



Conveyor / Radial Stacker Manual

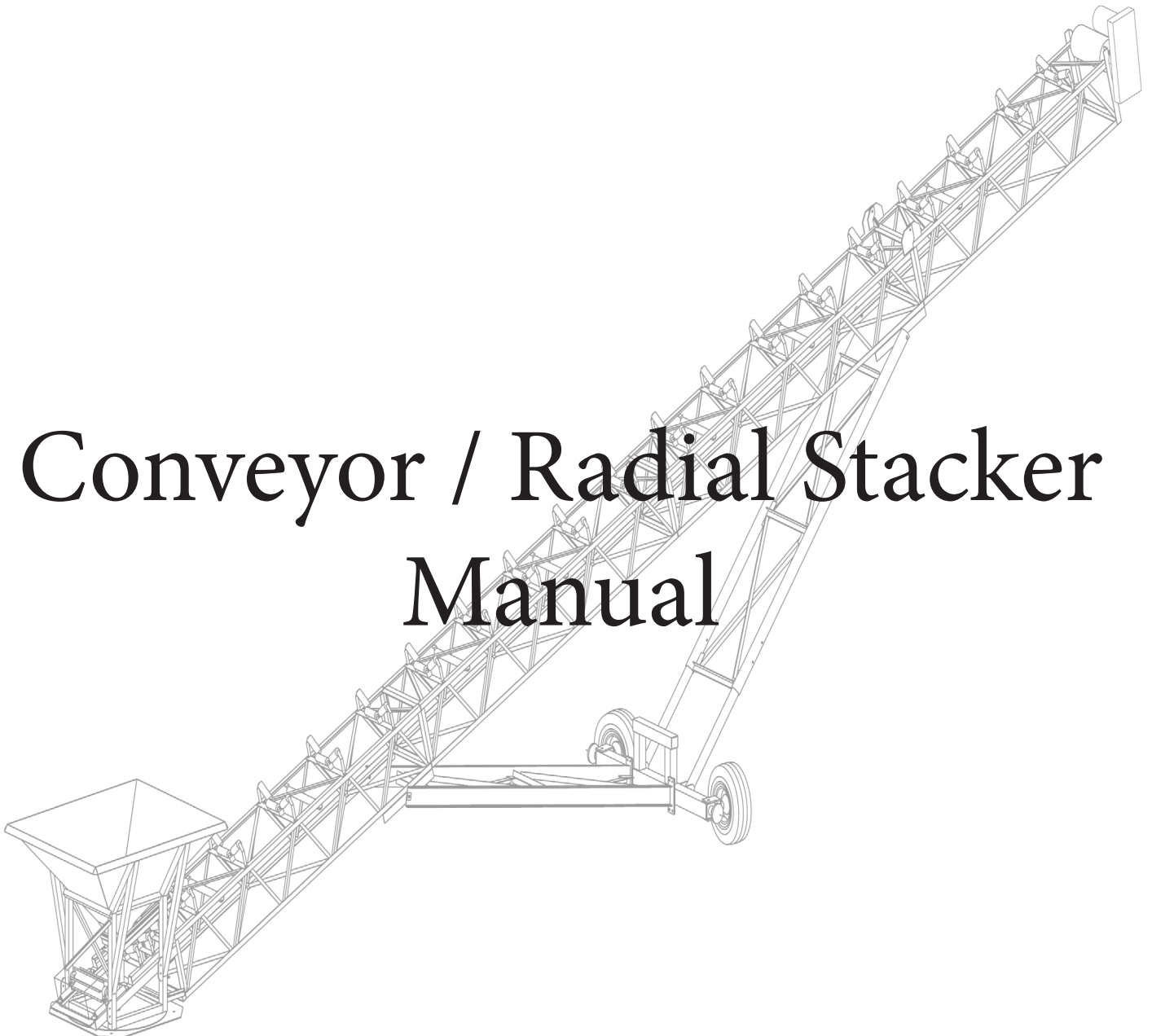


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IMPORTANT SAFETY INSTRUCTIONS

COMPLIANCE WITH SAFETY STANDARDS, INCLUDING OSHA AND OTHER FEDERAL, STATE AND LOCAL CODES OR REGULATIONS IS THE RESPONSIBILITY OF THE USER OF THE CONVEYOR INSTALLATION. PLACEMENT OF GUARDS AND OTHER SAFETY EQUIPMENT IN ACCORDANCE WITH SAFETY STANDARDS IS DEPENDENT UPON THE AREA AND USE TO WHICH THE SYSTEM IS APPLIED. A SAFETY STUDY SHOULD BE MADE OF THE CONVEYOR APPLICATION, AND GUARDS SHOULD BE INSTALLED WHEREVER APPROPRIATE. "SAFETY STANDARDS FOR CONVEYORS AND RELATED EQUIPMENT", ANSI B20.1, IS A GUIDE FOR SAFE CONSTRUCTION, INSTALLATION, OPERATION, AND MAINTENANCE OF CONVEYORS AND RELATED EQUIPMENT.

CONVEYOR SAFETY

SAFETY
POSTER



Bulk Handling Conveyors



 <p>Do Not Climb, Sit, Stand, Walk, Ride, or Touch the Conveyor at Any Time</p>	 <p>Do Not Perform Maintenance on Conveyor Until Electrical, Air, Hydraulic and Gravity Energy Sources Have Been Locked Out and Blocked</p>	 <p>Operate Equipment Only With All Approved Covers and Guards in Place</p>
 <p>Lock Out All Power and Block Gravity Loads Before Servicing</p>	 <p>Ensure That All Personnel Are Clear of Equipment Before Starting</p>	 <p>Allow Only Authorized Personnel and Trained Personnel To Operate or Maintain Conveyors and Accessories</p>
 <p>Keep Clothing, Body Parts, and Hair Away from Conveyors</p>	 <p>Clean Up Spillage Around Tail Pulleys, Idlers, and Load Points Only When the Power Is Locked Out and Guards Are In Place</p>	 <p>Do Not Modify or Misuse Conveyor Controls</p>
 <p>Ensure That ALL Controls and Pull Cords are Visible and Accessible</p>	 <p>Do Not Modify or Remove Controls, Guards, Interlocks, Warnings or other Safety Items without Manufacturer's Approval</p>	 <p>Report All Unsafe Conditions</p>

POST IN PROMINENT AREA

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SAFETY

REDUCER

ADD/CHECK OIL IN GEAR REDUCER

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IMPORTANT: Because Torque-Arm reducers are shipped without oil, it is extremely important to add the proper amount of lubricant prior to operating reducer. For most applications a high-grade petroleum-base rust and oxidation inhibited (R&O) gear oil is suitable.

Under severe conditions EP oil can be used provided the reducer is not equipped with an internal backstop. Internal backstops are designed to rely on friction to operate correctly. EP lubricants contain friction modifiers that will alter backstop performance and therefore must not be used on reducers equipped with internal backstops.

Follow instructions on reducer warning tags.

Lubrication is very important for satisfactory operation. The proper oil level must be maintained at all times. Frequent inspection, at least monthly, with the unit not running and allowing sufficient time for the oil to cool and the entrapped air to settle out of the oil should be made by removing the level plug and verifying the level is being maintained. If oil level is low, add the proper lubricant until the oil volume is increased to the correct level.

After an initial operation of about two weeks, the oil should be changed. If desired, this oil may be filtered and reused. After the initial break in period, under average industrial operating conditions, the lubricant should be changed every 2500 hours of

operation. At every oil change, drain reducer and flush with kerosene, clean magnetic drain plug and refill to proper level with new lubricant.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200°F, the oil should be changed every 1 to 3 months, depending on severity of conditions.

Heating is a natural characteristic of enclosed gearing. A maximum gear case temperature approaching 200°F is not uncommon for some units operating in normal ambient temperatures of 80°F. When operating at the rated capacity with proper lubrication, no damage will result from this temperature. This maximum temperature was taken into consideration during the design of the reducer.

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe this precaution could result in equipment damage and/or bodily injury.

It is highly suggested that you verify both the manufacturer and orientation of the reducer prior to initially filling, or replacing the lubrication. For additional information, please consult the [Reducer Lubrication](#) section of this manual.

SAFETY

DECAL NOMENCLATURE

SIGNAL WORDS

The use of the ANSI Z535 standard signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** have been incorporated into the equipment decals so as to notify all persons of potential danger. The appropriate signal word for each message has been selected using the definitions below as a guideline.

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

THE SAFETY ALERT SYMBOL



MEANS:

“ATTENTION, BE ALERT! YOUR SAFETY IS INVOLVED”.



Decals with a “DANGER” signal word indicate an imminently hazardous situation that, if not avoided, will result in serious injury or death.



Decals with a “WARNING” signal word indicate a situation that, if not avoided, could result in serious injury or death



Decals with a “CAUTION” signal word indicate a hazardous situation that, if not avoided, may result in minor or moderate injury.



Decals with a “NOTICE” signal word indicate a potentially hazardous situation that, if not avoided, may result in property damage

SAFETY EQUIPMENT DECALS

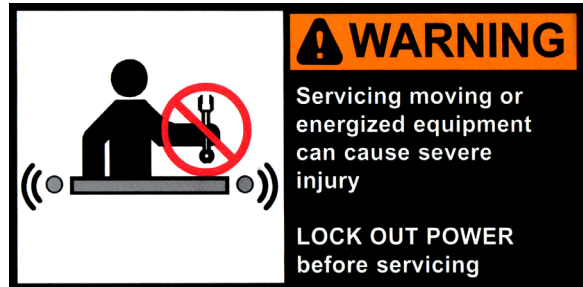
The following safety decals have been placed on the conveyor for the purposes of identifying potential hazards, consequences, and the safety measures that must be employed.

It is imperative that all personnel be familiar with this critically important information.

- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible.
- Replaced parts must display the same decal(s) as the original part. Please request additional decals when replacement parts are ordered from Smalis Conveyors.

DECAL INSTALLATION

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



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CONVEYOR SAFETY

SAFETY INFORMATION

SAFETY IS ALWAYS FIRST

Do not perform service on any conveyor until power is removed and the disconnect device is locked out.

Conveyor service must only be performed by trained and authorized personnel.

Keep clothing, fingers, hair, and all other parts of the body away from the conveyor at all times.

Never climb, step, sit or ride on the conveyor.

Do not load the conveyor over the design limits.

Never alter the conveyor guards.

Always ensure that all guards are in place, and firmly secured before starting a conveyor.

Before operating a conveyor, know the location and function of all controls, and ensure that these areas are free from obstructions.

Before starting a conveyor, ensure that all personnel are clear of the operating area.

Only trained personnel should operate a conveyor.

Keep the area around the conveyor clear of all obstructions.

SAFETY RESOURCES

SAFETY STANDARDS FOR CONVEYORS AND RELATED EQUIPMENT

www.asme.org

The ASME B20.1 - 2009 Safety Standard for Conveyors and Related Equipment presents certain guides for the design, construction, installation, operation, and maintenance of conveyors and related equipment. The conveyors may be of the bulk material, package, or unit-handling types, where the installation is designed for permanent, temporary, or portable operation.

The ultimate goal of this Standard is to help protect public safety, while reflecting industry best-practices

AMERICAN SOCIETY OF SAFETY ENGINEERS CONVEYOR SAFETY MANUAL

www.asse.org/ShopOnline/books/engineering/4378.htm

Features case studies which illustrate the nuances and special details that are required for the planning, design, and implementation of a safe conveyor system are often overlooked in considering conveyor safety as part of a general safety program.

Conveyor Safety Tips from The U.S. Department of Labor

www.msha.gov/Accident_Prevention/ideas/beltconveyor.html

Operation and safety tips on for belt conveyors.

CONCEPTS AND TECHNIQUES OF MACHINE GUARDING

www.osha.gov/Publications/Mach_SafeGuard/toc.html

Information compiled by OSHA regarding machine guarding techniques.

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ASSEMBLY

CONVEYOR AND STACKER

SAFETY IS ALWAYS FIRST!

Safe practices for operating belt conveyors are given in the American National Standards Publication,:

“Safety Standards for Conveyors and related equipment” ANSI B20.1, Sections 5.00 and 6.0.”

Proper personal safety equipment and clothing must be worn and only persons completely familiar with these standards should be allowed to operate or maintain this equipment. Failure to observe these safety precautions and other specific procedures emphasized throughout these instructions may result in personal injury or damage to equipment.

READ BEFORE
BEGINNING ASSEMBLY
OR OPERATING

ASSEMBLY INSTRUCTIONS:
CONVEYOR

1. Work and think safety. Use only accepted safety methods and procedures when assembling conveyor or stacker.

2. Install and use all safety guards.
3. Assemble the conveyor truss sections using ¾” diameter heavy structural bolts and nuts. On stationary conveyors, intermediate truss sections may be interchanged between head and tail section.
4. Mount the troughing idlers with arrow on idlers with the flow of materials. Offset center roll, goes toward tail pulley.

HIGH VOLTAGE CAN KILL

- DISCONNECT INPUT POWER BEFORE SERVICING
- INSTALL AND GROUND EQUIPMENT PER THE NATIONAL ELECTRICAL CODE
- ONLY QUALIFIED PERSONNEL SHOULD INSTALL, USE OR SERVICE THIS EQUIPMENT
- SEE NEMA MG2, “SAFETY FOR CONSTRUCTION AND GUIDE FOR SELECTION, INSTALLATION AND USE OF ELECTRIC MOTORS AND GENERATORS”
- DO NOT TOUCH ELECTRICALLY LIVE PARTS

The downloadable PDF version of the NEMA MG2 document is available at www.nema.org, or by following the NEMA link in the links section located at the bottom of each page

5. Install shaft mount reducer and motor assembly.

ASSEMBLY

CONVEYOR AND STACKER

NOTICE

REDUCERS / GEAR BOXES

1. **Unit is shipped without oil.** Add proper amount of recommended lubricant before operating. Failure to observe these precautions could result in damage to, or destruction of, the equipment.
 2. Extreme pressure (EP) lubricants are not recommended for average operating conditions.
 3. Too much oil will cause overheating and too little oil will result in gear failure. Check oil level regularly.
 4. Do not use oils containing slippery additives such as graphite or molybdenum disulphide in the reducer when backstop is used. These additives will destroy sprag action.
 5. Pour point of lubricant selected, should be at least 10° lower than expected minimum ambient starting temperature.
 6. To insure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding.
 7. It is highly suggested that you verify both the manufacturer and orientation of the reducer prior to initially filling, or replacing the lubrication. For additional information, please consult the [Reducer Lubrication](#) section of this manual.
-
6. Check alignment of V-belts, sheaves, and bushings. Carefully align shaft key slot with 2 outer taper bushings and center key slot in reducer. **Do not force key in.**

7. **Add gear oil to reducer.**
8. Grease all bearings and idlers before start up, and regrease again in 1 month, to 1 year depending on your abrasive, moisture, and working environment. Move sheaves in to reduce overhung load on motor and reducer shafts.
9. Run tail pulley screw take-up adjustment all the way forward.

PULLEYS

For the first month of operation, inspect bushings and cap screws for proper seating at least once a week and thereafter during periodic shut downs.

