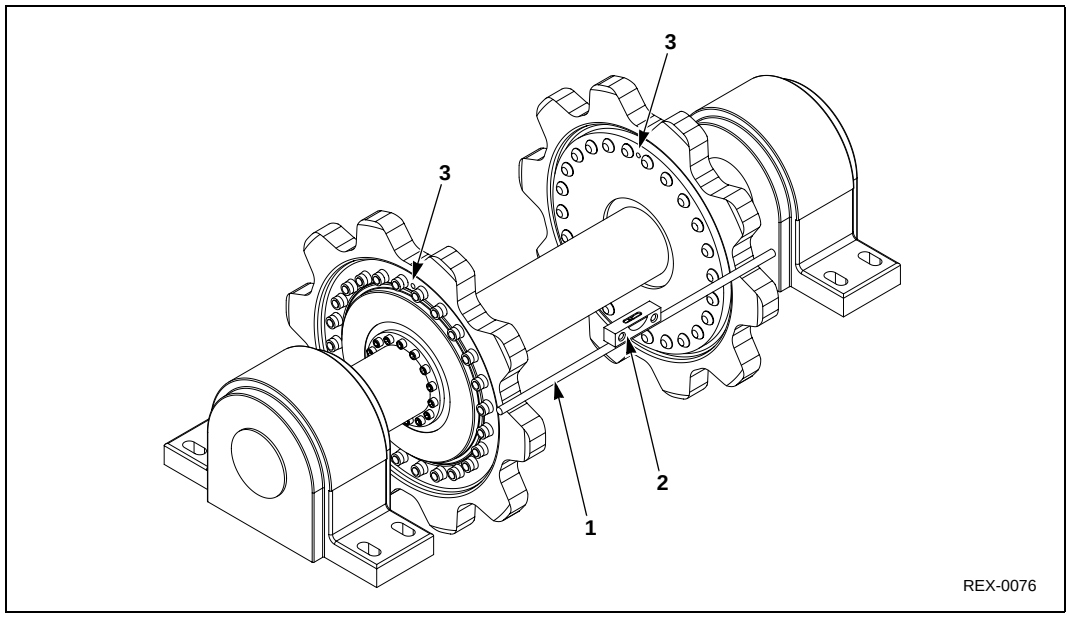


Figure 7-26: Head Shaft Assembly With Rims, Bar, and Level Between Bodies

1 – Round stock
2 – Level
3 – Pilot hole

Head Shaft Bearings

The bearings at the head shaft should be regularly inspected and lubricated, according to the bearing manufacturer's instructions. See *Bearings* tab in *Field Service Manual* for manufacturer's instructions.

To ensure bearings are not impregnated with foreign materials, keep the area around the bearings clean and lubricated. Also keep auxiliary seals lubricated if so equipped.

Regularly Inspect bearings for:

— Cracked housing.

— Temperature.

— Damaged seals.

— Excessive material build-up around bearing/seals.

— Unusual noise.

— Lubrication condition.

Bearing temperature should be monitored and recorded by plant maintenance personnel from the first startup of the elevator. Temperature readings should be kept and compared over the life of the bearing. When noticeable increases in bearing temperature exists the elevator should be shut down and the bearings inspected.

Maintenance Note

After lubrication or relubrication of bearings a slight temperature increase maybe noticed for one to two day.

Never weld on the bearings or housing, or use them as a grounding point when welding, or bearings may be destroyed.

NI-HARD Bearing Inspection

The ***Rex NI-HARD*** bearings are used to support and allow rotation of the take-up shaft within the take-up frame. The ***NI-HARD*** bearings are a very low maintenance item, requiring no lubrication, but should be inspected at least once a year for wear.

NI-HARD bearings require no lubrication! It is normal for a ***NI-HARD*** bearing to squeak during operation.

A ***Rex NI-HARD*** bearing consists of a block and sleeve. The bearing block is bolted to the take-up frame with the opening in the block towards the bottom. The bearing sleeve is held “locked” to the foot shaft geometrically with a “D” shaped blind hole.

