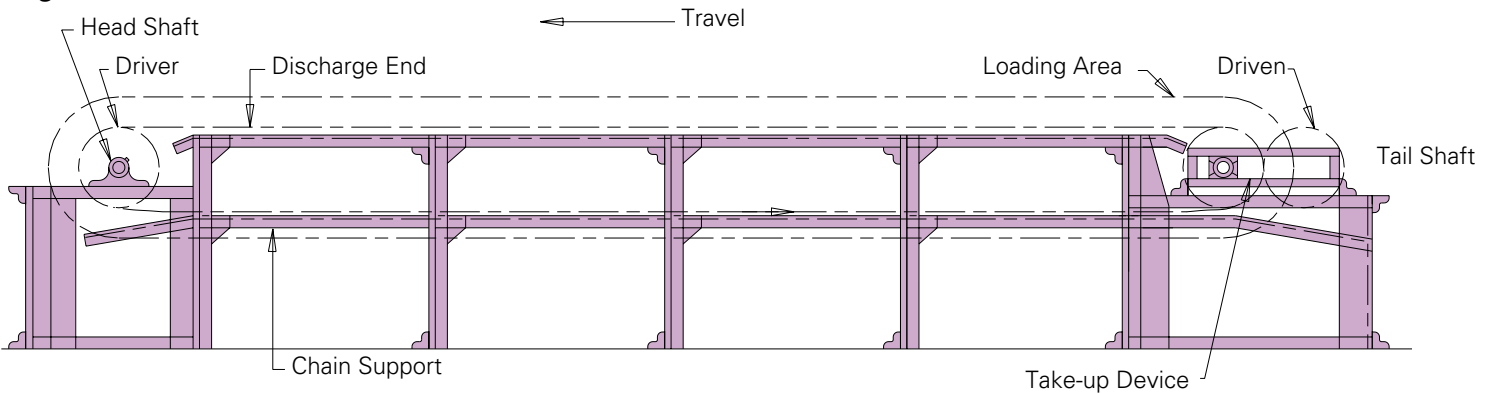


Roller Conveyor Chains

Figure 1



Roller Conveyor Chains are used to transfer bulk or unit product from one point to another. A typical conveyor frame is shown in Figure 1.

Design Considerations

Drive End

Apply driving power to the discharge end of a conveyor so that only the carrying run is under maximum tension. Apply power to the head sprocket through another chain and sprocket.

Pre-tension and Take-ups

Provide take-ups in all conveyor installations to ensure slack for installation and maintenance and to compensate for elongation due to wear. Install the catenary take-up at the head end of the conveyor; install all other take-ups at the foot or loading end of the conveyor.

Points to Consider

1. Ensure that chain is always engaged with at least three sprocket teeth.

2. For long conveyors, use take-up devices to eliminate chain slack. Take-up stroke = $(C \times 0.02) + S$

Where:

C = Center distance between sprockets

S = Catenary sag allowance

For conveyors shorter than 50 feet, consult Union Engineering.

(Note: The above equation is for conveyors longer than 50 ft.)

Long Shaft Center Distances

For unusually long shaft centers, either use two conveyors with a transfer point or use bearing roller chain. Contact Union Engineering for more information.

Return Chain Supports

On chain conveyors more than fifteen feet long, support the return strand on a track or guide to minimize pulsation and whip and to prevent the sagging chain from striking obstacles.

Operating Temperatures

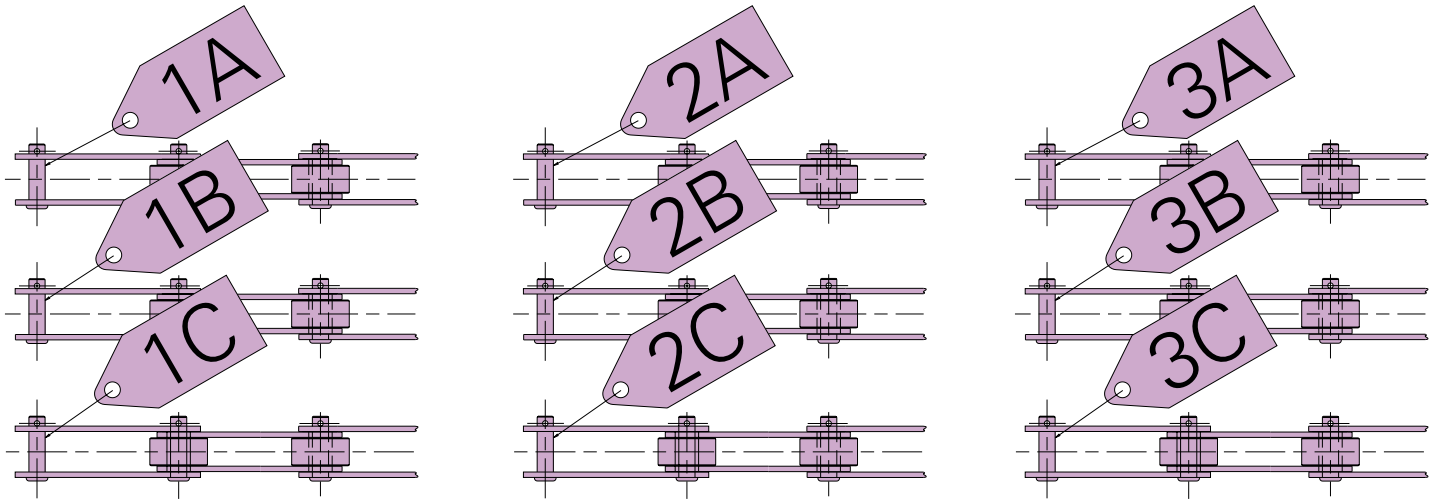
Standard conveyor chain can be operated normally in ambient temperatures between 15°F and 140°F. Select the appropriate chain for conditions outside of this range, including operation in freezing chambers or heat-treatment ovens.