10. Install conveyor belt thicker rubber side on top. Belt must be stretched tight with a puller. Belt must be cut straight and pulled with even tension on both ends of splice.

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RADIAL STACKER

ITEMS #11 - #19 APPLY TO RADIAL
STACKERS ONLY

THE RADIAL STACKER TRUSS FRAME MUST BE ASSEMBLED IN THE CORRECT SEQUENCE. IF IT IS A HYDRAULIC RAISE, REFER TO SEPARATE INSTRUCTIONS PROVIDED WITH THE RAISE.

In order to maintain a safe and satisfactory operation, the following conditions must be observed:

- A. The stacker must be properly assembled in strict accordance, with the instructions below.
- B. The site of operation must be level and firm allowing no settlement of the stacker.
- C. Raising or lowering the stacker must be in accordance with the procedure and limitation as set forth in the instructions that follow.
- D. This stacker maybe moved by towing for short distances and only on smooth, hard roads. In preparing for a move of this type do not lower the inner and outer tube to maximum collapsed length. A minimum of 10 degrees should be maintained. Install pins at lowest setting that exceeds to degrees. The stacker should be dismantled for longer moves.
- E. This stacker must be completely unloaded before adjusting or moving.
- F. *Violation of any of the conditions as set forth in the attached instructions and this letter will void the warranty and any related responsibility of the manufacturer and seller.*

11. Elevate the truss frame conveyor and position front support boom at head end corbel and pin with shaft the outer support to corbel. Attach come-alongs or chain hoist from conveyor to support and raise support boom close to frame.
12. Repeat Step #8 with rear channel boom.
13. Move axle in place under conveyor with channel and support connections facing correct way.
14. Using the come-along, lower and position rear channel into place before front boom. Bolt channel boom to axle.
15. Extend and lower front booms into position and pin to axle.
16. Lift conveyor and pin axles to proper angle of approximately 16 to 20 degrees.
17. Before startup, check and retighten all bolts and nuts to American standard torque specifications per bolt size and grade including set screws on head and tail bearings, tapered bushing on head and tail pulley, etc.
18. Wire motor and determine property rotation before installing v-belts, back stop is mounted internally in gear reducer.
19. After operating 24 hours, check and retighten v-belts, bolts, nuts, screws.

**ALL GUARDS MUST
BE IN PLACE AT
STARTUP, AND DURING
CONVEYOR OPERATION**

To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before removing any guards. Failure to observe these precautions could result in bodily injury

ASSEMBLY

REDUCER LUBRICATION

ADD/CHECK OIL IN GEAR REDUCER

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BELT INSTALLATION

The investment in material handling is tremendous, monitoring wear and preventive maintenance on your conveyor belting is frequently overlooked. Trucks, screens and crushers make a lot of noise and get a lot of attention, the conveyor belts on the other hand running smoothly and quietly get little attention. Preventive maintenance is required to get the longest life possible out of your equipment and begins with proper design and installation of the equipment. Daily inspection and correction of any potential or apparent problems should be done. Assigning one man the responsibility for daily inspection of your radial stacker or conveyor's condition will help insure its durability and safety.

Belt life depends primarily on these factors:

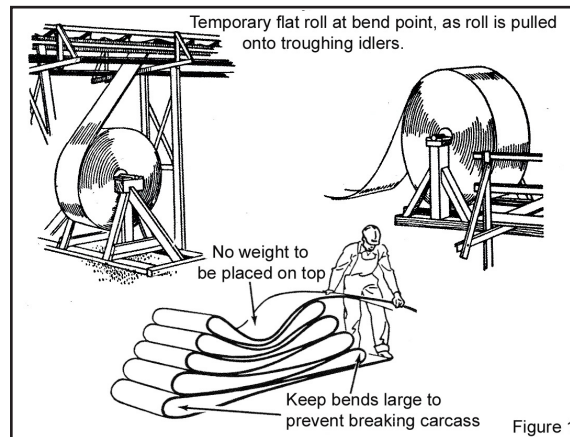
- Correct installation
- Proper loading
- Good belt alignment
- Adequate cleaning or housekeeping
- Good maintenance records

INSTALLATION

Once the roll of belting has been transported to the point of installation, it should be mounted on a suitable shaft for unrolling and threading onto the conveyor. Conveyor belting is normally rolled at the factory with the carrying side out. Consequently, in mounting the roll the belt must lead off the top of the roll if it is being pulled onto the troughing or carrying idlers, but it must lead off the bottom of the roll if it is being pulled onto the return idlers. When pulling the belt onto the conveyor or radial stacker, the roll will turn opposite the direction indicated by the arrows on the crate. The drawing bellows illustrates a suitable method of mounting as well as leading off the top of the roll for pulling onto the troughing idlers.

In some cases, such as in mines, where head room does not permit maneuvering a roll, the belt may have to be pulled off the roll and re-fed. Extreme care should be exercised to see that the loops have large bends to avoid kinking or placing undue strain on the belt, and no weight should ever be placed

on the belt when it is in this position. (Figure 1) Another method of handling belting under such conditions is to lay the roll on a turntable with a vertical spindle.



Handling The Roll

Reels or rolls should never be dropped from a freight car, truck, or other means of conveyance since their weight will break the packaging and may damage the belt. Reels or rolls should always be rolled or provisions should be made for hoisting them. For hoisting, a bar is passed through the hole in the center of the roll. Chains or cables looped around the bar ends should be provided with a spreader above the roll to avoid damage to the belt edges.

TRACKING/TRAINING THE BELT PROCEDURES

Training or tracking the belt on your radial stacker or conveyor system is a process of adjusting idlers, pulleys and loading conditions in a manner which will correct any tendency of the belt to run other than centrally. The basic rule which must be kept in mind when tracking a conveyor belt is simple, **“THE BELT MOVES TOWARD THAT END OF THE ROLL/IDLER IT CONTACTS FIRST.”** You can demonstrate this for yourself by laying a small dowel rod or a round pencil on a flat surface in a skewed orientation. Then lay a book across

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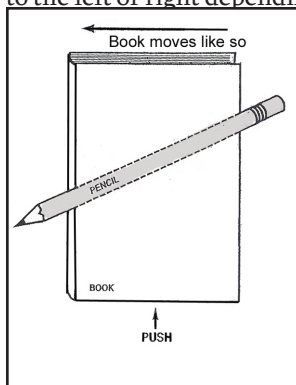
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BELT INSTALLATION

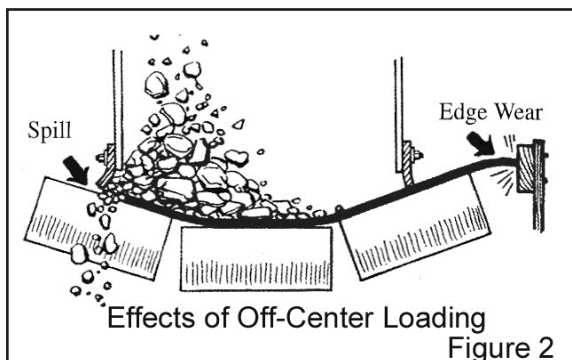
the dowel rod and gently push/roll it in a line directly away from you. The book will tend to shift to the left or right depending upon which end of that dowel rod the moving book contacts first.



When all portions of a belt run off through a part of the conveyor length, the cause is probably in the alignment or leveling of the radial stacker or conveyor structures, idlers or pulleys in that

area.

If one or more portions of the belt run off at all points along the conveyor, the cause is more likely in the belt itself, in the splices or in the loading of the belt. When the belt is loaded off-center, the center of gravity of the load tends to find the center of the troughing idlers, thus leading the belt off on its lightly loaded edge. (Figure 2)



These are the basic rules for diagnosis of belt running troubles. Combinations of these things sometimes produce cases that do not appear clear-cut as to cause, but if a sufficient number of belt revolutions are observed, the running pattern will become clear and the cause disclosed. The usual cases when a pattern does not emerge are those of erratic running, which may be found on an unloaded belt that does not trough well or a loaded belt which is not receiving its load uniformly centered.

FACTORS AFFECTING THE TRAINING OF A BELT

Pulleys and Snubs

Relatively little steering effect is obtained from the crown of conveyor pulleys. Crown is most effective when there is a long unsupported span of belting, (approximately four times belt width) approaching the pulley. As this is not possible on the conveyor carrying side, head pulley crowning is relatively ineffective and is not worth the lateral maldistribution of tension it produces in the belt.

Tail pulleys may have such an unsupported span of belt approaching them and crowning may help except when they are at points of high belt tension. The greatest advantage here is that the crown, to some degree, assists in centering the belt as it passes beneath the loading point, which is necessary for good loading. Take-up pulleys are sometimes crowned to take care of any slight misalignment which occurs in the take-up carriage as it shifts position.

All pulleys should be level with their axis at 90° to the intended path of the belt. They should be kept that way and not shifted as a means of training, with the exception that snub pulleys may have their axis shifted when other means of training have provided insufficient correction. Pulleys with their axes at other than 90° to the belt path will lead the belt in the direction of the edge of the belt which first contacts the misaligned pulley. When pulleys are not level the belt tends to run to the low side. This is contrary to the old "rule of thumb" statement that a belt runs to the "high" side of the pulley. When combinations of these two occur, the one having the stronger influence will become evident in the belt performance.

Carrying Idler

Training the belt with the troughing idlers is accomplished in two ways. Shifting the idler axis with respect to the path of the belt, commonly known as "knocking idlers," is effective where the

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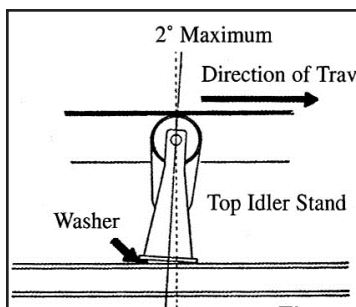
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BELT INSTALLATION

entire belt runs to one side along some portion of the conveyor or radial stacker. The belt can be centered by “knocking” ahead (in the direction of belt travel) the end of the idler to which the belt runs. Shifting idlers in this way should be spread over some length of the conveyor, or radial stacker, preceding the region of the trouble. It will be recognized that a belt might be made to run straight with half the idlers “knocked” one way and half the other, but this would be at the expense of increased rolling friction between belt and idlers. For this reason all idlers should initially be squared with the path of the belt and only the minimum shifting of idlers used as a training means. If the belt is over-corrected by shifting idlers, it should be restored by moving back the same idlers, not by shifting additional idlers in the other direction.

Obviously such idler shifting is effective for only one direction of belt travel. If the belt is reversed, a shifted idler, corrective in one direction, will misdirect in the other. Hence reversing belts should have all idlers squared up and left that way. Any correction required can be provided with self-aligning idlers designed for reversing operation. Not all self-aligners are of this type, as some work in one direction only.

Tilting the troughing idler forward (not over 2°) in the direction of belt travel produces a self-aligning effect. The idlers may be tilted in this manner by

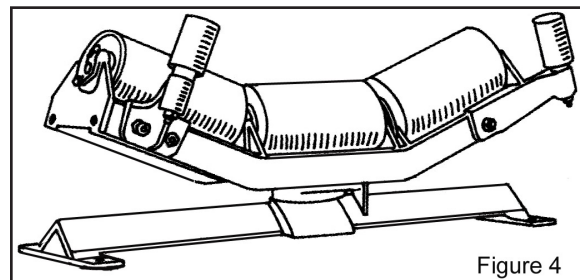


shimming the rear leg of the idler stand. Here again this method is not satisfactory where belts may be reversing, as illustrated in Figure 3.

This method has an advantage over “knocking idlers” in that it will correct for movement of the belt to either side of the idler, hence it is useful for training erratic belts. It has the disadvantage of

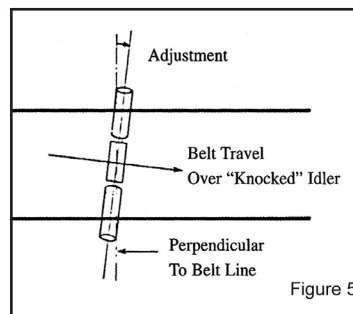
encouraging accelerated pulley cover wear due to increased friction on the troughing rolls. It should therefore be used as sparingly as possible - especially on the higher angle troughing idlers.

Special, self-aligning troughing idlers like the one to the right are available to assist in training the belt. (Figure 4)



Return Idlers

Return idlers, being flat, provide no self-aligning influence as in the case of tilted troughing idlers. However, by shifting their axis (knocking) with respect to the path of the belt, the return roll can be used to provide a constant corrective effect in one direction. As in the case of troughing rolls,



the end of the roll toward which the belt is shifting should be moved longitudinally in the direction of return belt travel to provide correction. (Figure 5)

Self-aligning return rolls should also be used. These are pivoted about a central pin. Pivoting of the roll about this pin results from an off-center belt and the idler roll axis becomes shifted with respect to the path of the belt in a self-correcting action. (Figure 6) Some return idlers are made with two

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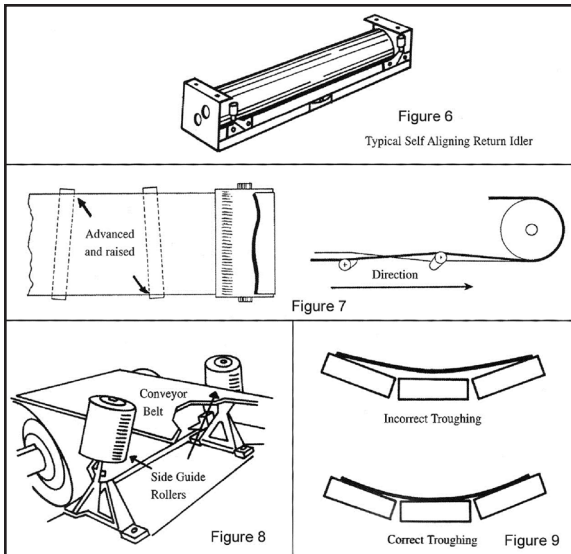
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BELT INSTALLATION



rolls forming a 10° to 20° V-trough, which is effective in helping to train the return run.

A further aid to centering the belt as it approaches the tail pulley may be had by slightly advancing and raising the alternate ends of the return rolls nearest the tail pulley. (Figure 7)

Assuring Effectiveness of Training Rolls

Normally, extra pressure is desired on self-aligning idlers and, in some cases, on standard idlers where strong training influence is required. One way to accomplish this is to raise such idlers above the line of adjacent idlers. Idlers or bend pulleys on convex (hump) curves along the return side have extra pressure due to component of the belt tension and are therefore effective training locations. Carrying side self aligners should not be located on a convex curve since their elevated positions can promote idler juncture failure of the carcass.

Side Guide Rollers

Guides of this type are not recommended for use in

making belts run straight. (Figure 8) They may be used to assist in training the belt initially to prevent it from running off the pulleys and damaging itself against the structure of the conveyor system. They may also be used to afford the same sort of protection to the belt as an emergency measure, provided that they do not touch the belt edge when it is running normally. If they bear on the belt continually, even though free to roll, they tend to wear off the belt edge and eventually cause ply separation along the edge. Side guide rollers should not be located so as to bear against the belt edge once the belt is actually on the pulley. At this point no edge pressure can move the belt laterally.