Figure 7-27 shows a ***NI-HARD*** bearing block and sleeve in an unworn condition. The ***NI-HARD*** bearing block in the illustration is oriented as it should appear within the elevator.

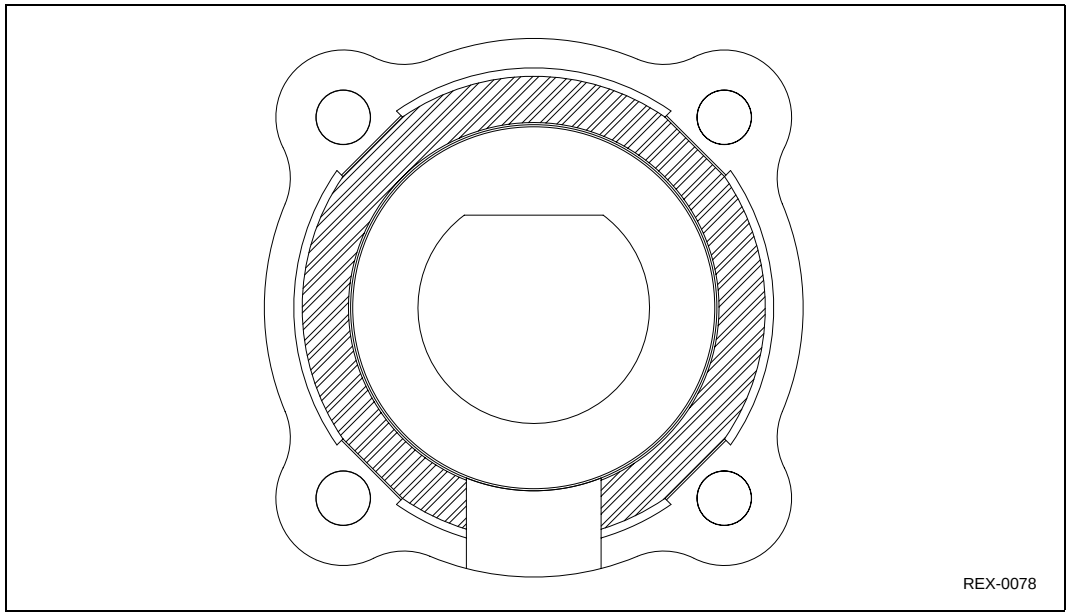


Figure 7-27: *Unworn **NI-HARD** Bearing Block and Sleeve*

Wear occurs between the sleeve and block after many hours of operation. The outside diameter of the sleeve will get smaller and the top flange area of the block will get thinner as shown in *Figure 7-28*.