Matched Strands

For multiple strand operation, specify "matched and tagged chain" along with the number of strands required. The factory will match the chain for uniform length and accurate attachment

alignment. In this multiple strand case, all sprocket teeth on the head shaft should be aligned. Strand matching and tagging are shown in Figure 2.

Figure 2

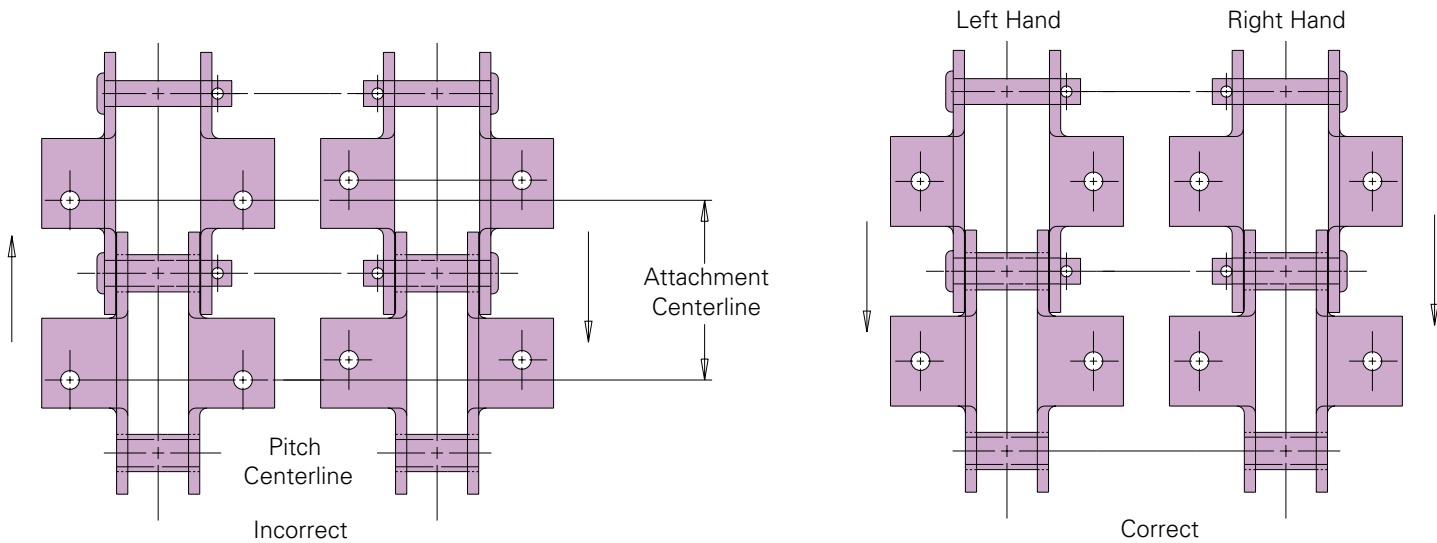


Right- and Left-hand Strands

Right- and left-hand strands are required in all multiple strand installations where the chain attachments, slots, or lugs are not symmetrical. Many conveyors must have cotters on the inside

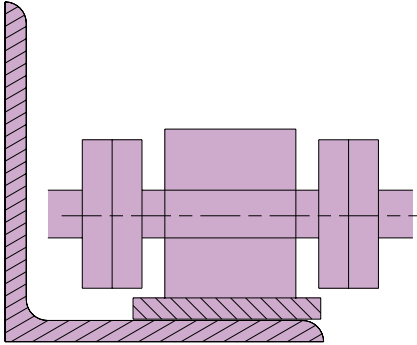
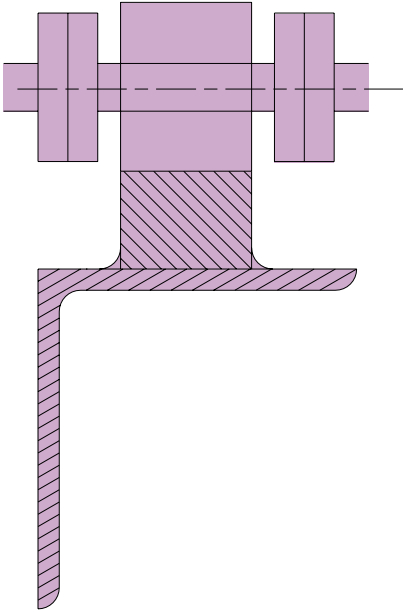
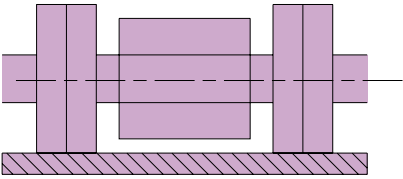
to clear guide rails and angle frames with the pin head on the outside, see Figure 3.

Figure 3



Rail Layout and Roller Type

Table 1 — Construction Considerations

Method of Chain Travel	Type of Roller	Features
<p style="text-align: center;">Chain Rolling (Horizontal or Vertical)</p> 	<p>Carrier roller type</p> <ul style="list-style-type: none"> • Heavy in chain weight • Greater allowable roller load • Less roller wear 	<ul style="list-style-type: none"> • Smooth operation • Less vibration • Lower friction and less power required • Generally used for lengths more than 35 ft. and speeds greater than 70 ft./min.
<p style="text-align: center;">Chain Rolling</p> 	<p>Small roller type</p> <ul style="list-style-type: none"> • Lightweight • Lower allowable roller load 	<ul style="list-style-type: none"> • Generally used for lengths less than 35 ft. and speeds less than 70 ft./min.
<p style="text-align: center;">Chain Sliding</p> 		<ul style="list-style-type: none"> • Suitable for impact conditions • Suitable for dirty conditions • Economical • Impact resistant • Greater power required

Roller Conveyor Speeds

Conveyor speed is dictated by the nature of the load, how it is loaded and unloaded on the conveyor, and what is done to the load during conveying. Table 2 shows the basic conveyors and their typical operating speeds.