The Belt Itself

A belt having extreme lateral stiffness, relative to its width, will be more difficult to train due to its lack of contact with the center roll of the carrying idler. Recognition of this fact enables the user to take extra precaution and, if necessary, load the belt during training to improve its steer ability. Observation of troughability design limitations will normally avoid this trouble. (Figure 9)

Some new belts may tend to run off to one side, in a certain portion or portions of their length, because of temporary lateral mal-distributions of tension. Operation of the belt under tension corrects this condition in practically all cases. Use of self-aligning idlers will aid in making the correction.

SEQUENCE OF TRAINING OPERATIONS

Initial installation of conveyor equipment or the set-up of a radial stacker should ensure good alignment of all pulleys, troughing and return idlers, i.e. they should be placed at right angles to the direction of belt travel, leveled and centered on a straight line. First movement of the belt should be slow and intermittent so that any tendency of the belt to run off may be quickly observed and the belt stopped

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BELT INSTALLATION

before damage occurs.

When the conveyor is a long center installation, men should be stationed at frequent intervals to observe the action of the belt. They should be provided with an effective method of communication so as to report their observations and, if necessary, cause the belt to be stopped.

Initial movement of the belt will provide indication of where corrections of the types described are required. The first corrections must be those at points where the belt is in danger of being damaged. Once the belt is clear of all danger points, a sequence of training operations can be followed.

The best procedure to use in starting the training sequence is probably to start with the return run and work toward the tail pulley. This assures early centering of the belt on the tail pulley so that it can be centrally loaded.

If the empty belt troughs readily, so that its running tendencies are not erratic, the training can and should be completed. Should the belt tend toward stiffness and erratic running, getting some load onto the belt as soon as the return run has been straightened up and the belt centered on the tail pulley will help hold the top run.

Normally, the belt can be trained properly onto the tail pulley by manipulation of return idlers and with the assistance of self-aligning return rolls. Seldom is any adjustment of snub or tail pulley necessary but the snub can be used as a supplementary training means.

Training of the top run, with the belt empty, is usually no problem if the belt troughs readily. In this case self-aligners on top are not required except as insurance against damage in the region approaching the head pulley. There, two self-aligners placed approximately 40' and 80' preceding the pulley, will help re-center the belt if it is ever forced off due to some temporary disturbance.

It should not be necessary to use the head pulley

for training purposes if it has been aligned properly. Likewise, the snub following the head pulley should not be required as a training means. It is relatively ineffective as a training device due to the strong influence of the head pulley.

The take-up carriage has a strong influence on the running of the belt at that point and, due to its movement as belt length changes, is subject to misalignment. A vertical take-up carriage, hanging in a festoon of belt, must be guided in its travel so that the pulley shaft remains horizontal. The belt cannot be depended upon to center itself on the pulley and, once it moves off center, the pulley will tip out of horizontal if not guided closely on its posts.

A horizontal take-up carriage is subject to misalignment due to loose track gauge, fouled rails or even jumping off the track. V-shaped rails will hold the gauge tight and, with the apex upward, are self-cleaning. Hold-down rails above the wheels with sufficient clearance so that they do not touch under normal operation will help prevent jumping off the track. (*Figure 10*)

With the empty belt trained satisfactorily, good operation with load is usually assured. Disturbances which appear with load are usually due to off-center loading or, to accumulation of material from the load on snub pulleys and return idlers.

When equipment is known to be properly aligned, training action should be taken slowly and in small steps because the belt requires some time to respond to corrective measures. It should begin at some point preceding that where run-off occurs and then gradually proceed forward, in the direction of belt travel, until the run-off condition has been corrected.

Under some conditions of operation where the conveyor is not level, is extremely short or too wide to be affected by permissible crowning, belts with a special guide strip have been used. This V-guide strip runs loosely in grooved pulley and

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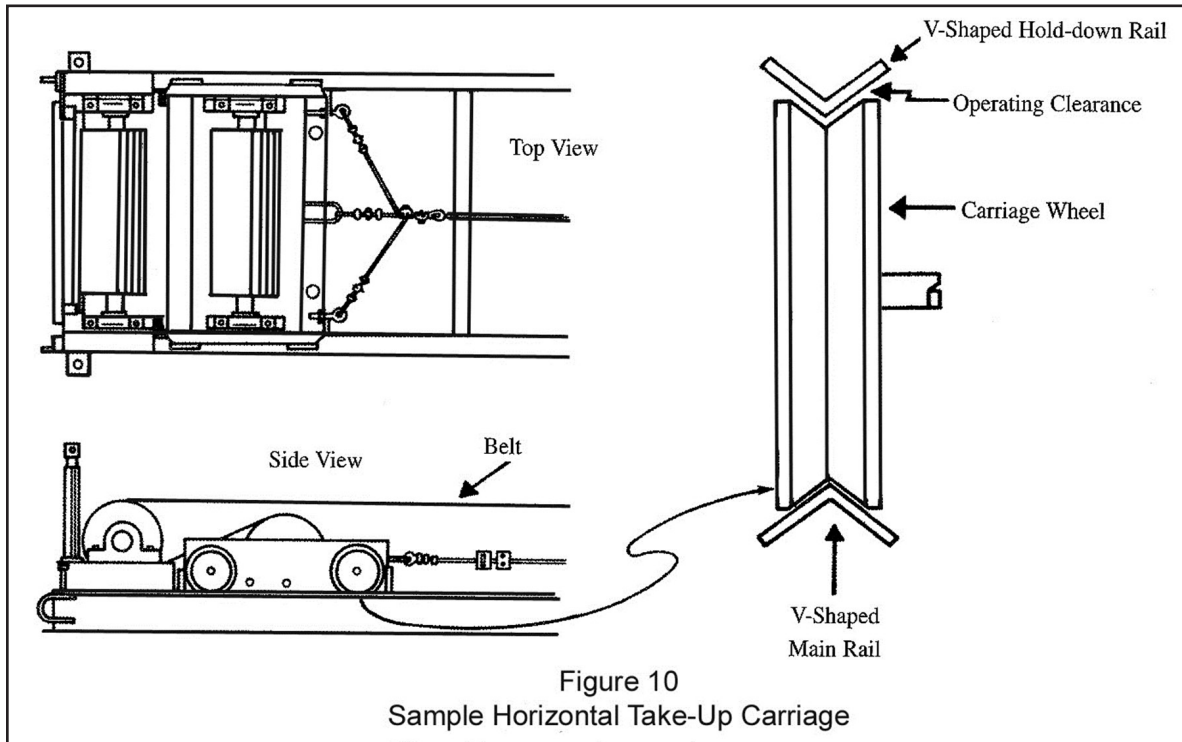
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idler rolls. Guide strips are not recommended or necessary for the long conveyors normally encountered in industrial use.

MAINTENANCE

Cleaning

Special care must be exercised to keep the return rolls and snub pulleys clean. Buildup of material on this equipment has a destructive effect upon training with the result that the belt may run against the structure and damage itself. It is advisable wherever possible that return idlers be suspended far enough below the structure so that any misalignment or dirty idlers can be easily seen. Caution must be used to insure that cleaning devices are used before the materials are allowed to accumulate to the point that the belt is running in it, and it creates more damage than if cleaning it had not been done at all.

Keeping the return rolls and snubs clean requires that the belt be clean when it enters the return run. Scraping is the most common method of doing this.

Rubber scrapers can be made by clamping rubber slabs $\frac{1}{2}$ " to 1" thick (not old belting) between two metal or wooden bars. Extend the rubber about twice its thickness beyond the bars and suspend the mechanism with a counter-weight to provide the pressure against the belt. Replace the rubber when it wears down near the bars. Two or three such scrapers can be used in succession.

The most common steel scraper is a series of diagonally set blades mounted on the end of a leaf spring to maintain pressure against the belt. These will scrape sticky materials which rubber scrapers may ride over.

Washing the belt with a water spray before wiping with a rubber scraper will do a good cleaning job on

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almost any material, including iron ores and mixed concrete.

Dry materials can be cleaned off the belt with rotating bristle or rubber vane brushes, driven at fairly high surface speed, usually three to five times the belt speed. They wear rapidly, require considerable maintenance and are likely to fill up solid if used with wet and sticky materials.

It is preferable to clean just after the head pulley and before the snub. An exception to this is that sticky material often requires scraping on the head pulley. This is because a large part of the fine material sticks to the belt and must be scraped into the chute.

In some cases the best possible cleaning is insufficient and steps must be taken to compensate for the effect of a dirty belt. Snub pulleys can be kept from building up by the use of soft rubber lagging or by scraping directly against the pulley. Diagonal grooving will distort and discharge accumulations on these pulleys. Rubber disc or spiral type return rolls prevent build-up on themselves and thus save a training problem.

The only cleaning required on the pulley side is removal of material, principally lumps, which may fall or bounce onto the return run, and be carried between the belt and tail pulley if not removed. Rubber faced plows immediately in front of the tail pulley are used for this purpose. They are usually held against the belt by gravity and set at an angle to the direction of belt travel.

Another point on a conveyor which is often overlooked is the discharge end. Occasionally at the point of discharge to a pile or bin, material overfills and the belt runs in the material and the belt is worn or torn off and rendered unusable. If there is a possibility of this happening, care must be taken to monitor the operations or possibly install a level control switch to prevent damage.

Loading

Generally most wear and tear in a conveyor belt occurs at the loading point because of the material impact on the belt. The loading point of any conveyor or radial stacker is nearly always the critical point, the life determining point of the belt. Here the conveyor receives its major abrasion, and practically all of its impact. The “ideal condition” is to have the material pass from chute to belt at the same speed and direction of travel as the belt with a minimum amount of impact, and strike the belt between and just forward of the idlers.

Receiving material off-center will cause the belt to move sideways after loading as the center of the load seeks the lowest point in the troughing idlers. This can be corrected by proper chute arrangement provided, of course, that the belt is centered as it enters the loading point.

The subject of chute design and arrangement is too broad to be discussed in detail, the following suggestions are offered:

The width of the receiving end of the loading chute should be great enough to accept material lying on the extreme edge of the preceding belt or feeder, and its position determined by the trajectory of the material coming into it. At no place should the chute be less than twice the size of the largest lumps, if fines are present, and 3 1/2 times the size of lumps, if uniform. The discharge width of the chute thus determined should not exceed about 2/3 of the receiving belts' width.

The slope of the chute is determined by the nature of the material, its entering velocity and length of the chute. This value varies with each particular installation, but about 35° has been found satisfactory for most dry industrial materials such as coal and rock.

An attempt to approach the above “ideal condition” should be made continually by adjusting the chute arrangement. Optimum loading and transferring

BELT MAINTENANCE

through chutes still requires considerable experimental adjustment in the field.

Skirt boards should be used to further center and settle the load as it leaves the loading point. The steel structure of the chute and skirts never should be placed closer to the surface of the belt than 1", this distance to be made increasing in the direction of belt travel to free any material trapped between the belt surface and the skirt. Skirt boards are usually 4 or 5 times the belt width in length, but may vary considerably due to belt speed, type of material and lump size.

Impact of material being loaded on the belt is often the cause of severe cuts and gouges. The degree of impact can be lessened to some extent by providing a cushion in the form of rubber covered disc type or semi-pneumatic idlers, which also tend to prevent material from crowding under the skirt boards at the instant of impact.

The use of a "Grizzly," a slightly fanned row of bars, at the bottom of the chute reduces wear on the belt. It distributes the impact of large lumps by allowing the fines to fall onto the belt first to act as a cushion. The fan shape of the "Grizzly" in the direction of travel prevents jamming of the lumps.

A "V-slot" cut in the bottom of the chute is another very satisfactory method of allowing fines to fall on the belt before the lumps and thereby reduce belt wear at this point.

Storage

Belts should be stored if at all possible, upright in its factory package until used, in a dry room between 50°F and 70° F, free from sunlight, steam pipes, oil and corrosive fumes. Under no conditions should rolls of belt be laid flat on a concrete floor. Moisture will shrink any exposed fabric which gets damp from such storage and the belt is liable to "bow" on one edge. Upright rolls on a dry wooden floor are recommended. Belts weighing more than 25,000 lbs. should be stored on A-frames and rotated a quarter turn every three months.

Reels or rolls should never be dropped from a freight car, truck, or other means of conveyance since their weight will break the packaging and may damage the belt. Reels or rolls should always be rolled or provisions should be made for hoisting them. For hoisting, a bar is passed through the hole in the center of the roll. Chains or cables looped around the bar ends should be provided with a spreader above the roll to avoid damage to the belt edges.

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REDUCERS

LUBRICATION

IMPORTANT: Because Torque-Arm reducers are shipped without oil, it is extremely important to add the proper amount of lubricant prior to operating reducer. For most applications a high-grade petroleum-base rust and oxidation inhibited (R&O) gear oil is suitable. Consult the following tables for proper oil volume and viscosity requirements.

Under severe conditions EP oil can be used provided the reducer is not equipped with an internal backstop. Internal backstops are designed to rely on friction to operate correctly. EP lubricants contain friction modifiers that will alter backstop performance and therefore must not be used on reducers equipped with internal backstops.

Follow instructions on reducer warning tags.

Lubrication is very important for satisfactory operation. The proper oil level must be maintained at all times. Frequent inspection, at least monthly, with the unit not running and allowing sufficient time for the oil to cool and the entrapped air to settle out of the oil should be made by removing the level plug and verifying the level is being maintained. If oil level is low, add the proper lubricant until the oil volume is increased to the correct level.

After an initial operation of about two weeks, the oil should be changed. If desired, this oil may be filtered and reused. After the initial break in period, under average industrial operating conditions, the lubricant should be changed every 2500 hours of operation. At every oil change, drain reducer and flush with kerosene, clean magnetic drain plug and refill to proper level with new lubricant.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200°F, the oil should be changed every 1 to 3 months, depending on severity of conditions.

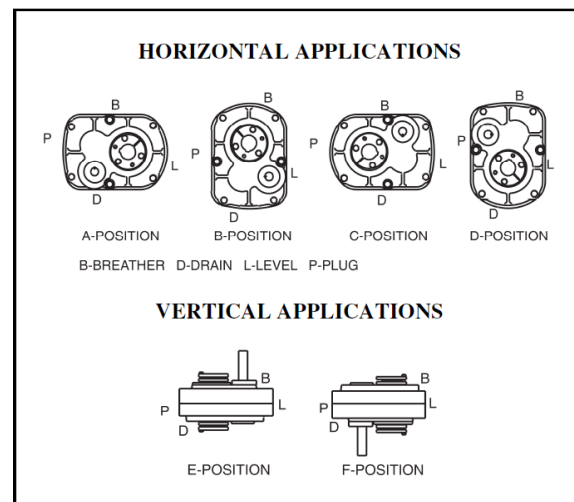
Heating is a natural characteristic of enclosed gearing. A maximum gear case temperature approaching 200°F is not uncommon for some

units operating in normal ambient temperatures of 80°F. When operating at the rated capacity with proper lubrication, no damage will result from this temperature. This maximum temperature was taken into consideration during the design of the reducer.

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe this precaution could result in equipment damage and/or bodily injury.

Smalis Conveyors generally orients the reducer with the pulley shaft located above the drive shaft as depicted by position B in figure 1. However, specialty applications may result in a differing orientation. It is therefore highly suggested that you verify both the manufacturer and orientation of the reducer prior to replacing the lubrication.

