

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



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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