Table 2 — Typical Operating Speeds

Conveyor	Speed (ft./min.)
Continuous bucket elevator	75 to 150
Centrifugal bucket elevator	200 to 300
Slat or flat top conveyor	50 to 150
Carrier conveyor ¹	50 to 150
Assembly line conveyor	5 to 15
Drag and scraper conveyors	50 to 100
Apron conveyors	10 to 60

¹Material conveyed directly on chain

Roller Conveyor Installation and Operation

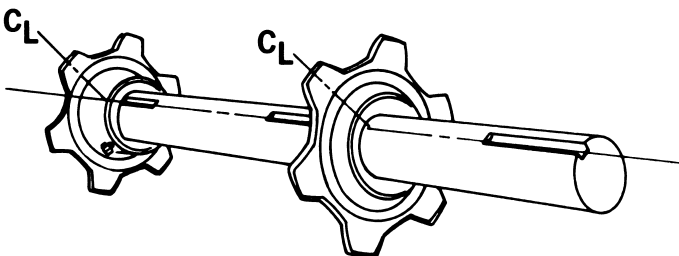
Shaft Alignment

Shaft alignment is ensured by rigidly supporting shafts in properly designed bearings. Align the shafts horizontally with a leveling device. Head and tail shafts must be parallel and at 90° to the direction of travel of the conveyor. Take-ups provide the means for shaft alignment and chain tension adjustment.

Sprocket Alignment

Sprockets must be in a line and not offset on the shafts. When two or more strands of chain operate as a single unit, as in a double-strand conveyor, the sprocket teeth on the head shaft must be timed to pick up the load on each chain simultaneously. First align the keyways in the shaft. Then align the keyways of the sprockets on tooth centerline. Sprockets should be "keywayed-in-line and matched in pairs." Since the tail shaft is an idling shaft, key it to only one sprocket. The other sprocket is held in alignment by set collars and is allowed to turn freely. In this way the sprocket can position itself if uneven wear takes place in the chain strands.

Headshaft Sprockets Keyed In Line



Chain

Place the chain around the sprockets with the free ends meeting one another. When assembling straight sidebar chains, insert the connecting link and then the closing bar over the pins. Drive the closing bar onto both pins at the same time, taking care not to bend the link. Most chains are designed with a "press-fit" between the pins and sidebars. Do not grind away a pin end so that it fits loosely in the chain sidebar.

Freedom from Interference

The chain should not come into contact with adjacent objects. Clearance should provide for normal chain sag and take-up movement. Guides and tracks should be smooth and free of foreign objects.

Start-Up

Adjust the chain tension. For high-temperature applications, adjust the chain while cold. Jog the conveyor through one complete cycle. Start the conveyor and run with no load, making certain that all chain joints flex freely.

For oil-lubricated applications, lubricate each chain joint well with a good grade of nondetergent petroleum base oil. The oil should be applied between the sidebars at each joint and be of a viscosity such that it will flow freely into the pin-bushing area. Grease may be used if it can be forced directly into the pin-bushing area.

A break-in running period of 8 to 12 hours under no load will allow the chain joints to seat properly. After this initial running period adjust take-ups again to compensate for initial elongation of chain.

Chain Tension

Make sure you have the correct amount of chain slack; when the chain is too tight the working parts of the chain carry a much heavier load.

Frequency of Adjustment

The chain will elongate at the beginning of operation due to slight distortion of its component parts. After this initial change in the chain, it elongates slightly, but constantly, due to normal wear. Maintain the proper chain tension by adjustments made according to the following suggested schedule (Table 3).

Table 3 — Suggested Adjustment Schedule

Time in Operation	Frequency of Adjustment
Week 1	Once a day
Weeks 2-4	Twice a week
After week 4	Twice a month

Note: This frequency schedule is based on eight hours of operation per day. For longer operation days, adjust the schedule accordingly.

Even Adjustment of Take-up

Even adjustment of take-up can be easily obtained with screw type or counter-weight take-ups. Where two parallel chains are adjusted by two independently operated take-ups, ensure even stroke on both the left and right side. An uneven adjustment will cause an overload when the link plate and the side of the sprocket teeth interfere with each other.

Insufficient Take-up Adjustment

If the chain is still too long after the take-up adjustment, take out one or two pitches to shorten the chain.

Loading Conveyors

Support the loading area as much as possible to minimize loading shock to the system. Reduce impact by loading as gently as possible. Slide load onto the conveyor when possible to reduce surges caused by rough loading. Unload a conveyor before shutting it down. Starting a loaded conveyor places extra strain on the system. Run the conveyor occasionally during extended shut-down periods to keep the system free from corrosion.

Installation of Bucket Elevator Chains, Sprockets, and Traction Wheels

Position foot take-ups at the top position of travel and head take-ups at the bottom position to provide maximum adjustment once the chain is installed.

Install chain from the top of the elevator casing when possible. Assemble the chain to form a single strand without buckets attached. Establish a lifting point slightly off center of the strand so that one leg is long enough to go around the foot sprocket and up to the inspection door.

Lower the chain from its lifting point into the elevator casing. Once the longer leg has been drawn around the foot sprocket and up close to the inspection door, block the head sprocket from moving. Disconnect the lifting hook and re-connect it to the long leg of the chain about two links short of the end. Draw chain ends together and attach them with the connecting pin. Adjust take-ups to create proper tension on the chain. Install buckets through rear panel door. Be sure to prick punch the bolt threads at the nuts to prevent them from loosening.