Figure 1: Mounting Positions



Note: Below 15 RPM output speed, oil level must be adjusted to reach the highest oil level plug (P).


DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury

CONVEYOR MAINTENANCE

LUBRICATION: WORLDWIDE ELECTRIC

CAUTION: All WorldWide Shaft Mount Reducers are shipped from Smalis Conveyors without oil. Every WorldWide Shaft Mount Reducer must be filled with a recommended gear oil. Failure to observe these precautions could result in damage to or destruction of the equipment.

Model Number	Approximate Capacity (Quarts & Liters)					
Position	A	B	C	D	E	F
SMR2	0.875 Quarts	1.0 Quarts	0.625 Quarts	1.0 Quarts	1.625 Quarts	1.75 Quarts
	0.83 Liters	0.95 Liters	0.59 Liters	0.95 Liters	1.54 Liters	1.66 Liters
SMR3	1.5 Quarts	1.5 Quarts	0.75 Quarts	2.25 Quarts	2.625 Quarts	3.0 Quarts
	1.42 Liters	1.42 Liters	0.71 Liters	2.13 Liters	2.48 Liters	2.84 Liters
SMR4	1.875 Quarts	2.25 Quarts	1.25 Quarts	1.75 Quarts	3.375 Quarts	4.25 Quarts
	1.77 Liters	2.13 Liters	1.18 Liters	1.66 Liters	3.19 Liters	4.02 Liters
SMR5	3.25 Quarts	4.0 Quarts	3.25 Quarts	4.0 Quarts	7.0 Quarts	8.625 Quarts
	3.08 Liters	3.79 Liters	3.08 Liters	3.79 Liters	6.62 Liters	8.04 Liters
SMR6	4.25 Quarts	5.0 Quarts	4.25 Quarts	5.0 Quarts	8.625 Quarts	9.125 Quarts
	4 Liters	4.7 Liters	4.0 Liters	4.7 Liters	8.2 Liters	8.6 Liters
SMR7	6.5 Quarts	8.0 Quarts	7.25 Quarts	9.25 Quarts	15.375 Quarts	16.375 Quarts
	6.1 Liters	7.57 Liters	6.86 Liters	8.75 Liters	14.55 Liters	15.5 Liters
SMR8	8.5 Quarts	11.0 Quarts	10.5 Quarts	8.5 Quarts	19.125 Quarts	19.125 Quarts
	8.0 Liters	10.4 Liters	9.94 Liters	8.0 Liters	18.10 Liters	18.10 Liters
SMR9	13.0 Quarts	13.0 Quarts	12.5 Quarts	14.25 Quarts	25.375 Quarts	25.375 Quarts
	12.3 Liters	12.3 Liters	11.83 Liters	13.48 Liters	24.0 Liters	24.0 Liters

	15° to 60° F (-9° to 16° C)		50° to 125° F (10° to 50° C)	
	Mobil SHC 629	Mobil SHC 630	Mobil SHC 630	Mobil SHC 632
<i>AGMA Rating</i>	4	5	5	6
<i>ISO Grade</i>	150	220	220	320
SMR2	N/A	1 - 400 RPM	N/A	1 - 400 RPM
SMR3	151 - 400 RPM	1 - 150 RPM	151 - 400 RPM	1 - 150 RPM
SMR4	126 - 400 RPM	1 - 125 RPM	126 - 400 RPM	1 - 125 RPM
SMR5	101 - 400 RPM	1 - 100 RPM	101 - 400 RPM	1 - 100 RPM
SMR6	41 - 400 RPM	1 - 40 RPM	41 - 400 RPM	1 - 40 RPM
SMR7	41 - 400 RPM	1 - 40 RPM	41 - 400 RPM	1 - 40 RPM
SMR8	41 - 400 RPM	1 - 40 RPM	41 - 400 RPM	1 - 40 RPM
SMR9	41 - 400 RPM	1 - 40 RPM	41 - 400 RPM	1 - 40 RPM

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CONVEYOR MAINTENANCE

LUBRICATION: DODGE

CAUTION: All Dodge Reducers are shipped from Smalis Conveyors without oil. Every Dodge Reducer must be filled with a recommended gear oil. Failure to observe these precautions could result in damage to or destruction of the equipment.

Model Number	Approximate Capacity (Quarts & Liters)					
Position	A	B	C	D	E	F
TXT1A	0.5 Quarts	0.5 Quarts	0.625 Quarts	0.75 Quarts	1.0 Quarts	1.25 Quarts
	0.5 Liters	0.5 Liters	0.625 Liters	0.75 Liters	1.0 Liters	1.125 Liters
TXT2A	0.875 Quarts	1.0 Quarts	0.625 Quarts	1.0 Quarts	1.625 Quarts	1.75 Quarts
	0.875 Liters	1.0 Liters	0.625 Liters	1.0 Liters	1.5 Liters	1.625 Liters
TXT3B	1.5 Quarts	1.5 Quarts	0.75 Quarts	2.25 Quarts	2.625 Quarts	3.0 Quarts
	1.375 Liters	1.375 Liters	0.75 Liters	2.125 Liters	2.5 Liters	2.875 Liters
TXT4B	1.875 Quarts	2.25 Quarts	1.25 Quarts	1.75 Quarts	3.375 Quarts	4.25 Quarts
	1.75 Liters	2.125 Liters	1.125 Liters	1.625 Liters	3.125 Liters	4.8 Liters
TXT5C	3.25 Quarts	4.0 Quarts	3.25 Quarts	4.0 Quarts	7.0 Quarts	8.625 Quarts
	3.125 Liters	3.75 Liters	3.125 Liters	3.75 Liters	6.625 Liters	8.125 Liters
TXT6A	4.25 Quarts	5.0 Quarts	4.25 Quarts	5.0 Quarts	8.625 Quarts	9.125 Quarts
	4 Liters	4.75 Liters	4.0 Liters	4.75 Liters	8.125 Liters	8.625 Liters
TXT7A	6.5 Quarts	8.0 Quarts	7.25 Quarts	9.25 Quarts	15.375 Quarts	16.375 Quarts
	6.125 Liters	7.5 Liters	6.875 Liters	8.75 Liters	14.5 Liters	15.5 Liters
TXT8A	8.5 Quarts	11 Quarts	10.5 Quarts	8.5 Quarts	19.125 Quarts	19.125 Quarts
	8.0 Liters	10.375 Liters	9.875 Liters	8.0 Liters	18.125 Liters	18.125 Liters
TXT9A	13.0 Quarts	13.0 Quarts	12.5 Quarts	14.25 Quarts	25.375 Quarts	25.375 Quarts
	12.25 Liters	12.25 Liters	11.875 Liters	13.5 Liters	24.0 Liters	24.0 Liters

ISO Grade for Ambient Temperature of 50° to 125° F

Output RPM	Torque Arm Reducer Size								
	TXT1A	TXT2A	TXT3B	TXT4B	TXT5C	TXT6A	TXT7A	TXT8A	TXT9A
301 - 400	320	320	220	220	220	220	220	220	220
201 - 300	320	320	220	220	220	220	220	220	220
151 - 200	320	320	220	220	220	220	220	220	220
126 - 150	320	320	320	220	220	220	220	220	220
101 - 125	320	320	320	320	220	220	220	220	220
81 - 100	320	320	320	320	320	220	220	220	220
41 - 80	320	320	320	320	320	220	220	220	220
11 - 40	320	320	320	320	320	320	320	320	320
1 - 10	320	320	320	320	320	320	320	320	320

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LUBRICATION: DODGE

<i>ISO Grade for Ambient Temperature of 15° to 60° F</i>									
Output RPM	Torque Arm Reducer Size								
	TXT1A	TXT2A	TXT3B	TXT4B	TXT5C	TXT6A	TXT7A	TXT8A	TXT9A
301 - 400	220	220	150	150	150	150	150	150	150
201 - 300	220	220	150	150	150	150	150	150	150
151 - 200	220	220	150	150	150	150	150	150	150
126 - 150	220	220	220	150	150	150	150	150	150
101 - 125	220	220	220	220	150	150	150	150	150
81 - 100	220	220	220	220	220	150	150	150	150
41 - 80	220	220	220	220	220	150	150	150	150
11 - 40	220	220	220	220	220	220	220	220	220
1 - 10	220	220	220	220	220	220	220	220	220

■Notes:

1. Assumes auxiliary cooling where recommended in the catalog.
2. Pour point of lubricant selected should be at least 10°F lower than expected minimum ambient starting temperature.
3. Extreme pressure (EP) lubricants are not necessary for average operating conditions. TORQUE-ARM internal backstops are not suitable for use with EP lubricants.
4. Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturer's representative for his recommendations.
5. For reducers operating in ambient temperatures between -22°F (-30°C) and 20°F (-6.6°C) use a synthetic hydrocarbon lubricant, 100 ISO grade or AGMA 3 grade (for example, Mobil SHC627). Above 125°F (51°C), consult DODGE Gear Application Engineering (864) 288-9050 for lubrication recommendation.
6. Mobil SHC630 Series oil is recommended for high ambient temperatures.

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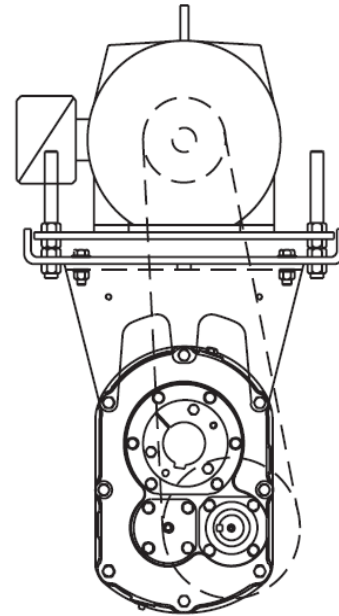
REDUCERS MAINTENANCE

Although Smalis conveyors are manufactured for many years of reliable service, many factors such as corrosive environments, ambient weather conditions and proper maintenance can influence the longevity of components.

Smalis Conveyors offers a wide variety of OEM replacement parts for both reducers as well as the entire drive assembly. Although a complete list of replacement parts is well beyond the scope of this document, we encourage you to contact our knowledgeable staff for assistance in identifying the required components.

Smalis Conveyors
1-800-348-0765
1-724-925-8500
sales@usaconvey.com

- ✓ Motors
- ✓ Motor Mounts
- ✓ Gearing
- ✓ Backstops
- ✓ Seal Kits
- ✓ Bearings
- ✓ Sheaves
- ✓ Bushings
- ✓ Torque Arms
- ✓ Shafts
- ✓ Shaft Keys
- ✓ Belts
- ✓ Guards



MAINTENANCE: WORLDWIDE ELECTRIC

IMPORTANT: Using tools normally found in a maintenance department, Shaft Mounted Reducers can be disassembled and re-assembled by careful attention to the instructions following.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears (for shrinking these parts on shafts) should be available.

The oil seals are of the rubbing type and considerable care should be used during disassembly and re-assembly to avoid damage to the surface which the seals rub on.

The key-seat in the input shaft, as well as any sharp edges on the output hub should be covered with tape or paper before disassembly or re-assembly. Also, be

careful to remove any burrs or nicks on surfaces of the input shaft or out hub before disassembly or re-assembly.

ORDERING PARTS: When ordering parts for reducers, specify reducer size number, part name, part number, and quantity.

It is strongly recommended that, when a pinion or gear is replaced, the mating pinion or gear is replaced also.

If the large gear on the output hub must be replaced, it is recommended that an output hub assembly of a gear assembled on a hub be ordered to secure undamaged surfaces on the output hub where the output seals rub. However, if it is desired to use the old output hub, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage

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MAINTENANCE: WORLDWIDE ELECTRIC

resulting from the pressing operation. To prevent oil leakage at the shaft seals, the smooth surface of the output hub must not be damaged.

If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against outer race of any bearing.

Because old shaft rubber oil seals may be damaged in disassembly, it is advisable to order replacements for these parts.

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury

REMOVING REDUCER FROM SHAFT:

CAUTION: Remove all external loads from drive before removing or servicing drive or accessories.

1. Remove bushing screws.
2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws, make sure screw threads and threaded holes in bushing flanges are clean.

DISASSEMBLY:

1. Position the reducer on its side and remove all housing bolts. Drive dowel pins from housing. Gently tap the output hub and input shaft with a soft hammer (rawhide, not a lead hammer) to separate the housing halves. Open housing evenly to prevent damage to the parts inside.
2. Lift shaft, gear, and bearing assemblies from housing.

3. Remove seals from housing.

RE-ASSEMBLY:

1. Output Hub Assembly: Heat gear to 160° to 180° to shrink onto hub. Heat bearings to 130° to 145° to shrink onto hub. Any injury to hub surfaces where the oil seals rub will cause leakage, making it necessary to use a new hub.

2. Countershaft Assembly: Shaft and pinion are integral. Press gear and bearings on shaft. Press against inner (not outer) race of bearing.

3. Input Shaft Assembly: Shaft and pinion are integral. Press bearings on shaft. Press against inner (not outer) race of bearings (for SMR2 press against the ball bearing on shaft).

4. Drive the two dowel pins into place in the right-hand housing half. Apply sealant to carriers for R.H. side (back stop side) of reducer. Install carriers and torque bolts with 30-27 for SMR3 to 6, 50-45 lb.-ft. for SMR7 to 9, for SMR2 do not have this carriers).

5. Place R.H. housing half on blocks to allow for protruding end of output hub.

6. Install bearing cups in right-hand housing half, making sure they are properly seated (for SMR2 do not have this step).

7. Mesh output hub gear and small countershaft gear together and set in place in housing. Set input shaft assembly in place in the housing. Make sure bearing rollers (cones) are properly seated in their cups. Set bearing cups for left-hand housing half in place on their rollers (except SMR2).

8. Clean housing flange surfaces on both halves, making sure not to nick or scratch the face. Apply sealant to flange face. (make sure that the sealant is placed between bolt holes and inside of the surface) Place L.H. housing into position and tap with a soft hammer (rawhide, not lead hammer) until housing bolts can be used to draw housing halves together. Torque housing bolts per torque values 30-27 lb.-ft. for SMR2, 50-45 lb.-ft. for SMR3 to 4, 75-68 lb.-ft. for SMR5 to 6, 150-135 lb.-ft. for SMR7 to 9.

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9. Place output hub seal carrier in position without shims and install two carrier screws diametrically opposed. Torque each screw to 25 in.-lbs. Rotate the output hub to roll in the bearings and then torque each screw to 50 in.-lbs. Again turn output hub to roll in the bearings. With a feeler or taper carrier flange. To determine the required shim thickness, take the average of the two feeler gage readings. Remove carrier and install the required shims plus 0.002. Install carrier with shims and torque bolts per torque values 17-15 lb.-ft. for SMR3, 30-27 lb.-ft. for SMR4 to 6, 50-45lb.-ft. for SMR7 to 9, for SMR2 do not have this step. Rotate hub assembly, tap lightly with rawhide mallet on end of hub, while rotating, to ensure bearings are seated. Using a dial indicator check end play of hub bearings, end play should be 0.001-0.003. Repeat this process as necessary to obtain proper end play. Place sealant inside the carrier at the shim I.D. and install carrier on reducer housing. Torque carrier bolts to value 17-15 lb.-ft. for SMR3, 30-27 lb.-ft. for SMR4 to 6, 50-45lb.-ft. for SMR7 to 9, for SMR2 do not have this step.