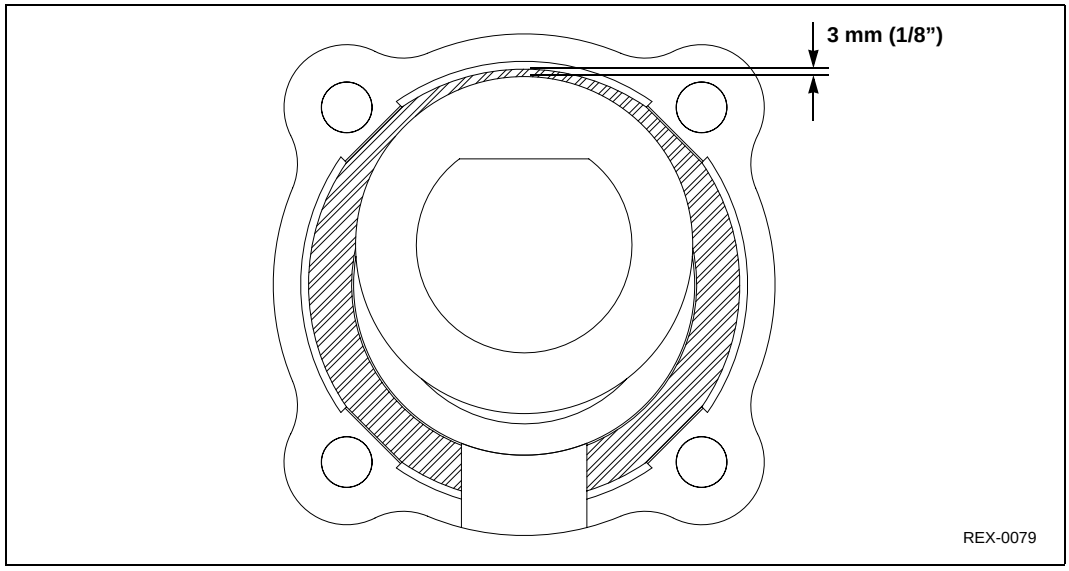


Figure 7-28: *Worn **NI-HARD** Bearing Block and Sleeve*

To inspect the bearing for wear/replacement, measure the top flange area of the block. The sleeve and block must be replaced when the material left at the top flange area of the block is 3 mm (1/8”) or less.

STOP

Do not allow the sleeve to wear through the top flange of the block, doing so can cause the elevator to jam.

Always replace the block and sleeve as a set.

NI-HARD Bearing Replacement

To replace the ***NI-HARD*** bearings, perform the following procedure.

1. Remove take-up assembly as outlined under *Take-up Assembly Removal and Installation, page 7-38*.
2. Support the take-up frame and foot shaft assembly so the bearing blocks can be unbolted.
3. Unbolt the bearing blocks from the take-up frame and slide ***NI-HARD*** bearings and foot shaft assembly out of take-up frame.
4. Remove ***NI-HARD*** bearing blocks and sleeves from foot shaft.
5. Install new ***NI-HARD*** bearing blocks and sleeves on foot shaft
6. Slide ***NI-HARD*** bearings and foot shaft assembly into the take-up frame. Making sure the bearing block is oriented properly before installing in frame. See *Figure 7-27*.
7. Bolt the bearing blocks to the take-up frame.
8. Replace take-up assembly as outlined in *Take-up Assembly Removal and Installation, page 7-38*. For detailed instructions on installing and adjusting the take-up assembly see *Take-up Assembly and Take-up Guide Installation, page 4-11*.

Take-up Assembly and Take-up Guides Inspection

Inspect the take-up and take-up guides monthly for the following.

1. The take-up moves freely up and down between the guides.

If the take-up assembly does not move freely up and down the take-up guides, check for the following below and perform the necessary work needed to correct the problem:

a. Excessive material buildup between take-up assembly and guides.
Remove excessive material from between take-up and guides.

b. Improper spacing between take-up assembly and guides.
To properly position the take-up assembly and guides see *Take-up Assembly and Take-up Guide Installation, page 4-11*.

c. Chain is mistracking on a sprocket or has jumped off the traction wheel or sprocket.
   — Position chain properly on traction wheel or sprocket.
   — Check chain for bent or damaged links and replace any that are found.
   — Check and adjust the position of the upper stop blocks.

2. Wear, corrosion, and bent or broken components.

The take-up and take-up guides wear at the points they make contact with one another. See *Figure 7-29*. The wear can easily be observed from the side doors in the boot. When the flange areas of the take-up and/or guides are excessively worn (worn thin) it is time to

replace the take-up, take-up guides or both.

Damaged or broken components of the take-up or take-up guide must be repaired or replaced before placing the elevator back into service.