Adjust take-ups or check functioning of gravity take-ups before putting elevator into operation. Start the elevator chain by jogging the system through one complete cycle. Then run the chain for about four hours without a load. After this break-in period, begin regular operation.

Of Special Note

- Material should not be allowed to build up in the boot by overloading. Properly regulating flow, within the capacity of the buckets, will extend service life and prevent surging caused by the buckets digging out the boot.
- During normal operation start the elevator empty. This prevents overload of the chain and alleviates the danger of backrun.
- For traction wheels, securely mount the solid or split hub to the shaft. Bolt the traction wheel segments or segmental rim sprockets in place loosely. Tighten with a torque wrench. All segmental rim bolts must have nuts tightened to not more than the maximum torque values suggested on page C-34.

Special Environments

Standard conveyor chain can be operated normally in ambient temperatures between 15°F and 140°F without trouble.

When the chain is operated in very low or high temperatures, or in an abrasive or corrosive atmosphere, the following should be taken into account (Table 4).

- (1) Under very low or high temperatures:

Chain must be selected in a different manner when it is operated in freezing chambers, cold areas, when it passes through a heat-treatment furnace, or is affected by heat from the material conveyed.

- (2) In wet conditions:

When chain is exposed to water, e.g., in a sterilizer or water screen, excessive wear due to insufficient lubrication and rust may shorten chain life. In these cases, a larger chain size provides less bearing pressure and stainless steel or plated chain will provide rust prevention.

- (3) In corrosive conditions:

When chain is exposed to an acidic or alkaline solution and/or operated in a corrosive atmosphere, excessive wear may occur due to chemical corrosion on the chain parts in addition to mechanical wear. Hydrogen embrittlement may also occur in an acidic atmosphere. Conveyor chain is more affected by acid than alkali. In special cases, electrochemical corrosion may occur on the chain due to sea or mine water. Refer to Table 6 "Corrosion Resistance Guide" for the corrosion resistance of various materials.

- (4) In dusty conditions:

When conveyor chain is operated in dusty conditions, e.g., in the presence of coke, metal powder, and sand, etc. the chain wears more because foreign material gets between the parts of the chain and also the engaging surfaces of the sprocket teeth and chain. In such cases, select a larger chain size to reduce the bearing pressure or choose a chain especially designed for high wear resistance.

The foregoing information is intended to provide general guidelines for conveyor chain selection. Please consult Union Chain for specific application problems.

Table 4 — Considerations for Use in Special Environments

Temperatures	Chain Selection	Caution
-60°F ~ -20°F	<ul style="list-style-type: none"> •-20°F or less, ANSI 300 Series stainless steel chains and 600 Series stainless steel chains are suggested. •Carbon chains are not suggested. 	(1) Low temperature embrittlement may occur on link plates of carbon steel chain. (2) Freezing of lubricant. (3) Rust due to water condensation. (4) Seizure due to freezing.
-20°F ~ 15°F	The chain should be selected on the basis of the corrected working load, Table 5.	
140°F ~ 300°F	Special lubrication is required.	
300°F ~ 480°F	The chain should be selected on the basis of the corrected working load, below. Selection of the next larger pitch chain over the originally selected one is suggested.	(1) Excessive wear due to decrease of hardness of pin and bushing. (2) Poor lubrication due to deterioration and carbonization.
480°F or greater	Consult Union Engineering.	

Table 5 — Corrected Working Load

Temperature	Corrected Working Load
-20°F ~ -4°F	(Maximum allowable load in catalog) x 0.25
-4°F ~ 15°F	(Maximum allowable load in catalog) x 0.3
15°F ~ 300°F	(Maximum allowable load in catalog) x 1.0
300°F ~ 390°F	(Maximum allowable load in catalog) x 0.75
390°F ~ 480°F	(Maximum allowable load in catalog) x 0.5



UNION CHAIN DIVISION - ENGINEERING INFORMATION - ROLLER CONVEYOR CHAINS

Corrosion Resistance Guide

Determine the corrosion-resistant properties of materials using this information as a guide. When making final specifications of chain, be sure to consider all operating conditions.

If you have any questions, contact Union Engineering. This table shows properties of materials at 68°F unless otherwise noted.