10. Adjust the countershaft bearings using the same method as in step 9 above. The axial end play should be 0.001" to 0.003".

11. Again, using the same procedure as in step 9, adjust the input shaft bearing, except the axial end play should be 0.002" to 0.004". Using gaskets install

input shaft cover and counter shaft cover to right-hand housing half. Install input and output seals. Extreme care should be used when installing seals to avoid damage due to contact with sharp edges on the input shaft or output hub. The possibility of damage and consequent oil leakage can be decreased by covering all sharp edges with tape prior to seal installation. Fill cavity between seal lips with grease. Seals should be pressed or tapped with a soft hammer evenly into place in the carrier, applying pressure only on the outer edge of the seals. A slight oil leakage at the seals may be evident during initial running, but should disappear unless seals have been damaged.

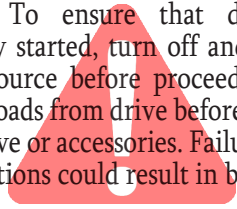
12. Install bushing backup plates and snap rings on Taper Bushed reducers. (Please note SMR6,8,9's snap rings have a little notch for the bushing screw, and the notch must have a right angle to output hub's key seat.)

13. Install the backstop into the housing (please take attention to the rotation of the output hub) if desired.

14. Install the backstop cover onto the box, if the cover was wrought iron, do not forget the backstop gasket, if the cover was cast iron, do not forget place some sealant to the joint surface (inside the bolt holes).

MAINTENANCE: DODGE

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury



REPLACEMENT OF PARTS

IMPORTANT: Using tools normally found in a maintenance department, a Dodge Torque-Arm speed reducer can be disassembled and reassembled by careful attention to the instructions following.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears (for shrinking these parts on shafts) should be available.

Smalis Conveyors can have reducers repaired for customers who do not have proper facilities or who, for any reason, desire factory service.

The oil seals are designed with a contact lip. Considerable care should be used during disassembly and reassembly to avoid damage to the surface on which the seals rub.

The keyseat in the input shaft, as well as any sharp edges on the output hub should be covered with tape or paper before disassembly or reassembly. Also, be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

Ordering Parts: When ordering parts for a Dodge Torque Arm reducer, specify reducer part number, part name, and quantity required.

It is strongly recommended that, when a pinion or gear is replaced, the mating pinion or gear is replaced also.

If the large gear on the output hub must be replaced, it is recommended that an output hub assembly

consisting of a gear assembled on a hub be ordered to ensure undamaged surfaces on the output hub where the output seals rub. However, if it is desired to use the old output hub, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the shaft oil seals, the smooth surface of the output hub must not be damaged.

If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against rollers or cage of any bearing.

Because old shaft oil seals may be damaged in disassembly, it is advisable to order replacements for these parts.

Removing Reducer from Shaft:**Taper Bushed Reducer:**

1. Disconnect and remove belt guard, v-drive, and motor mount as required. Disconnect torque arm rod from reducer adapter.
2. Remove bushing screws.
3. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws, make sure screw threads and threaded holes in bushing flanges are clean. A tap can be used to clean out the threads. Use caution to use the proper size tap to prevent damage to the threads.
4. Remove the outside bushing, the reducer, and then the inboard bushing.

Straight Bore Reducer:

1. Disconnect and remove belt guard, v-drive, and motor mount as required. Disconnect torque arm rod from reducer adapter.

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2. Loosen and remove the set screws in both output hub collars.

3. Remove the collar from the output hub closest to the end of the shaft. This will expose three puller holes in the output hub to permit the use of a three prong puller. In removing the reducer from the shaft, use care not to damage the reducer output hub.

Disassembly:

1. Drain all oil from the reducer.

2. Remove all locking collars, retaining rings, and bushing backup plated as required. Position the reducer on its side and remove all housing bolts. Using the three pry slots around the periphery of the flange, gently separate the housing halves and open evenly to prevent damage to the parts inside. Remove the two dowel pins.

3. Lift input shaft, all gear assemblies, and bearing assemblies from housing.

4. Remove seals from housing.

5. Remove bearings from shafts and hubs. Be careful not to scratch or damage any assembly or seal area during bearing removal. The hub assembly can be disassembled for gear replacement but if scratching or grooving occurs on the hub, seal leakage will occur and the hub will need to be replaced.

TXT Reassembly:

1. Output Hub Assembly: Heat gear to 325°F to 350°F to shrink onto hub. Heat bearings to 270°F to 290°F to shrink onto hub. Any damage to the hub surfaces where the oil seals rub will cause leakage, making it necessary to replace the hub.

2. Countershaft Assembly: Heat gear to 325°F to 350°F and bearings to 270°F to 290°F to shrink onto shaft.

3. Input Shaft Assembly: Heat bearings 270°F to 290°F to shrink onto shaft. Press bearings on shaft.

4. Drive the two dowel pins into place in the right-hand housing half (backstop side).

5. Place R.H. housing half on blocks to allow for protruding end of output hub.

6. Install all bearing cups on TXT3B thru TXT10A in right-hand housing half, making sure they are properly seated. TXT1A and TXT2A reducers use ball bearings on all shafts and do not incorporate bearing cups.

7. Mesh output hub gear and small countershaft gear together and set in place in housing. Set input shaft assembly in place in the housing. Make sure bearing rollers (cones) are properly seated in their cups.

8. Make sure both housing halves are clean. Apply a continuous 1/8" diameter bead of Dow Corning RTV732 sealant on the flange surface of the R.H. housing (make sure RTV is placed around all bolt holes). Set the left-hand housing half into position onto the dowel pins and gently tap with a soft hammer (rawhide, not lead hammer) until housing bolts can be used to draw housing halves together. Make sure reducer shafts do not bind while tightening housing bolts. Torque housing bolts per torque values listed in Table 2.

9. On TXT1A and TXT2A reducers, skip to step number 12.

10. Place the output bearing cup into the housing and tap into place. Install the output seal carrier and draw down with two bolts 180° apart to 50 inch pounds of torque. Loosen both bolts then retighten finger tight only. Measure the clearance between the housing and carrier flange at each bolt and average the two values. Add 0.010" to the average reading and make up shim pack. Install shim pack between the carrier flange and the reducer housing. Torque the bolts to the value shown in Table 2. Using a magnetic base and dial indicator, check the axial end play. Add or remove shims until the axial endplay reading of the output hub is per Table 1.

11. Repeat step 9 above for installing and adjusting the countershaft and input bearings. Adjust the axial endplay per Table 1.

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12. Install input and output seals. Lightly coat the seal lips with Mobilith AW2 All-Purpose grease or equivalent. The possibility of damage and consequent oil leakage can be decreased by covering all sharp edges with tape prior to seal installation. Seals should be pressed or tapped with a soft hammer evenly into place in the reducer housing, applying pressure only on the outer edge of the seals.

Extreme care should be used when installing seals to avoid damage due to contact with sharp edges on the input shaft or output hub. A slight oil leak at the seals may be evident during initial running, but should disappear unless seals have been damaged.

13. Install bushing backup plates and snap rings on Taper Bushed reducers or hub collars on straight bore reducers and install backstop cover. Make sure all bolts are tightened to the correct torque values listed in Table 2.

Table 1: Bearing Adjustment Tolerances

Reducer Size	Bearing Endplay Values		
	Input	Counter Shaft	Output
TXT1A	N/A	N/A	N/A
TXT2A	N/A	N/A	N/A
TXT3B	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT4B	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT5C	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT6A	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT7A	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT8A	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT9A	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose
TXT10A	.002-.004 Loose	.0005-.003 Loose	.0005-.003 Loose

Table 2: Recommended Bolt Torque Values

Reducer Size	Recommended Torque Values (lbs. - ft.)			
	Housing Bolts	Outer Seal Carrier	C/S Bearing Cover	Input Seal Carrier
TXT1A	30 - 27	N/A	N/A	N/A
TXT2A	30 - 27	N/A	N/A	N/A
TXT3B	50 - 45	17 - 15	17 - 15	17 - 15
TXT4B	50 - 45	30 - 27	30 - 27	30 - 27
TXT5C	75 - 68	30 - 27	30 - 27	30 - 27
TXT6A	75 - 68	30 - 27	30 - 27	30 - 27
TXT7A	150 - 135	50 - 45	50 - 45	50 - 45
TXT8A	150 - 135	30 - 27	30 - 27	30 - 27
TXT9A	150 - 135	30 - 27	30 - 27	30 - 27
TXT10A	150 - 135	30 - 27	30 - 27	30 - 27

Table 3: Backstop Cover Bolt Recommended Torque Values

Reducer Size	Fastener Size	Torque in Ft.-Lbs
TXT1A	10 - 24 x 3/8	5 - 4
TXT2A	10 - 24 x 3/8	5 - 4
TXT3B	10 - 24 x 3/8	5 - 4
TXT4B	1/4 - 20 x 1/2	8 - 7
TXT5C	1/4 - 20 x 1/2	8 - 7
TXT6A	1/4 - 20 x 1/2	8 - 7
TXT7A	1/4 - 20 x 1/2	8 - 7
TXT8A	1/4 - 20 x 1/2	8 - 7
TXT9A	1/4 - 20 x 1/2	8 - 7
TXT10A	1/4 - 20 x 1/2	8 - 7

TXT TAPERED BUSHING INSTALLATION

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury

Taper Bore Bushings:

1. One bushing assembly is required to mount the reducer on the driven shaft. An assembly consists of two tapered bushings, bushing screws and washers, and necessary shaft keys or key.

The driven shaft must extend through the full length of the reducer. The minimum shaft length, as measured from the end of the shaft to the outer edge of the bushing flange (see Figure 1), is given in Table 4. This dimension does not include dimension "A". Dimension "A" should be added to the minimum shaft length to allow for the removal of the bushings at disassembly.

2. Place one bushing, flange end first, onto the driven shaft and position per dimension "A", as shown in Table 5. This will allow the bolts to be threaded into the bushing and for future bushing and reducer removal. If the reducer must be

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positioned closer to the equipment than dimension “A”, place the screws, with washers installed, into the unthreaded holes of the bushing flange prior to placing the bushing on the shaft and position as required.

3. Insert the output key in the shaft and bushing. For easy of installation, rotate the driven shaft so that the shaft keyseat is at the top position.

4. Mount the reducer on the driven shaft and align the shaft key with the reducer hub keyway. Maintain the recommended minimum distance “A” from the shaft bearing.

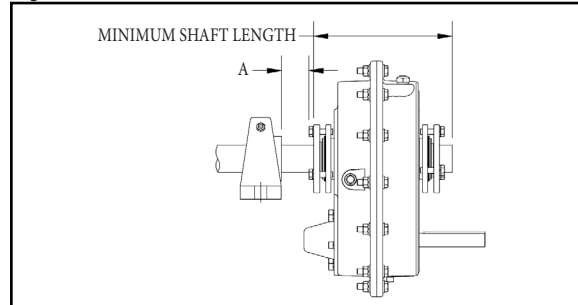
5. Insert the screws, with washers installed, in the unthreaded holes in the bushing flange and align with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing screws. Tighten the screws lightly. If the reducer must be positioned closer than dimension “A”, place the screws with washers installed, in the unthreaded holes in the bushing before positioning reducer making sure to maintain at least 1/8” between the screw heads and the bearing.

6. Place the second tapered bushing in position on the shaft and align the bushing keyway with the shaft key. Align the unthreaded holes in the bushing with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing holes. Insert bushing screws, with washers installed in the unthreaded holes in the bushing. Tighten screws lightly.

7. Alternately and evenly tighten the screws in the bushing nearest the equipment to the recommended torque given in Table 5. Repeat procedure on outer bushing.

Straight Bore Bushings:

1. One bushing assembly is required to mount the reducer on the driven shaft. An assembly consists of one keyed straight bushing, one plain straight

Figure 1: Minimum Recommended Dimensions**Table 4: Minimum Mounting Dimensions and Bolt Torques**

Minimum Required Shaft Length		
Reducer Size	Taper Bushing	Straight Bushing
TXT1A	6-1/2	5-5/8
TXT2A	6-3/4	5-13/16
TXT3B	8-9/16	7-11/16
TXT4B	9-5/16	8-1/4
TXT5C	9-3/4	8-11/16
TXT6A	10-3/4	9-5/8
TXT7A	11-15/16	10-3/4
TXT8A	13-1/8	11-3/8
TXT9A	13-0	11-3/8
TXT10A	14-13/16	12-3/8

Table 5: Minimum Mounting Dimensions and Bolt Torques

Bushing Screw Information and Clearance for Removal			
Reducer Size	Fastener Size	Torque in In-Lbs	Dim. “A”
TXT1A	5/16-18	200	1-1/4
TXT2A	5/16-18	200	1-1/4
TXT3B	3/8-16	200	1-1/2
TXT4B	3/8-16	360	1-3/4
TXT5C	3/8-16	360	1-13/16
TXT6A	1/2-13	360	1-13/16
TXT7A	1/2-13	800	2-1/16
TXT8A	1/2-13	800	2-1/16
TXT9A	1/2-13	900	2-7/16
TXT10A	5/8-11	900	2-7/16

bushing, required set screws, and necessary shaft key or keys. The driven shaft must extend through the reducer to operate properly. The minimum shaft length, as measured from the end of the shaft to the outer edge of the retaining collar, is given in Table 1.

2. Install the plain bushing into the reducer output hub on the side toward the equipment or bearing. Remove two short set screws from the retaining collar and install two of the longer set screws

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supplied with the bushing kit. Line up the bushing holes with the set screws. Thread the set screws in until they locate into the bushing holes. Make sure the set screws are threaded in only enough to locate the bushing in the reducer hub and does not extend thru the bushing.

3. Install the keyed bushing into the opposite end of the reducer hub as the plain bushing. Remove one short set screw from the retaining collar and install the remaining set screw from the bushing kit into the collar. Line up the bushing hole with the set screw. Thread the set screw in until it locates into the bushing hole. Make sure the set screw is threaded in only enough to locate the bushing in the reducer hub and does not extend thru the bushing.

4. Mount the reducer on the driven shaft as close to the equipment or bearing as practical.

5. Line up the keyway in the bushing with the keyway in the driven shaft. Insert the key supplied with the bushing kit into the keyway. Gently tap

the key into position until the key is flush with the edge of the reducer. Securely tighten all set screws.

Standard Tapered Bushings Removal:

1. Remove bushing screws.

2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws make sure screw threads and threaded holes in the bushing flanges are clean. If the reducer was positioned closer than the recommended minimum distance "A" as shown in Table 1, loosen the inboard bushing screws until they are clear of the bushing flange by 1/8". Locate two (2) wedges at 180 degrees between the bushing flange and the bushing backup plate. Drive the wedges alternately and evenly until the bushing is free on the shaft.

3. Remove the outside bushing, the reducer, key(s), and inboard bushing.

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REDUCERS

LONG TERM STORAGE

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GUIDELINES FOR LONG-TERM STORAGE:

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage.