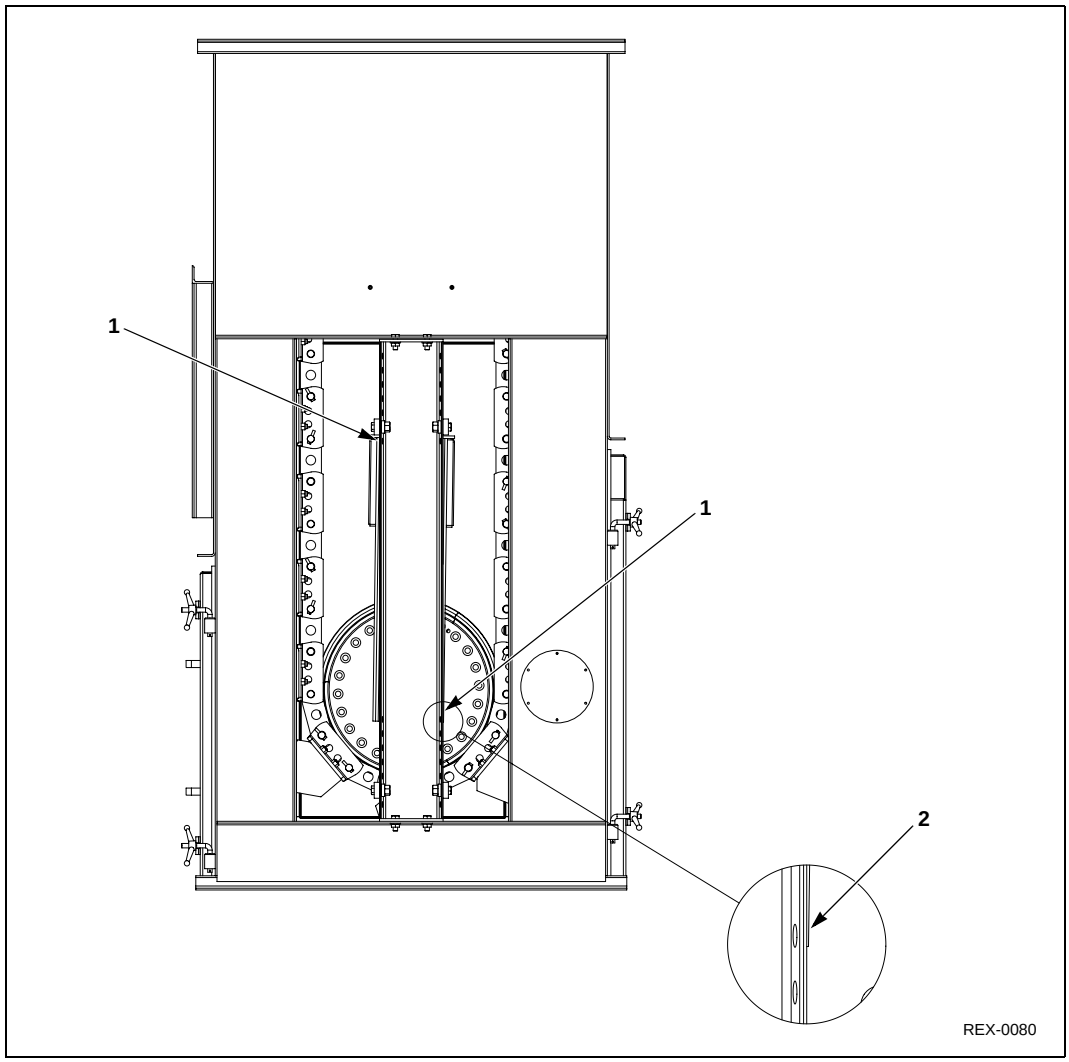


Figure 7-29: Checking Wear Areas of Take-up Assembly

1 – Wear points of take-up assembly
2 – Illustration of take-up frame wearing thin

3. All stop block mounting hardware is tight and the upper stop blocks are properly positioned.

See *Adjusting Stop Blocks on Take-up Assembly, page 7-39* for instructions on properly setting the stop blocks.

Take-up Assembly Removal and Installation

Removal

1. Support the take-up assembly from the lifting beam in the boot section with a chain hoist. See *Figure 4-11: Cutaway of Boot – Positioning/Setting Take-up and*

Guides, page 4-14

2. Mark the position of one of the take-up guides within the door frame of the boot section.
3. Unbolt and remove the take-up guide marked in step 2 from the door of the boot section.
4. Remove take-up assembly from the boot section of the elevator.

Installation

To install the take-up, perform steps 1-4 in the removal section above in reverse order. For detailed installation instructions and adjustments of the take-up and guides, see *Take-up Assembly and Take-up Guide Installation, page 4-11*.

Adjusting Stop Blocks on Take-up Assembly

The stop blocks should be checked for mounting hardware tightness and proper clearance between stop blocks and take-up monthly. Elevators operating in very harsh conditions may require more frequent checks.

Upper Stop Blocks

During normal operation the chain will elongate over time due to wear, which in turn will lower the take-up in the boot.