Fluid	Steel	300 Stainless Steel	400 Stainless Steel	600 Stainless Steel	UHMW	Delrin or EPC78 STP
Acetic Acid (5%)	N	R	R	L	R	N
Acetic Acid (10%)	N	R	R	*	R	R
Acetone	N	R	R	N	R	R
Alcohol	R	R	R	R	R	R
Ammonia Water	L	R	R	*	*	R
Aqueous Ammonia	L	R	R	R	R	R
Beer	L	R	R	R	R	R
Benzene	R	R	R	R	L	R
Boric Acid (5%)	N	R	R	*	*	*
Butyric Acid	*	R	R	*	*	R
Calcium Hydroxide (20% Boiling Point)	*	R	R	*	*	R
Calcium Hypochlorite	N	R	N	*	*	N
Caustic Soda (25%)	N	R	R	R	R	R
Carbolic Acid	*	R	R	*	*	N
Carbon Tetrachloride	L	L	L	L	L	R
Carbonated Water	N	R	R	R	R	R
Chlorine Gas (wet)	N	N	N	N	*	*
Citric Acid	N	R	L	L	R	L
Formaldehyde	R	R	R	R	*	R
Formic Acid	N	R	R	N	R	N
Formic Acid Aldehyde	R	R	R	R	R	R
Fruit Juice	N	R	L	L	R	R
Gasoline	R	R	R	R	L	R
Glycerin	R	R	R	*	*	R
Hydrochloric Acid (2%)	N	N	N	N	N	N
Hydrogen Peroxide (30%)	N	R	L	L	R	N
Hypochlorite Soda	N	N	N	N	R	N
Iodine	N	N	N	N	N	N
Kerosene	R	R	R	R	R	L
Lactic Acid	N	R	L	L	R	R
Methyl-Ethyl-Propyl-Butyl Alcohol	R	R	R	R	*	R
Milk	L	R	R	R	R	R
Nitric Acid (5%)	N	R	R	L	L	N
Oils (Vegetable and Mineral)	R	R	R	R	R	R
Oxalic Acid	N	R	L	*	*	*
Paraffin	R	R	R	R	R	R
Petroleum	R	R	R	R	R	R
Phosphoric Acid	N	L	N	N	N	N
Potassium Permanganate	*	R	R	*	*	R
Sea Water	N	L	L	L	R	R
Soapy Water	L	R	R	R	R	R
Sodium Bicarbonate	*	R	R	*	*	R
Sodium Carbonate (saturation) Boiling Point	*	R	R	*	*	*
Sodium Chloride	N	R	L	L	R	R
Sodium Hypochlorite (10%)	N	N	N	N	*	N
Sodium Sulfate (saturation)	*	R	R	*	*	*
Soft Drinks	L	R	R	R	R	R
Sulfuric Acid	N	L	N	N	N	N
Vegetable Juice	L	R	R	R	R	R
Vinegar	N	L	N	N	R	L
Water	L	R	R	R	R	R
Whiskey	L	R	R	R	R	R
Wine	L	R	R	R	R	R

R = Resistant; L = Less resistant; N = Not resistant; * = Unavailable

Maintenance Check Points

Check Points	Comments
Centering	A high precision guide rail is essential to ensure proper centering of the conveyor. If centering is not accurate (with no side guide rail), the conveyor chain will wobble and weave resulting in shorter conveyor chain life.
Sprocket alignment	When two or more sprockets are installed in a row, be sure to align the position of the sprocket teeth. If the sprocket teeth are not properly aligned, the working load will not be equally divided and will cause the chain to twist.
Take-up	If take-ups on both sides are uneven, the conveyor chain will not engage smoothly with the sprocket.
Initial chain tension	Maintain adequate chain slack. If chain tension is too high, loss of power will result. This is a dangerous situation and if too loose, the chain will climb the sprocket.
Trial run	Trial run after installation should be made under no load conditions by switching on and off several times intermittently. After inspection, continuous operation may begin.
Stopping conveyor	Stop conveyor under no load conditions, or remaining material will impose an overload when the conveyor starts again.
Lubrication	Lubricate conveyor chain periodically, unless the chain does not require lubrication. Lubrication of reducer, bearing, and driving roller chain is essential.
Securing conveyor parts	Parts fastened to the conveyor such as buckets, aprons, slats, etc., are apt to loosen due to vibration. Pay careful attention to fastening nuts and bolts securely. Be sure to check periodically.
Amount of chain slack	Regularly check and adjust the amount of chain slack.
Temperature and prevention of freezing	When differences in temperatures (summer and winter or between day and night in the winter) are very severe, conveyor damage may occur. Under these circumstances, operate the conveyor carefully, taking any variations in temperature into account.
Conveyor record of use and maintenance	After installing the conveyor, keep a record of the expected capacity to be conveyed, conveyor speed, r.p.m. of main shaft, electric current, voltage, working hours, actual conveying capacity, inspection date, lubricating date, details of trouble, etc. This will serve as protection against unexpected accidents. This record will also be convenient for maintenance and repairs.

Troubleshooting

Problem	Possible Causes	What to Do
Excessive noise	<ul style="list-style-type: none"> • Misalignment of sprocket • Loose casings or bearings • Too little or too much slack • Chain and/or sprocket wear • Inadequate lubrication or no lubrication • Chain pitch size too large 	<ul style="list-style-type: none"> • Realign sprockets and shafts • Tighten set-bolts • Adjust centers or idler take-up • Replace chain and/or sprocket • Lubricate properly • Replace with correct chain size
Chain vibration	<ul style="list-style-type: none"> • Resonance to the vibration cycle of machine to be installed • High load fluctuation 	<ul style="list-style-type: none"> • Change vibration cycle of chain or machine • Use torque converter or fluid coupling
Wear on inside of link plate and one side of sprocket teeth	<ul style="list-style-type: none"> • Misalignment 	<ul style="list-style-type: none"> • Realign sprockets and shafts
Chain climbs sprockets	<ul style="list-style-type: none"> • Excessive chain slack • Heavy overload 	<ul style="list-style-type: none"> • Adjust centers or idler take-up • Reduce load or install stronger chain
Broken pins, bushings or rollers or heavy wear of pins, bushings or rollers	<ul style="list-style-type: none"> • Chain speed too high for pitch and sprocket size • Heavy shock or suddenly applied loads • Material build-up in sprocket tooth pockets • Inadequate lubrication • Chain or sprocket corrosion 	<ul style="list-style-type: none"> • Use shorter pitch chain or install larger diameter sprockets • Reduce shock load or install stronger chain • Remove material build-up or install side gashed sprockets • Lubricate properly • Install anti-corrosive chain or sprockets
Chain clings to sprocket	<ul style="list-style-type: none"> • Center distance too big or high load fluctuation • Excessive chain slack 	<ul style="list-style-type: none"> • Adjust the center distance or install idler take-up • Same as above
Chain gets stiff	<ul style="list-style-type: none"> • Misalignment • Inadequate lubrication • Corrosion • Excessive load • Material build-up in chain joint • Peening of link plate edges 	<ul style="list-style-type: none"> • Realign sprockets and shafts • Lubricate properly • Replace with anti-corrosive chain • Reduce load or replace with chain of suitable strength • Shield drive from foreign matter • Check for chain interference
Breakage of link plate	<ul style="list-style-type: none"> • Subjected to shock load • Vibration • Inertia load is too large 	<ul style="list-style-type: none"> • Reduce shock (e.g., install a shock absorber) • Install a device to absorb vibration (e.g., tightener, idler wheel) • Chain section should be checked (increase number of strands or select next larger size chain)
Camber (curved tracking of straight faced roller chains on long conveyors where chain strands are rigidly attached)	<ul style="list-style-type: none"> • Head shaft sprocket misalignment • Track or rail out of level due to previous chain travel wear • Higher chain tension on one strand than the other strands • Chain strand lengths are different 	<ul style="list-style-type: none"> • Realign head sprockets • Level track or rails • Balance conveyed material load between strands • Specify measured matched and tagged strands