PREPARATION:

1. Drain the oil from the unit. Add a vapor phase corrosion inhibiting oil in accordance with followed table.

Table 1: Quantities of Vapor Phase Oil

Size	2	3	4	5	6	7	8	9
Liters	.1	.1	.2	.3	.4	.5	.6	.9

2. Seal the unit airtight. Replace the air breather plug with standard pipe plug and wire the vent to the unit.

3. Cover the shaft extension with a waxy rust preventative compound that will keep oxygen away from the bare metal.

4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside or cover the unit with a durable waterproof cover which can keep moisture away.

5. Protect reducer from dust moisture, and other contaminants by storing the unit in a dry area.

6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors, cover the entire

exterior with a rust preventative.

WHEN PLACING THE REDUCER INTO SERVICE:

1. Assemble the vent plug into the proper hole.
2. Clean the shaft extensions with petroleum solvents.
3. Fill the unit to the proper oil level using a recommended lubricant. The vapor phase corrosion inhibiting oil will not affect the new lubricant.
4. Follow the installation instructions provided by the manufacturer.

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GUIDELINES FOR TXT REDUCER LONG-TERM STORAGE

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage:

Preparation: 1. Drain oil from the unit. Add a vapor phase corrosion inhibiting oil (VCI-105 oil by Daubert Chemical Co.) in accordance with Table 1.

2. Seal the unit airtight. Replace the vent plug with a standard pipe plug and wire the vent to the unit.

3. Cover all unpainted exterior parts with a waxy rust preventative compound that will keep oxygen away from the bare metal. (Non-Rust X-110 by Daubert Chemical Co. or equivalent)

4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside, or cover the unit with a durable waterproof cover which can keep moisture away.

5. Protect reducer from dust, moisture, and other contaminants by storing the unit in a dry area.

6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors,

cover the entire exterior with a rust preventative.

When placing the reducer into service:

1. Fill the unit to the proper oil level using a recommended lubricant. The VCI oil will not affect the new lubricant.
2. Clean the shaft extensions with petroleum solvents.
3. Assemble the vent plug into the proper hole. Follow the installation instructions provided by the manufacturer

Table 1: Quantities of VCI #105 Oil

Reducer Size	Quantity (Ounces / Milliliters)
TXT1A	1 / 30
TXT2A	1 / 30
TXT3B	1 / 30
TXT4B	1 / 30
TXT5C	1 / 30
TXT6A	2 / 59
TXT7A	2 / 59
TXT8A	3 / 89
TXT9A	4 / 118
TXT10A	6 / 177

VCI #105 and #10 are interchangeable. VCI #105 is more readily available.

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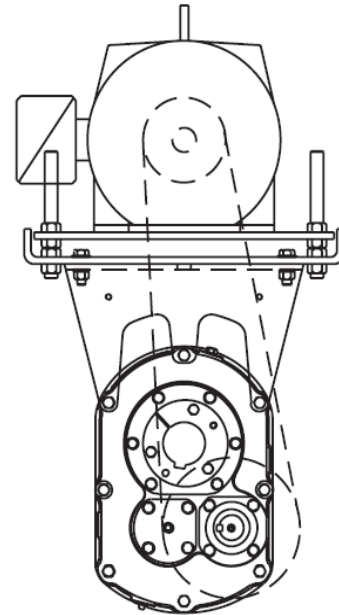
MAINTENANCE

Although Smalis conveyors are manufactured for many years of reliable service, many factors such as corrosive environments, ambient weather conditions and proper maintenance can influence the longevity of components.

Smalis Conveyors offers a wide variety of OEM replacement motors and parts for the entire drive assembly. Although a complete list of replacement parts is well beyond the scope of this document, we encourage you to contact our knowledgeable staff for assistance in identifying the required components.

Smalis Conveyors
1-800-348-0765
1-724-925-8500
sales@usaconvey.com

- ✓ Motors
- ✓ Motor Mounts
- ✓ Gearing
- ✓ Backstops
- ✓ Seal Kits
- ✓ Bearings
- ✓ Sheaves
- ✓ Bushings
- ✓ Torque Arms
- ✓ Shafts
- ✓ Shaft Keys
- ✓ Belts
- ✓ Guards



SAFETY DEPENDS ON YOU

Motors that are 3-phase industrial motors are designed and built with safety in mind. However, your overall safety can be increased by proper installation and thoughtful operation. Read and observe all instructions and specific safety precautions included in the manual, and most importantly, think before you act and be careful. This equipment contains hazardous voltages, rotating parts and hot surfaces. Severe personal injury or property damage can result if safety instructions are not followed. The successful and safe operation of this equipment is dependent upon proper handling, installation, operation and maintenance.

QUALIFIED PERSON

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices, and maintenance procedures contained herein. In addition, they have the following qualifications:

1. Are trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
2. Are trained in the proper care and a use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
3. Are trained in rendering first aid.

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MOTORS

MAINTENANCE

Motor Inspection

Periodically inspect your motor for excessive dirt, friction or vibration. Dust may be blown from inaccessible locations using compressed air. Keep the ventilation openings clear to allow free passage of air. Be sure the drain holes in the motors are kept open and the shaft slinger is positioned against the end bracket.

Grease or oil can be wiped by using a petroleum solvent.

Overheating of the bearings caused by excessive friction is usually caused by one of the following factors:

1. Bent shaft.
2. Excessive belt tension.
3. Excessive end or side thrust from the gearing, flexible coupling, etc.
4. Poor alignment.

Damaging vibrations can be caused by loose motor mountings; motor misalignment resulting from the settling or distortion of the foundation, or it may be transmitted from the driven machine. Vibration may also be caused by excessive belt or chain tension.

Failure to properly maintain the equipment can result in severe personal injury and product failure. The instructions contained herein should be carefully reviewed, understood and followed. The following maintenance procedures should be performed regularly:

Bearing lubrication

Prior to shipment, motor bearings are lubricated with grease, the proper amount and grade, to last at least six months under typical service, under normal operation and conditions. Where the motor is used constantly in dirty, wet or corrosive atmospheres, it is advisable to add one-quarter ounce of grease per bearing every three months.

Bearing life is assured by maintaining proper alignment, proper belt or chain tension, and good lubrication at all times. When greasing the bearings, keep all dirt out of the area. Wipe the fittings completely clean and use clean equipment. More bearing failures are caused by dirt introduced during greasing than from insufficient grease.

Do not lubricate motor while in operation, since excess grease will be forced through the bearings and into the motor before it will force its way out of the drain plug. Excess grease accumulation on windings reduces insulation life.

For best results, grease should be compounded from a polyurea base and a good grade of petroleum oil. It should be of NO.2 consistency and stabilized against oxidation. Operating temperature range should be from -15°F to +250°F for class B insulation, and to +300°F for class F and H. Most leading oil companies have special bearing greases that are satisfactory.

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury

Relubricate bearings about every six months (more often if conditions require), as follows:

- 1) Stop the motor. Lock out the switch.
- 2) Thoroughly clean off pipe plugs and remove from housings.
- 3) Remove hardened grease from drains with stiff wire or rod.
- 4) Add grease to inlet with hand gun until small amount of new grease is forced out of drain.

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5) Remove excess grease from ports, replace inlet plugs, and run motor ½ hour before replacing drain plug.

6) Put motor back in operation.

Insulation Resistance Check

Check insulation resistance periodically. Any approved method of measuring insulation resistance may be used, provided the voltage across the insulation is at a safe value for the type and condition of the insulation. A hand cranked megger of not over 500 volts is the most convenient and safest method.

Standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) recommend that the insulation resistance of stator windings at 75°C, measured at 500 volts DC, after one minute should not be less than:

$$\frac{\text{Rated Voltage of Machine} + 1000}{1000} = \text{Insulation Resistance in Megohms}$$

This formula is satisfactory for most checks. For more information; see IEEE Standard No. 43, "Recommended Practice for Insulation Resistance Testing of AC Rotating Machinery".

Cleaning

- Do not attempt to clean motor while it is operating. Contact with rotating parts can

cause severe personal injury or property damage. Stop the motor and lock out switch before cleaning.

- The motor exterior must be kept free of oil, dust, dirt, water, and chemicals. For fan cooled motors, it is particularly important to keep the air intake openings free of foreign material. Do not block air outlet or inlet.
- On non-explosion-proof TEFC motors, a removable plug in the bottom center of the motor frame or housing permits removal of accumulated moisture. Drain regularly.
- This checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures.
- Dangerous voltages are present in the equipment which can cause severe personal injury and product failure. Always de-energize and ground the equipment before maintenance. Maintenance should be performed only by qualified personnel.
- The use of unauthorized parts in the repair of the equipment, tampering by unqualified personnel, or removal or alteration of guards or conduit covers will result in dangerous conditions which can cause severe personal injury or equipment damage. Follow all safety instructions contained herein.

MOTORS

REPLACEMENT

Installation must be handled by qualified personnel. Motors may be mounted in any position. The motors have drain holes suitable for standard horizontal and vertical mountings. Other mounting positions may require either rotation of the end brackets for drilling additional holes to attain proper drainage. Before drilling additional holes in the motor enclosure, remove the end brackets to prevent blindly drilling into the winding or other functional parts of the motor. Make sure the inside of the motor is cleared of drill chips and any other foreign matter before reassembling the motor.

The motor foundation must be sure that the motor rests evenly on all feet. Shims may be needed when precise alignment is required, so they will not be pulled out of the foundation when mounting bolts are tightened. All wiring to the motor and control must be in accordance with the National Electrical Code and all local regulations. Before drive is connected, momentarily energize motor to check that direction of rotation is proper. For direct drive, accurate alignment is 0.004 inch/ft. (radius to dial indicator = one foot.)

Any change in shims requires rechecking alignment. When alignment is within limits, dowel two feet of each unit. When installing flat belt pulley, V-belt sheave, spur or helical pinion or chain drives, be certain that they are within NEMA limitations.

OPERATION

Repeated trial starts can overheat the motor and may result in motor burnout. If repeated trial starts are made, allow sufficient time between trials to permit heat to dissipate from windings and rotor to prevent overheating. Starting currents are several times running currents, and heating varies as the square of the current.

After installation is completed, but before motor is put in regular service, make an initial start as follows:

1. Check motor starting and control device

connections against wiring diagrams. If the motor rotates in the wrong direction, interchange any two line leads.

2. Check voltage, phase, and frequency of line circuit (power supply) against motor nameplate.
3. If possible, remove external load (disconnect drive) and turn shaft by hand to ensure free rotation. If done during installation procedure it may not be necessary.
 - a. If drive is disconnected, run motor free of load long enough to be certain that no unusual conditions develop. During this period, check for any unusual or excessive noise or thermal conditions, and stop motor immediately if present. Investigate the cause and correct before putting motor in service.
 - b. If drive is not disconnected, interrupt the starting cycle after motor has accelerated to low speed. Carefully observe for unusual conditions as motor coasts to a stop.
4. When checks are satisfactory, operate at minimum load and look for unusual condition. Increase load slowly to maximum. Check for satisfactory operation

CAUTION: *Guard against overloading.*

Overloading causes overheating and overheating means shortened insulation life. A motor subjected to a 10 degree Celcius temperature rise above the maximum limit for the insulation may cause the insulation life to be reduced by 50%. To avoid overloading, be sure motor current does not exceed nameplate current when nameplate voltage is applied.

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Electric motors operating under normal conditions become quite warm. Although some places may feel hot to the touch, the unit may be operational within limits. Use a thermo-couple to measure winding temperature when there is any concern.

The total temperature, not the temperature rise, is the measure of safe operation. Investigate the operating conditions if the total temperature measured by a thermocouple placed on the winding exceeds:

230°F (110°C) for class "8" insulation

275°F (135°C) for class "F" insulation

302°F (150°C) for class "H" insulation

Voltage Regulation

Motors will operate successfully under the following conditions of voltage and frequency variation, but not necessarily in accordance with the standards established for operation under rated conditions:

1. When the variation in voltage does not exceed 10% above or below normal, with all phases balanced.
2. When the variation in frequency does not exceed 5% above or below normal.
3. When the sum of the voltage and frequency does not exceed 10% above or below normal (provided the frequency variation does not exceed 5%).

Electrical Connections

Motor Voltage vs. Power System Voltage

Your new motor should be applied to voltage systems following the table information to the right.

NEMA Motor Nameplate Voltage	Nominal System Voltage
200	208
230	220, 230, 240
460	440, 460, 480
575	575, 600

Dual Voltage (200/400 or 230/460) Motors

Proper connection of the motor leads for either voltage is shown on the motor nameplate. For example, "LOW VOLTAGE" on the nameplate shows the wiring for the lower of the two possible input voltages listed on the nameplate. Each motor lead is tagged with the lead number corresponding to the connection diagram.

Dual voltage industry motors name plated 230/460 volts are suitable for 208 volt operation on the low voltage connection up to the maximum amps at 208 volts as listed on the nameplate. Such a motor (203 volt motor on 208 volt system) may not meet all NEMA performance limits. DO NOT apply 200-volt motors on 230 systems.

Single Voltage (150 Hp) Motors

These larger motors are specifically wound for single voltages. Standard voltages are 460 and 575 volts.

Connection to Power Supply

Proper branch circuit supply to a motor should include a disconnect switch, short circuit current fuse or breaker protection, motor starter (controller) and overload relay protection.

Short circuit current fuses or breakers are for the protection of the branch circuit. Starter or controller overload relays are for the protection of the motor.

Each of these should be properly sized and installed per the National Electrical Codes. Unless specifically exempted by the National Electrical Code of local codes ground the motor as specified in the codes. Some motors may be equipped with space heaters or thermal overload protection such as thermostats and thermistors. If installed, the name of the option will be listed on the motor nameplate.

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IDLERS

MAINTENANCE

Although Smalis conveyors are manufactured for many years of reliable service, many factors such as corrosive environments, ambient weather conditions and proper maintenance can influence the longevity of components.

Smalis Conveyors offers a wide variety of OEM replacement idler assemblies, individual rollers and guards. Although a complete list of replacement parts is well beyond the scope of this document, we encourage you to contact our knowledgeable staff for assistance in identifying the required components.

Smalis Conveyors
1-800-348-0765
1-724-925-8500
sales@usaconvey.com

- ✓ Flat Belt Idlers
- ✓ 20° Troughing
- ✓ 35° Troughing
- ✓ 45° Troughing
- ✓ Impact Idlers
- ✓ Training Idlers
- ✓ Picking Table Idlers
- ✓ Return Idlers
- ✓ Self Cleaning Idlers
- ✓ Drop Brackets
- ✓ Guide Rollers
- ✓ Regreasable Rollers
- ✓ Sealed Rollers
- ✓ In-line Frames
- ✓ Off-set Frames
- ✓ Pinch Guards
- ✓ CEMA B
- ✓ CEMA C
- ✓ CEMA D
- ✓ CEMA E
- ✓ CEMA E Plus
- ✓ Impact Cradles
- ✓ Impact Bars
- ✓ UHMW Boards
- ✓ Channel Supports
- ✓ Variety of Widths

LUBRICATION INSTRUCTIONS (Regreasable Type)

CAUTION: Safe practices for operating belt conveyors are given in American National Standards publication, "Safety Standards for Conveyors and Related Equipment" ANSI B20.1, Sections 5 and 6.01. Proper personal safety equipment and clothing must be worn and only persons completely familiar with these standards should be permitted to operate or maintain this equipment. Failure to observe these safety precautions and other specific procedures emphasized throughout these instructions may result in personal injury or damage to equipment.