Periodically adjust the upper stop blocks to sustain the proper gap of 6–25 mm (1/4”–1”) between the take-up and stop blocks.

Excessive gap between upper stop blocks and take-up will allow chain to disengage from traction wheel or sprocket. Damage to chain and bucket assembly, take-up and take-up guides will result as chain and bucket assembly swings wildly within elevator boot.

Lower Stop Blocks

The lower stop blocks once installed properly on the take-up guides do not require adjustment, however the stop block mounting hardware should be checked for tightness when the upper stop blocks are being checked or adjusted for proper clearance.

Take-up assembly must never be allowed to set on lower stop blocks when in operation. If take-up assembly is close to lower stop blocks, chain links must be removed from elevator.

Backstop Maintenance and Removal

Maintenance

The backstop should be maintained as stated in the manufacturer’s literature, which can be found under the drive assembly tab in the ***Rexnord*** *Service Manual*.

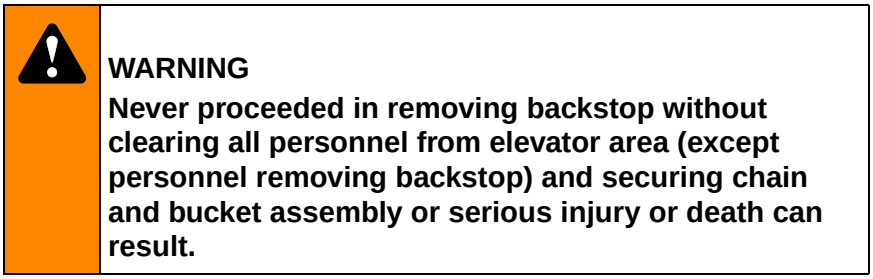
In addition to the manufacturer's recommendations, backstops should be visually checked during the elevators monthly inspection for the following:

- Backstop is securely and properly mounted on head shaft or drive reducer.
- Loose or missing hardware.
- All guarding is in place and secure.
- Proper lubrication.
- Build up of material on or around the backstop.
- Proper clearance around torque arm support brackets.

Removal

To remove the backstop from an elevator perform the following steps

1. Empty all elevator buckets.
2. Tie off chain and bucket assembly so it is secure and all the pressure is relieved on backstop.
3. Remove backstop as instructed in the manufacturer's instructions.



Drive Unit Maintenance and Removal

Maintenance

The drive unit should be maintained as stated in the manufacturer's literature, which can be found under the Drive Assembly tab in the ***Rexnord*** *Service Manual*.

In addition to the manufacturer's recommendations, drive unit should be visually checked during the elevators monthly inspection for the following:

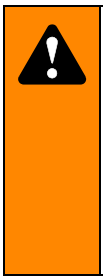
- All the components are lubricated properly.
- No lubricant is leaking from any of the components.
- All component fasteners are secured and all safety guards are in place.
- Breather plug(s) in reducer(s) are not clogged.
- No unusual noise or vibrations coming from any of the components.
- None of the components are excessively hot.

Never weld on the drive, or use the drive unit as a grounding point when welding, or bearings and/or gearing may be destroyed.

Removal

To remove the drive unit from an elevator perform the following steps

1. Empty all elevator buckets.
2. Tie off chain and bucket assembly so it is secure and all the pressure is relieved on drive unit.
3. Remove drive unit as instructed in the manufacturer's instructions.



WARNING

Never proceed in removing drive unit with integrated backstop without clearing all personnel from elevator area (except personnel removing drive unit) and securing chain and bucket assembly or serious injury or death can result.

Drive Chain and Sprockets Maintenance

The drive chain should be inspected during the elevators monthly inspection. Check the drive chain for:

a. Check chain sidebars and sprocket sides for evidence of misalignment.
b. Check chain for missing pin-locks or cotters.
c. Check sprockets for hooked or broken teeth.
d. Proper lubrication.