Lubrication

Proper lubrication reduces wear, maximizes horsepower, and helps reduce chain pulsation.

Important points of lubrication are shown in Figure 4.

- Between sidebars (for pin and bushing lubrication).
- Between roller and sidebar (for lubrication of roller and bushing).

Factors to Consider when Lubricating Roller Conveyor Chain

For large diameter rollers or outboard rollers lubricate by self-lubricating sintered metal bushings or by pressure through a grease fitting. Lubrication through pin heads or through rods is suggested only for chains with more than 3/4" pin or rod diameter. When this method is used on through rods, lock collars are provided in place of cotter pins. In severe applications rollers may be equipped with anti-friction bearings that have grease fittings or removable caps for grease packing.

Lubrication with grease requires pressure fittings to port the grease through chain joints. The following examples are methods of porting grease lubrication (Figure 5).

Figure 4

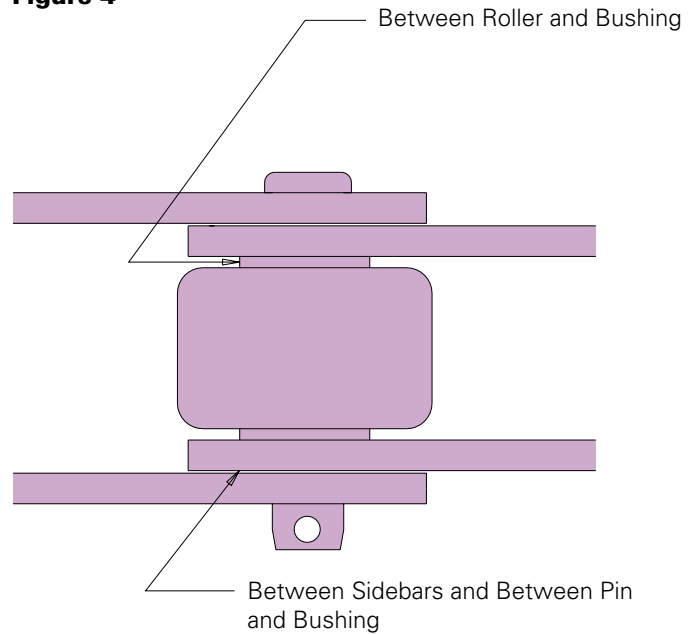


Figure 5

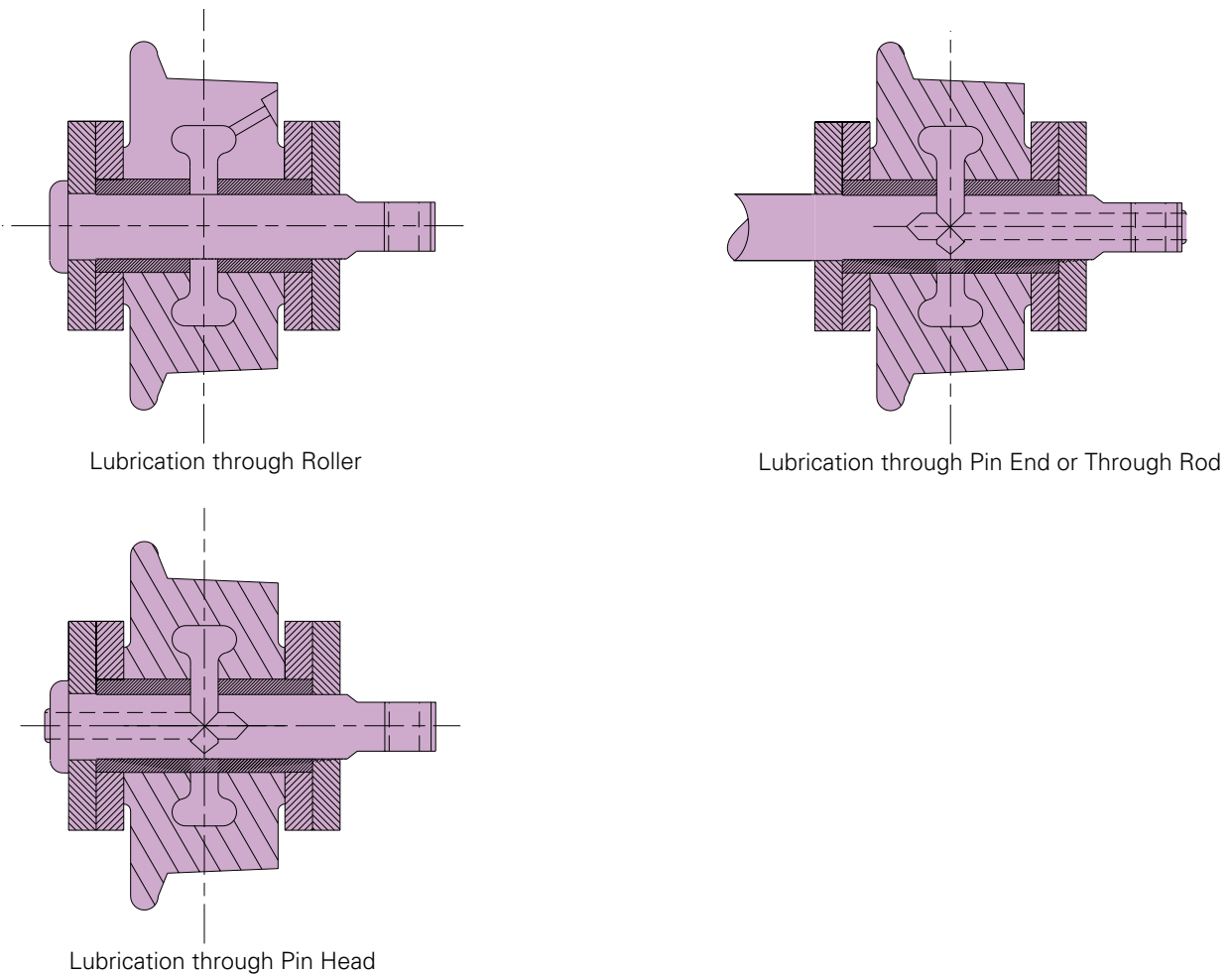
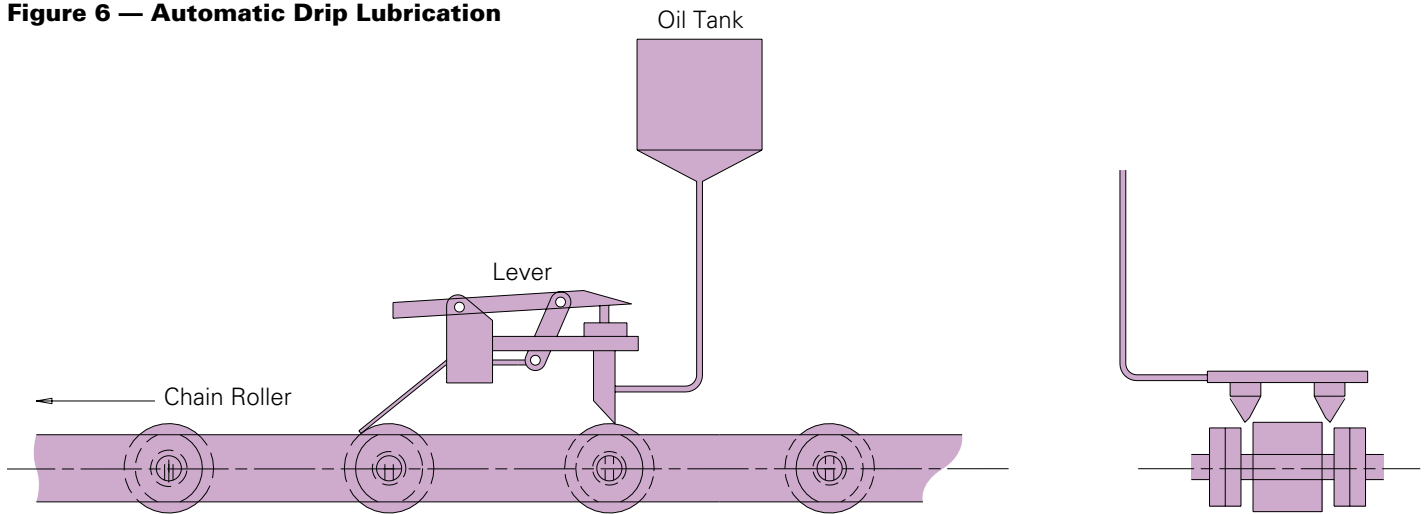


Figure 6 — Automatic Drip Lubrication



Automatic Lubrication

Use automatic lubrication to save labor or when manual lubrication is not possible due to the location of the chain.

The automatic drip system shown in Figure 6 utilizes the chain roller as a cam. The roller pushes a pump as it passes by and causes the oil to drip.

Use a mist-type lubricator when the conveyor chain is used as an overhead trolley conveyor or when the chain requires many points to be lubricated.

For coil conveyor chain, an automatic grease feeder is suggested.

Lubrication is ineffective for bulk conveyors that convey powdery and granular materials. It will not work for flow or trough conveyors where the chain buries itself in the material as it moves and dust or other particles become embedded in the chain clearances.

Inspection

Lubrication

- Manual: Carefully follow lubrication schedule.
- Drip: Inspect the filling of oiler cups and the rate of feed. Check that the feed cups are not clogged and are properly positioned over the chain.
- Bath: Inspect the oil level and check that there is no sludge. Drain, flush and refill the system as the application requires.

If the chains have not been lubricated properly, the joints may have a brownish (rusty) color and the pins of the connecting link of the chain, when removed, may be a discolored brown. The pins may also be roughened, grooved, or galled. Properly lubricated chains will not show the brownish color at the joints; they will be brightly polished with a high luster.