The following information has been compiled for Stephens-Adamson (S&A), Series 2174 and 2175 Belt Conveyor Idlers. However, these instructions would be primarily the same regardless of the idler manufacturer.

All Stephens-Adamson idlers are factory lubricated

and ready for operation as received. Idlers not put in operation within six months after delivery must be field lubricated before installation. Greases that are exposed to the elements and not under operating conditions can oxidize and have separation of oil and base. When lubricating after long storage, grease each idler slowly, rotating each roller until fresh grease is observed coming out of the seal cartridge breather holes at both ends of each roller. Some grease may also appear where the shaft protrudes from the seal cartridge. Wipe off excess grease. Repeat the greasing every six months prior to start-up.

Since the purpose of greasing idler rolls is to lubricate the bearing and force foreign material and contaminated grease out of the seal, the frequency of re-lubrication is dependent upon the conditions and environment of each conveyor application.

The suggested guide that follows may be of assistance to those attempting to establish a realistic maintenance program. Bear in mind that different portions of the same conveyor may be subject to different environments and thus the same conveyor

IDLERS

MAINTENANCE

may require several different interval schedules. Also, lubrication intervals should not be confused with more frequent mechanical inspections conducted by operation personnel.

SUGGESTED GUIDE FOR LUBRICATION INTERVAL

Local Environment	Condition of Material Being Handled	Relubrication Schedule (***)
Clean, indoor, and dry	Clean and sized	5 years or more
	Dusty	2 years
Covered conveyor, outdoor, dry and humid	Clean and sized	5 years
	Dusty	2 years
Open Conveyor, indoor or outdoor and wet	Wet and sized	6 months or less
	Wet and fine	3 months or less

*** Based on normal 8-hour day. Continuous service may require more frequent intervals. Conscientious local personnel observing local conditions over a period of time should establish suitable lubrication schedules.

DANGER: Since the best results will be obtained if the idlers are lubricated while the conveyor is running, personnel must wear suitable clothing and exercise care when wiping fittings and attaching grease hose to fittings to avoid injury.

LUBRICATION PROCEDURE

- Grease fittings are located in shaft end at both ends of single rollers and at both end brackets of troughing idlers. Wipe fitting clean of dirt and old grease before attaching grease gun.
- Introduce grease until fresh grease is observed coming out of seal cartridge breather holes at both ends of each roller. Some grease may also appear where the shaft protrudes from the seal cartridge.

LUBRICATION SYSTEM DESCRIPTION

2174 and 2175 Series troughing idler rollers that are equipped with the SYNCHRO-LUBE system are connected together with flexible tubes having threaded fittings at both ends. Lubrication fittings are provided in the shaft end at each end bracket. Return rollers and flat rollers that are equipped with the SYNCHRO-LUBE system have lubrication fittings at each end of the roller shaft. The SYNCHRO-LUBE system provides a metered amount of grease to each bearing when grease is introduced from either end of the idler. Relief holes are provided in each bearing seal cartridge to purge air, foreign material and contaminated grease from each bearing chamber of each roller. The outer seal cartridge consists of a laminated nitrile rubber and felt contact seal.

RECOMMENDED LUBRICANT

2174 and 2175 Series idler rollers are factory greased with lithium soap multipurpose industrial grease, especially compounded to provide oxidation resistance and rust corrosion protection. Typical physical and chemical characteristics of the brand of grease to be used are listed in order to aid in obtaining compatible substitutes.

Mobil		MOBIL OIL CORPORATION
		MOBILUX - EP 1 (OR EQUAL)
NLG1#	1	
Structure	Smooth	
Soap Type	Non-lead Lithium 12 Hydroxystearate	
Color	Brown	
ASTM Penetration	Worked	325
At 77° F	Unworked	310-340
Dropping Point	340° F (Min)	
Mineral Oil %	89%	
Viscosity	75 SUS @ 210 degrees F	

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Roller Assembly and Idler Repair

2174 and 2175 Series rollers are machine assembled at the factory and cannot easily be dismantled and reassembled without special precision assembly equipment.

Idlers are provided with precision ground ball bearings factory lubricated and doubled sealed. In addition to the sealed bearing, cadmium plated metal cartridges containing a factory-oiled felt/nitrile seal provide additional protection to the roller assembly. Additional lubrication is not required in SEALED-FOR-LIFE idlers.

Squeaking rollers that are rotating or able to be rotated manually:

- If the idlers are SEALED-FOR-LIFE they should be frequently inspected and replaced if they become seized and can no longer be rotated manually.

- If the idlers are SYNCHRO-LUBE they may only need re-lubrication, however they should be frequently inspected and replaced if they become seized and can no longer be rotated manually.

Replacement Components

Spare parts for idler repairs are available. Gather the following information in addition to the individual part numbers for spare parts to be ordered before calling. Replacement rollers are ordered by idler series number, type, roller diameter and belt width.

- Idler Series Number
- Idler Type (Troughing, Return, Impact, etc.)
- Trough Angle (20 degree, 35 degree, 45 degree)
- Roller Diameter
- Belt Width

IDLERS

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The following information has been compiled for Stephens-Adamson (S&A), Series 2174 and 2175 Belt Conveyor Idlers. However, these instructions would be primarily the same regardless of the idler manufacturer.

Reliable operation and long service life of these idlers depend on the care taken during installation and operation. Periodic inspection and maintenance are required. The following information can be considered to be the minimum care recommended. Local environment, working conditions and regulations may require more frequent servicing.

NOTICE: Safe practices for operating belt conveyors are given in American National Standards publication, "Safety Standards for Conveyors and Related Equipment" ANSI B20.1, Sections 5 and 6.01. Proper personal safety equipment and clothing must be worn and only persons completely familiar with these standards should be permitted to operate or maintain this equipment. Failure to observe these safety precautions and other specific procedures emphasized throughout these instructions may result in personal injury or damage to equipment.

PRE-INSTALLATION CARE

All Stephens-Adamson idlers are factory lubricated and ready for operation as received. If the idlers are *SEALED-FOR-LIFE*, additional lubrication is not required. Idlers stored for an extended period of time must be stored inside or be covered with a tarpaulin. The cover should allow for air circulation to avoid condensation. SYNCHRO-LUBE idlers, which are not put in operation within 6 months after delivery, must be field lubricated before installation, because greases that are exposed to the elements and not under operation conditions, oxidize and have separation of oil and base. Refer to ***LUBRICATION INSTRUCTIONS*** for procedure and lubricant to be used.

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding with any belt conveyor idler installation. Failure to observe these precautions could result in bodily injury.

WARNING: Conveyor belts stopped with conveyed material on the belt may require substantial blocking to raise the belt line off of the idler being installed.

Open conveyor frames without decking may present additional hazards to personal safety while positioning and fastening idler frames in place.

Exercise extreme care when placing and removing any temporary blocking, decking or scaffolding that may be required before starting the belt conveyor.

TROUGHING IDLER INSTALLATION

1. Remove mud, stone or any other debris from conveyor stringers and deck plate. Remove all burrs, dents and bumps caused by excessive weld spatter so that the belt conveyor idler frame can be securely positioned level with the plane of the conveyor and perpendicular to the line of conveyor belt travel.
2. Troughing idler frames are marked with the conveyor belt width, troughing angle and a direction arrow. Check the conveyor carefully so that the idler roll diameter and frame correspond with others on the same conveyor.
3. Position the troughing idler frame on the conveyor frame so that the direction arrow marked on the idler frame end bracket

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points in the direction that the carrying run of the conveyor belt will move. The middle of each center roller of all troughing idlers must be located on the centerline of the conveyor and the idler frames must be perpendicular to the centerline of the conveyor.

When installing troughing idlers on a *REVERSIBLE BELT CONVEYOR*, position each idler frame so that the direction arrow points opposite to that of the next adjacent frame. Alternate the direction of the idler frames throughout the entire length of the conveyor.

4. Troughing idlers are shipped completely assembled but with out mounting bolts (2 req'd). Mounting bolts must be tightened securely after the idler frame is correctly positioned. Rollers are factory lubricated and ready for operation; those requiring additional lubrication will have fittings.
5. Rotate each roller to be sure it turns freely and make a thorough inspection before removal of blocking to be certain that the idler roller and lubrication lines and fittings were not damaged during installation.

BELT TRAINING TROUGHING IDLER INSTALLATION

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding with any belt conveyor idler installation. Failure to observe these precautions could result in bodily injury.

1. Belt training troughing idlers are installed above frame stringers or deck, usually about 50 feet away from terminals or bend pulleys,

in the same manner as regular troughing idlers. Follow previous instructions, under ***TROUGHING IDLER INSTALLATION.***

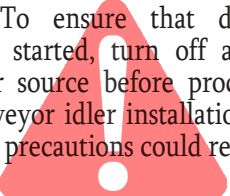
2. Belt training troughing idlers are shipped completely assembled without mounting bolts (4 required). Pivot and guide roller bearings are factory lubricated and sealed ready for operation. Rollers are factory lubricated and ready for operation; those requiring additional lubrication will have fittings.
3. Carefully check training idler position to be certain that the guide roller assemblies are properly located so that if the conveyor belt shifts, its edges will contact the guide rollers. The guide roller brackets should extend behind the frame pivot opposite, the direction that the arrow points. Release any blocking or shipping wires so that the roller frame can pivot freely and properly aid in maintaining conveyor belt alignment.
4. Belt training idlers are intended to aid in maintaining alignment when conditions such as temporary off center loading, unusual side wind or misalignment of a transient nature, due to lump concentration, disturbs the alignment of a properly installed conveyor. A properly aligned and loaded conveyor belt will not require corrective action from the belt training idlers.
5. When training idlers are used on belt conveyors equipped with belt trippers, they must be placed away from locations traversed by the tripper.
6. **IMPORTANT** – Periodically training idlers must be inspected for free movement and any accumulated dirt and debris must be removed.

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IMPACT TROUGHING IDLER
INSTALLATION

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding with any belt conveyor idler installation. Failure to observe these precautions could result in bodily injury.

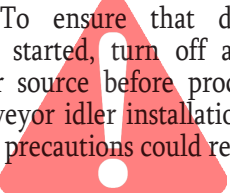


1. Impact troughing idlers are installed in the same manner as regular troughing idlers and are usually located under the loading portions of the system.

RETURN IDLER INSTALLATION
AND RUBBER DISC RETURN IDLER
INSTALLATION

Return roller assemblies are factory lubricated ready for operation as received. If the idlers are SEALED-FOR-LIFE additional lubrication is not required. SYNCHRO-LUBE idlers will have lubrication fittings installed at each shaft end. Refer to [LUBRICATION INSTRUCTIONS](#) for procedure and lubricant to be used. Hanger bracket and shaft retainer are shipped unassembled without mounting bolts.

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding with any belt conveyor idler installation. Failure to observe these precautions could result in bodily injury.



1. First, bolt hanger brackets loosely in place below belt conveyor frame side stringer.
2. Next, insert roller assembly with shaft retainer AD-IDL15-19-00 assembled on shaft into slot of each hanger bracket

while holding the shaft retainer open ends pinched together so that the slots will seat firmly in the brackets and the bent ends of each shaft retainer locks the roller assembly to each hanger bracket.

3. IMPORTANT- After the return roller has been assembled and properly aligned so that it is horizontal and square with the centerline of the conveyor frame, securely tighten the hanger bracket bolts so as to maintain roller alignment during operation.

BELT TRAINING RETURN IDLER
INSTALLATION

1. Belt training return idlers are installed below the conveyor frame stringers or deck in a location that is free of bracing, supports or other impediments that might limit free movement of the pivot frame or guide roller assembly. Usually they are located about 50 feet away from the terminals or bend pulleys.
2. Belt training return idlers are shipped completely assembled without mounting bolts (4 required). Pivot and guide roller bearings are factory lubricated and sealed ready for operation. Additional lubrication of return rollers may or may not be required; rollers requiring additional lubrication will have lubrication fittings installed at each shaft end.
3. Position the idler frame so that the direction arrow located on the end bracket points in the direction that the return run of the conveyor belt will move. The pivot point of the pivot frame assembly must be located on the centerline of the belt conveyor, and the idler frame must be perpendicular to the centerline of the belt conveyor. Bolt idler frame securely to conveyor frame

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with four bolts.

4. Check to be certain that the guide roller assemblies are properly located so the rollers will be able to contact the conveyor belt edges and are extended in a direction opposite to the direction arrow. Release any blocking or shipping wires so that the pivot frame can move freely without striking any obstruction.
5. IMPORTANT - Periodically training return idlers must be inspected for free movement, and any accumulated dirt and debris must be removed.

IDLER ROLLER REPLACEMENT

DANGER: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding with any belt conveyor idler installation. Failure to observe these precautions could result in bodily injury.

Rollers, of all styles of idlers, are field replaceable.

1. Carefully support carrying run of belt conveyor on both sides of idler frame to be removed.
2. Loosen mounting bolts and remove idler frame to a convenient, safe place for removal of roller.
3. Replace idler with spare idler to reduce duration of conveyor down time. Refer to installation instructions.
4. Loosen fitting 00-717-755-405 fastening connector tube AD-IDL07-04-** to shaft of roller to be removed. Fitting will remain attached to tube because of metal ferrule at tube end. If center roller is to be removed, fittings at both ends of roller shaft must be loosened.
5. Pull connector tube out of shaft end.
6. Remove end shaft retainer AD-IDL15-19-00 by pinching the ends together and lift the roller assembly out of the bracket. Remove retainer from shaft then repeat for other end of the roller assembly.
7. Remove plastic cap plugs from ends of new roller assembly. Insert fitting 00-717-755-405 in end of roller and insert connector tube AD-IDL07-04-** end into fitting. If this is a center roller, repeat for opposite end of roller. If end roller is being replaced, remove bushing AD-FIT05-001-1 and hydraulic fitting 00-733-105-024 from old roller and fasten to outer end of new roller shaft.
8. Insert roller assembly with shaft retainer AD-IDL15-19-00 assembled on shaft into slot of each bracket while holding the shaft retainer open, ends pinched together, so that the slots will seat firmly in the brackets and the bent ends of each shaft retainer locks the roller assembly to each bracket.
9. Rotate the rollers by hand to be sure it turns freely.
10. Rotate the rollers by hand while re-lubricating idler. Follow **LUBRICATION INSTRUCTIONS.**

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PULLEYS, SHAFTS AND BEARINGS

MAINTENANCE AND LONG TERM STORAGE

Although Smalis conveyors are manufactured for many years of reliable service, many factors such as corrosive environments, ambient weather conditions and proper maintenance can influence the longevity of components.