Belt and Sheave Maintenance

The belt(s) and sheaves should be checked monthly for the following and any deficiencies corrected before operating equipment:

a. Damaged guard or interference between guard and the sheaves or belt
b. Any worn bearings, leaky seals or bent shafts in area which could effect belt and sheaves performance.
c. Damaged or worn belt(s).
d. Damaged or worn sheaves.
e. Oil or grease on sheaves and belt(s).
f. Belt(s) are properly tensioned.

Motion Sensor Maintenance

The motion sensor switch should be checked during the annual inspection for:

a. motion sensor probe is in good condition and positioned properly.
b. Wiring to the motion sensor switch is all connected and in good condition.
c. Check motion sensor is adjusted properly to operating speed.
d. Check all interlocks work properly when the motion sensor switch is activated.

Boot Flood Switch Maintenance

The boot flood switch should be checked during the annual inspection for:

a. Diaphragm is in good condition.
b. No binding occurs when diaphragm is pushed in or left to return.
c. Wiring to switch is in good shape.
d. Check all interlocks work properly when switch is activated.

Belt Wander Switch Maintenance

The wander switch should be checked during the annual inspection for:

a. Roller or plunger pad in good shape and roller rolls freely.
b. Wiring to switch is in good shape.
c. Check all interlocks are working properly when switch is activated.

Foundation

The area around the foundation must be kept clean of debris and material. A dirty foundation area is a safety hazard to personnel and equipment.

- Materials left to pile on foundations can lead to the erosion, and/or corrosion of the foundation and anchor bolts.

Care must be taken not to damage foundation when using power equipment and machinery to clean around foundation.

- The concrete pad or steel supports on which the elevator is installed should be checked periodically for erosion, chipping, cracking, and/or corrosion. If the foundation is observed to be in poor shape, the foundation must be repaired or replaced.
- If the foundation must be repaired or replaced, steps must be taken to support the elevator and hold it in alignment, while the foundation is being worked on.
- Do not operate elevator while working on the foundation.
- The anchor bolts' position and projection must be as shown in the General Arrangement Drawings located under the tab labeled "Drawings". If location of anchor bolts is not correct, this situation must be remedied at once.
- The housing, shafting, and drive alignment must be checked and corrected before placing elevator back into service.
- The anchor bolts should be imbedded in the concrete at least several days before restarting the elevator.
- Periodically check anchor bolt nuts for tightness. Two nuts should always be placed on each anchor bolt.

Housing (Boot, Intermediate Casings, Collars, and Head)

Rex bucket elevators are self-supporting but not free standing. This means that the

elevator requires lateral supporting to keep it in an align vertical position, but all of the load (elevator components and material weight) is supported through the elevator casings and transferred into the foundation.

Periodically the housing must be checked for structural damage (holes, heavy wear, heavy corrosion and evidence of interference), if any of these are observed the structural integrity of the elevator may be compromised and the elevator could collapse.

If any of the structural components are observed to be in need of repair or replacement, the elevator should be removed from the production circuit immediately and ***Rexnord*** consulted.

When inspecting the elevator pay particular attention to:

- *Boot Section, page 7-43*
- *Intermediate Casings and Collars, page 7-44*
- *Platform, Grating, Handrails, Ladders, Safety Cage, and Hoist Frame, page 7-45*
- *Upper and Lower Head Sections, page 7-44*

Do not cut holes in any of housings unless instructed in writing by ***Rexnord***. Cutting holes in the housing can weaken the elevators structure and cause it to fail.

Boot Section

- Periodically clean out and inspect the boot section for material leakage and wear.
- Remove built up material from the sides of the boot section and also clean out any material lying in the bottom.

Material left in the bottom of the boot section will eventually draw moisture or settle, getting very hard. This material, if left in the bottom of the boot section, will prematurely wear and damage the chain and bucket assembly.

- Inspect all seals around all doors, removable panels and flanges for signs of leakage. Repair any latches, hinges or seals that are worn or missing.
- Inspect boot section for wear, damage and corrosion. Pay special attention to the corner angles. If the boot section and especially the corner angles are observed to be in poor shape, immediately remove the elevator from operation and consult ***Rexnord*** on how to repair or replace.
- Inspect liner plates, replace any liner plates that are worn, damaged or missing. Check that all liners are securely fastened in place, repair any that are loose.
- If equipped, inspect loading legs for interference with chain and bucket assembly, wear, damage and corrosion.
- If evidence of interference is observed between loading legs and chain and bucket

assembly check for the following:

— Damaged chain and bucket assembly.