- Check wear on link plates and sides of sprocket teeth indicating misalignment.
- Check shaft and sprocket alignment to prevent wear.
- Check wear on working faces of sprocket teeth. As the system runs these faces should develop a bright, polished appearance. Scratches, galls, grooves, or visible changes in tooth form are probably caused by lubrication failure or overloading.
- Check and adjust chain tension. An elongation of as much as five percent indicates that the chain is riding near its limit of

allowable height on the sprocket teeth. A gradual increase in chain length is the result of normal wear. A sudden increase in slack indicates one or more of the following:

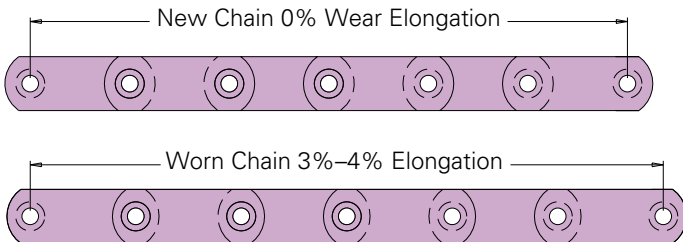
- Lubrication failure
- Excessive overloading or shock
- Displacement of shaft bearings
- Displacement or failure of take-ups

- Check the chain to be sure it is free from dirt, grit or other abrasive material. Clean the chain periodically.
- Check guides, tracks, and the area below the conveyor for buildup of material or dirt which will cause interference or binding of the chain. Exit and entry points of guides and tracks must permit the chain to pass with a minimum amount of impact or interference. Roller chain tracks can be over-lubricated, forcing the rollers to slide rather than roll.
- Exceptionally low chain conveyor speed coupled with high drag friction will occasionally cause surging. A slight increase in speed will correct this problem if the friction can not be reduced.
- Inspect apron and pan bead openings. If the beads have been wedged apart or otherwise distorted, fine material may bleed into moving parts and cause excessive wear.

Chain Pitch Elongation

As the bearing parts wear, the chain elongates causing the chain to climb to the top of the sprockets and inhibit smooth articulation. This is shown in Figure 7. Conveyor chains should be replaced when chain elongation equals 3% to 4%.

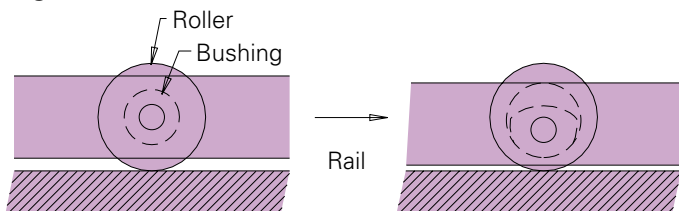
Figure 7



Life of Roller Conveyor Chain and Sprockets

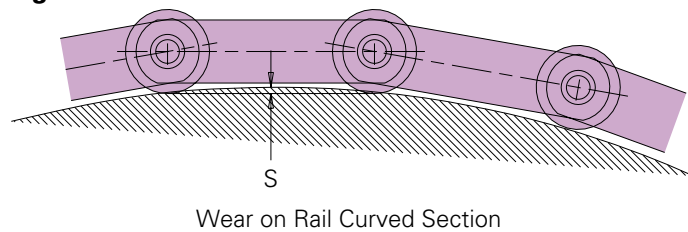
The chain has reached the end of its service life when, due to track wear, rollers do not project from sidebars. The under surface edge of the sidebar may actually touch the track in some cases, causing a significant change in friction and resulting in higher chain tension (Figure 8).

Figure 8



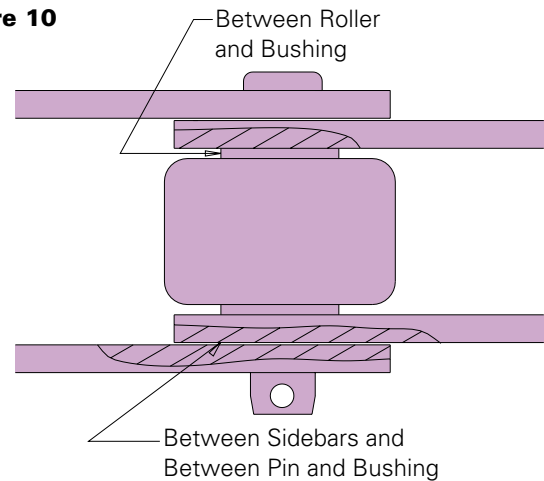
Wear must be inspected even more often with a curved section of rail than with horizontal sections. Decrease the allowed wear amount for a curved section by a dimension equivalent to "S" (Figure 9).

Figure 9



Chains should be replaced when the bushing wear, due to conveying abrasive materials, exceeds one-third of the wall thickness. Reciprocal friction between inner and outer sidebars and contact between the side surface of the roller and the inside surface of sidebars cause wear, as shown in Figure 10.

Figure 10

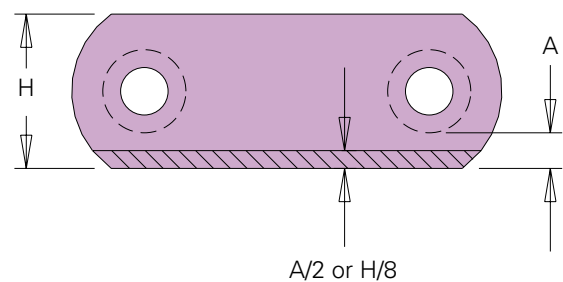


Replace chain when wear exceeds 1/3 of the original plate thickness.

When sidebar wear appears faster than wear of other component parts, misalignment of the conveyor is usually at fault. To ensure proper alignment, check the alignment of driving and driven sprockets, the alignment of shafts in horizontal and vertical planes, and the preciseness of leveling.

The service life of a chain that slides directly in the conveyed material or on a steel plate casing should end when the worn section equals $A/2$ or $H/8$, as shown in Figure 11.

Figure 11



Never insert a new link in a chain that has been appreciably elongated by wear. Do not install new chain on badly worn sprockets.

Protect the chain during long periods of idleness. If the chain is to be stored, remove it from the sprockets, clean and re-oil it and cover it with heavy grease. Store the chain where it will be protected from moisture and mechanical injury. Before placing the conveyor in service again, thoroughly clean the chain and sprockets to remove the protective grease and then re-lubricate the chain.