— Improperly positioned take-up guides.

— Bent or worn take-up frame and take-up guides.

— Worn take-up bearings.

— Worn sprockets.

Intermediate Casings and Collars

- Periodically clean and inspect the intermediate casings for structural damage, holes, corrosion and evidence of interference.
- Pay particular attention for damage to the corners, crimped beads and flange angles. If any of the preceding are damaged remove the elevator from production and consult ***Rexnord***
- Inspect casing flanges for signs of material leakage. If leakage is observed, inspect the casing for the following and repair problematic items:

  — No sealing compound used between flanges.

  — Flange bolts are loose.

  — Structural damage to casing flange angles. Consult ***Rexnord*** if observed.

Securing the flange bolts. ***Rexnord*** *recommends that site personnel fasten bolts using the 'Turn of the Nut' tightening technique, as bolt tension and not torque, create the safest connection. Bolts are installed in all holes of the connection and brought to a snug tight condition; that is when the mating flanges or plies of the joint are in firm contact. Snug tightening progresses systematically from the most rigid part of the connection to the free edges until all bolts in the connection are fully compacted. Following this operation, all bolts are tightened further another 1/3 turn, progressing again from the most rigid part of the joint to it's free edges.*

Lateral Support Bracing

- Clean and inspect all lateral support bracing.
- Make sure there is a gap between the lateral support bracing and the elevator and that the gap is free of debris and material allowing the elevator to expand.
- Inspect all welds and hardware holding the lateral support together. Make sure all welds are not cracked and all the hardware is not loose or missing. Repair any cracked welds and loose or missing hardware.
- If lateral support bracing is found to have cracked welds, or loose or missing hardware, casing alignment should be checked. See *Intermediate Casings, page 4-3* and *Aligning Head and Foot Shaft, page 4-18* for alignment instructions.

Upper and Lower Head Sections

- Periodically clean and inspect the head sections for material leakage and wear.

- Remove built up material from the sides and discharge areas of the head section and also clean out any material lying in the bottom on elevators with pant leg casings.
- Inspect all seals around all doors, removable panels and flanges for signs of leakage. Repair any latches, hinges or seals that are worn or missing.
- Inspect the head section for wear, damage and corrosion. Pay special attention to the corner angles. If the head section and especially the corner angles are observed to be in poor shape, immediately remove the elevator from operation and consult ***Rexnord*** on how to repair or replace.
- Inspect liner plates, replace any liner plates that are worn, damaged or missing. Check that all liners are securely fastened in place, repair any that are observed loose.

Platform, Grating, Handrails, Ladders, Safety Cage, and Hoist Frame

- Periodically clean and inspect any and all platforms, grating, handrails, ladders, safety cages and hoist frames.
- Inspect platform for loose, missing or damaged grating, hardware, and structural steel. Rope off any problematic areas following proper safety procedures and repair and/or replace grating immediately.
- Inspect handrails for loose hardware or cracked welds holding the handrails together. Also inspect for any damage and/or heavy corrosion which would make the railing unsafe. Rope off any problematic areas of handrail following proper safety procedures and repair or replace immediately.

Primary Recommendations

The primary recommendation is that the entire bucket elevator material should be stored in a dry, heated and humidity controlled building. Preferably, where the temperature is controlled between 10º–40ºC (50º–120ºF) and the maximum relative humidity is below 60%. All material is to be blocked off the floor.

After placing material in building, the following procedures should be adhered to:

1. Initially all machined surfaces should be inspected and given a liberal coat of film forming type rust inhibitor compound or wax-type protective coating as and where needed to prevent rusting. Once per month thereafter machined surfaces are to be reinspected and protective coating should be reapplied as needed.

2. On a monthly basis, the headshaft bearings are to be rotated manually to spread lubricant over the bearing surfaces and to prevent possible brinelling. Time alone causes a certain deterioration in the grease. Therefore it is recommended to replenish or replace the grease before placing headshaft bearings into initial operation and/or after one year in storage.

3. Most new reducer units are furnished with a rust preventative oil that will protect parts against rust for a period of twelve months when stored in a dry building after shipment from the factory. See the reducer manufacturer's instructions to verify that the reducer has been prepared for storage. If reducer has not been preparedly for storage or the unit will be stored or inactive beyond the above period, follow the manufacturer's instructions to prepare the reducer for long term storage.

   If there are no manufacturer's instructions on how to prepare the reducer for long term storage prepare reducer as follows: The reducer unit is to be completely sealed. All gauges, oil drain plugs, and filler plugs are to tightly snugged up in place. Air vents are to be sealed with pressure sensitive tape or the opening in the unit closed with a plastic plug. Grease bearings and seals. Apply pressure sensitive tape around the dipstick; around the shafts; and against the seal housing of the labyrinth seals. Spray all internal parts with a rust preventative oil that is soluble in lubricating oil or add "Motorstor" vapor phase rust inhibitor. On a monthly basis, inspect the reducer unit, manually rotate shafts, and spray or add rust inhibitor if necessary.

   Before operating, the reducer must be filled to the proper level with a fresh oil meeting the specifications of the unit. See manufacturer's instructions contained in the ***Rexnord Field Service Manual***.

4. Holdback units or Backstops are shipped without lubricant but do contain one ounce of Motorstor vapor phase rust inhibitor which will protect internal parts against rust for a period up to six months.

   If the backstop is to be stored or inactive for more than six months, add the recommended amount of lubricant indicated in the manufacturer's instructions contained in the ***Rexnord Field Service Manual*** and add one ounce of Motorstor every additional six month period.

   Indoor dry storage is recommended. If outdoor storage is necessary, cover the backstop with tarpaulin or suitable covering.

   Before placing backstop in operation drain lubricant mixture and replace breather and

oil sight gauge, if removed. Flush backstop and refill with clean, fresh lubricant.

5. Motor shafts are to be rotated manually every month. Add grease to the bearing cavity every six months allowing some of the existing grease to be purged. At time of removal from storage or after one year in storage, completely replace the existing grease in the bearing cavity with new fresh grease.
6. All chain parts must be given a liberal coat of slush oil when first placed into storage and then on a periodic basis to prevent rusting in the chain joints.
7. All boxed material should be opened and inspected for proof of shipment and then resealed. Boxed material can be stacked if storage space is at a premium.
8. All painted structural material should be inspected for rust or corrosion and retouched if required.

Secondary Recommendations

If indoor storage for the entire bucket elevator is impractical, then the material can be stored as follows:

This procedure can also be used for short term storage.

1. The following material must be stored inside, per instructions given in primary recommendations above: field box material; all chain; motors; reducer units; and buckets (if customer prefers not to paint them)
2. The following material can be stored outside on a well drained surface, preferably paved or crushed stone, and all items must be blocked off the ground:
   a. Intermediate Casings: The insides of casings are to be given a coat of paint both on inside and outside of entire casings. The casings are to be stored in an upright position (on flanged end).
   b. Head Sections and Boot Sections: Follow paint instructions as given in *Step 2*a above. All machined surfaces should be given a liberal coat of film forming type rust inhibitor compound or wax-type protective coating as needed to prevent rusting. Follow primary recommendations instructions contained in *Step 2* for the head shaft bearings and *Step 4* for hold back unit. Both head section and boot section are to be stored in a upright position. Do not stack.
   c. Buckets: All buckets should be prime painted and then rebanded on same shipping pallets. Pallets can be stacked two high if space is a problem.
   d. Platforms: Grating, handrailing, chain guards. This material is shipped banded, crated or in some cases in loose pieces. This material can be stored in its present condition as long as material is blocked off the ground.
   e. Periodically inspect all of the material for rust or corrosion and maintain as required.

   If the storage recommendations outlined in *Primary Recommendations, page 8-1* and *Secondary Recommendations, page 8-2* are followed, we are confident that the integrity of the bucket elevator material will be maintained.