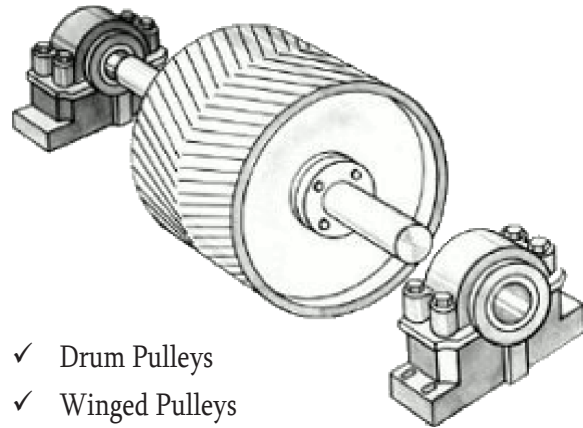
Smalis Conveyors offers a wide variety of OEM replacement pulleys, shafts and bearings. Although a complete list of replacement parts is well beyond the scope of this document, we encourage you to contact our knowledgeable staff for assistance in identifying the required components.

Smalis Conveyors
1-800-348-0765
1-724-925-8500
sales@usaconvey.com

MAINTENANCE

Preventive maintenance and periodic inspection will do much to prolong the life of your pulley's, shafts and bearings. A regular inspection should be set up on a periodic basis. The frequency of inspection will depend entirely on the type of operation and the operating conditions. If the conveyor is operating in exposed, dusty or dirty conditions, inspection should be conducted at more frequent intervals. The following maintenance tips will do much to optimal pulley/component life.

1. Foreign material should not be allowed to become entrapped between the belt and pulley rim. Material build-up on the pulley face should be avoided.
2. Bearings and housings have been mounted according to the manufacturers instructions



- ✓ Drum Pulleys
- ✓ Winged Pulleys
- ✓ Lagged Pulleys
- ✓ Flat Face
- ✓ Crowned Face
- ✓ XT Hubs
- ✓ Keyed Shafts
- ✓ Plain Shafts
- ✓ SC Bearings
- ✓ SCM Bearings
- ✓ SAF Bearings
- ✓ Type E Bearings
- ✓ 2 Bolt Bearings
- ✓ 4 Bolt Bearings
- ✓ Take Up Frames

and the information provided with your order. For long life, use care to keep clean and remount to manufacturers specs if any work needs to be done. The bearings are designed to allow a maximum of $\pm 2^\circ$ static misalignment. These bearings are not suitable for dynamic misalignment. To ensure good alignment, mounting surfaces must be checked for flatness and must lie in the same plane. When tightening base bolts, each bolt should be alternatively tightened in incremental torque values until torque is fully achieved to prevent the angular shifting of the pillow block that occurs when one bolt is tightened to its full torque. Shimming may be required to minimize misalignment.

3. Grease: Bearings and housings have been filled, as much as practical, without

PULLEYS, SHAFTS AND BEARINGS MAINTENANCE AND LONG TERM STORAGE

causing grease purging during shipping and handling. The bearings have been initially lubricated with Alvania #2 and should be relubricated with the same or some equivalent. Immediately after startup, housing and seals should be regreased until clean grease purges through the seals. Remove the drain plug from the face of the housing in order to relieve pressure, then replace the plug. For high speeds, high loads, extreme temperatures and other abnormal operating conditions, special greases may be required.

LONG TERM STORAGE INSTRUCTIONS

PULLEY

1. Block the pulley to keep the face from prolonged contact with the ground.
2. If stored outside, protect the entire pulley assembly from the elements; i.e., sunlight, rain, snow, etc.

LAGGED PULLEY

1. Store in a cool, dark area where they will not be exposed to direct sunlight or large temperature or humidity variations from normal conditions. Areas of high ozone concentration, such as areas with motor generators or other electrical arc producing machinery, should not be used for storage.
2. Deterioration may result if oil, grease, kerosene, solvents, or other chemicals are allowed to remain on the lagging.

3. When lagged pulleys remain out of service for long periods of time, surface refurbishing by grinding of 1 mm (1/32") of rubber from the cover thickness; i.e., reducing the oxidized layer.

SHAFTS

1. A petroleum-based coating has been applied at the factory to all exposed surfaces. If long-term storage is required, additional coatings of approved rust preventative may be required.
2. All rust preventatives must be removed immediately prior to installation of bearings or other components.

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actuator - a device that initiates the action of controls or controllers and is manually operated. The actuator may be a push button, toggle switch, foot pedal, hand lever, hand set timer, or any other device that performs the described function.

antirunaway - a safety device to stop a declining conveyor and thus prevent moving away in the event of a mechanical or electrical failure

apron pan - one of a series of overlapping or interlocking plates or shapes that, together with others, forms the conveyor bed

automatically controlled - describes the operation by the action of a mechanism that is initiated by some impersonal influence, such as a conveyor that is started by a low level bin indicator

backstop - a mechanical device to prevent reversal of a loaded conveyor under action of gravity when forward travel is interrupted

bed -

(a) that part of a conveyor upon which the load or carrying medium rests or slides while being conveyed
(b) in bulk material conveyors, the mass of material being conveyed

belt idler - a roller or series of rollers that supports the belt of a belt conveyor

belt tripper - a device incorporating a system of pulleys that causes the conveyor belt to discharge material at one or more points along the length of the conveyor

boom - a cantilevered member or structure that may be hinged, fixed, or pivoted

brake - a friction device for slowing down conveyor components, bringing conveyor equipment to a controlled stop, holding traveling or traversing equipment in a selected location, preventing reverse travel, and controlling overspeed due to the action of gravity

bunker - a large bin or compartment for the storage of bulk materials

car unloader - a type of conveyor characterized by a shallow, horizontal loading section which enables it to receive and unload material from hopper bottom cars without requiring a pit or other excavation

carrier -

(a) a device attached to or hung from trolleys to support the load
(b) the receptacle in which objects are placed for transmittal through a conveying system
(c) the moving part of a vertical or inclined reciprocating conveyor that supports the load

chain - a series of links pivotally joined together to form a medium for conveying or transmitting motion or

power. General classes of chain common to conveyors are detachable, pintle, combination, roller, rivetless, coil, inverted tooth, and bar link chains.

chute - a trough through which bulk materials or objects are directed and lowered by gravity. The trough may be open or enclosed, straight or curved.

control - the system governing the starting, stopping, direction of motion, acceleration, speed, retardation, identification, and function of the moving member in a predetermined manner

controller - an electromechanical device or assembly of devices for starting, stopping, accelerating, or decelerating a drive, or serving to govern in some predetermined manner the power delivered to the drive

conveying medium - that portion of a conveyor that moves or carries materials, packages or objects

conveyor - a horizontal, inclined, or vertical device for moving or transporting bulk material, packages, or objects, in a path predetermined by the design of the device, and having points of loading and discharge, fixed or selective. Included are skip hoists, and vertical reciprocating and inclined reciprocating conveyors. Typical exceptions are those devices known as industrial trucks, tractors, trailers, tiering machines (except pallet load tierers), cranes, hoists, power shovels, power scoops, bucket drag lines, trenchers, platform elevators designed to carry passengers or an operator, manlifts, moving walks, moving stairways (escalators), highway or railway vehicles, cableways, tramways, dumbwaiters, pneumatic conveyors, robots, or integral machine transfer devices.

conveyor belt - a belt used to carry materials and transmit the power required to move the load being conveyed

conveyor screw - the material propelling medium of a screw conveyor generally consisting of an assembly of helical flights mounted on a rotating pipe or shaft

conveyor, apron - conveyor in which a series of apron pans forms a moving bed

conveyor, belt - an endless fabric, rubber, plastic, leather, or metal belt operating over suitable drive, tail end, and bend tenninals and over belt idlers or slider bed for handling bulk materials, packages, or objects placed directly upon the belt

conveyor, bucket - any type of conveyor in which the material is carried in a series of buckets

conveyor, chain - any type of conveyor in which one or more chains act as the conveying medium; a British term for trolley conveyor

conveyor, declining - a conveyor transporting down a slope

conveyor; electrified monorail - a conveyor consisting of a network of tracks or guide rails that may be installed

horizontally, vertically, inclined, or in combination, with one or more self-propelled cars or trolleys that move independently under automatic control from one point to another within the track network, carrying material in containers or by devices suspended from or attached to the cars or trolleys

conveyor, en masse - a conveyor, comprised of a series of skeleton or solid flights on an endless chain or other linkage, that operates in horizontal, inclined, or vertical paths within a closely fitted casing for the carrying run. Bulk material is conveyed and elevated in a substantially continuous stream with a full cross section of the casing.

conveyor, extendable - a conveyor that may be lengthened or shortened to suit operating needs.

conveyor, flight - a type of conveyor comprised of one or more endless propelling media, such as chain, to which flights are attached, and a trough through which material is pushed by the flights

conveyor, horizontal reciprocating - a conveyor that progressively advances material by a back and forth motion of its conveying medium. It may be equipped with hinged flights or tilting dogs or pushers. These units operate generally in the range of 0 deg. to 30 deg. from the horizontal.

conveyor, inclined reciprocating - a reciprocating power or gravity actuated unit (not designed to carry passengers or an operator) that receives objects on a carrier. These units operate on inclines generally in the range of 30 deg. to 70 deg. from the horizontal

conveyor, live roller - a series of rollers over which objects are moved by the application of power to all or some of the rollers. The power transmitting medium is usually belting or chain.

conveyor, mobile - conveyor, supported on a structure, which is movable under its own power and includes, but is not limited to, radial stackers, winged stackers, reclaiming conveyors, and shiploaders. These conveyors normally handle bulk material.

conveyor, oscillating - a type of vibrating conveyor having a relatively low frequency and large amplitude of motion, usually powered by a rotating eccentric

conveyor, overland - a single or series of belt conveyors designed to carry bulk material across country, usually following the general contour of the land

conveyor, portable - a transportable conveyor which is not self-propelled, usually having supports that provide mobility

conveyor, power and free - a conveying system wherein the load is carried on a trolley or trolleys that is mechanically propelled through part of the system and may be gravity or manually propelled through another part. This arrangement provides a means of switching the free trolleys into and out of adjacent

lines. The spur or subsidiary lines may or may not be powered.

conveyor, pusher bar - two endless chains cross-connected at intervals by bars or rotatable pushers that propel the load along the bed or trough of the conveyor

conveyor, reciprocating - a conveyor where the canier or pusher moves forward and back, or up and down, in the same plane

conveyor roller - a series of rollers supported in a frame, over which objects are advanced manually, by gravity, or by power

conveyor, roller slat - a slat conveyor using rollers for slats

conveyor, screw - a conveyor screw revolving in a suitably shaped stationary trough or casing fitted with hangers; trough ends, and other auxiliary accessories

conveyor, shuttle - any conveyor such as a belt, chain, apron, screw, etc., in a self-contained structure, movable in a defined path parallel to the flow of the material

conveyor, slat - a conveyor employing one or more endless chains to which non-overlapping, non-interlocking spaced slats are attached

conveyor, suspended tray - a vertical conveyor, having one or more endless chains with suitable pendant trays, cars, or carriers, that receives objects at one elevation and delivers them to another elevation

conveyor, tow - an endless chain supported by trolleys from an overhead track or running in a track at the floor with means for towing floor supported trucks, dollies, or carts

conveyor, trolley - a series of trolleys supported from or within an overhead track and connected by endless propelling means, such as chain, cable, or other linkage, with loads usually suspended from the trolleys

conveyor, vertical articulated - a type of vertical conveyor in which sections of articulated slat conveyor apron form rigid carriers for vertical movement in continuous flow. The carriers are flexible in but one direction, and they assume a vertical position on the non-carrying run to minimize space requirements.

conveyor, vertical chain, opposed shelf type - two or more vertical elevating-conveying units opposed to each other. Each unit consists of one or more endless chains whose adjacent facing runs operate in parallel paths. Thus each pair of opposing shelves or brackets receives objects (usually dish trays) and delivers them to any number of stations.

conveyor, vertical reciprocating - a reciprocating power or gravity actuated unit (not designed to carry passengers or an operator) that receives objects on a carrier and transmits these objects vertically between two or more levels

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conveyor, vibrating - a trough, tube, or other device flexibly supported and vibrated at a relatively high frequency and small amplitude to convey bulk material or objects; usually powered by an electrical or pneumatic impulse

conveyor, wheel - a series of wheels supported in a frame over which objects are moved manually or by gravity

deflector

(a) a device across the path of a conveyor placed at an angle and designed to deflect objects

(b) a plate inserted in the trajectory of a bulk material discharge to change direction

drive - an assembly of the necessary structural, mechanical, and electrical parts that provide the motive power for a conveyor

drum - a cylindrical or polygonal rim type of wheel around which cable, chain, belt, or other linkage may be wrapped. A drum may be driven or driving. The face may be smooth, grooved, fluted, or flanged.

dumbwaiter - a type of material lifting device specifically limited to a platform area of 9 ft² (0.8 m²) or less, an inside car height of 4 ft (1.2 m) or less, and a hoistway door height of 4 ft 1 in. (1.24 m) or less

emergency stop - a stop arising from a sudden and unexpected need, and not as a part of the normal operation

emergency stop device - a device that can be actuated in an emergency situation to stop a conveyor

enclosed - describes guarding of moving parts in such a manner that inadvertent physical contact by parts of the body is precluded as long as the guard or enclosure remains in place. The guarding may make use of hinged, sliding, or removable doors for inspection or service.

flight -

(a) plain or shaped plates suitably made for attachment to the propelling medium of a flight conveyor

(b) a term applied to any section of a conveyor in a tandem series

gate - a device or structure by means of which the flow of material may be stopped or regulated; also, a section of conveyor equipped with a hinge mechanism for movable service, often called a *hinged section*

grating -

(a) a coarse screen made of parallel or crossed bars to prevent passage of oversize material

(b) a series of parallel and crossed bars used as platform or walkway floors, or as coverings for pits and trenches over which traffic may pass. Generally removable to permit access to conveying equipment for servicing.

(c) a series of parallel or cross bar units, or both fastened to or propelled by the conveying medium, used for carrying large lump-sized bulk material or objects. Usually used to permit passage of air for cooling or heat to maintain temperature.

guard -

(a) a covering, barricade, grating, fence, or other form of barrier used to prevent inadvertent physical contact with operating components such as gears, sprockets, chains, and belts

(b) a structure mounted below an overhead mounted conveyor to protect personnel from falling materials

guarded - shielded, fenced, enclosed, or otherwise protected by means of suitable enclosure, covers, casing, shields, troughs, railings, or by nature of location so as to reduce foreseeable risk of personal injury

guarded by location - describes moving parts so protected by their remoteness from the floor, platform, walkway, or other working level, or by their location with reference to frame, foundation, or structure as to reduce the foreseeable risk of accidental contact by persons or objects. Remoteness from foreseeable, regular, or frequent presence of public or employed personnel may in reasonable circumstances constitute guarding by location.

hopper - a box having a funnel-shaped bottom, or a bottom reduced in size, narrowed, or necked to receive material and direct it to a conveyor, feeder, or chute

inactive controls - those controls that are not a part of or do not contribute to the present or future contemplated use of the conveyor or system, as presently installed and wired

limit switch - an electrical device by which the movement of a conveyor and allied equipment may be controlled within predetermined limits

nip point - a point at which a machine element moving in line meets a rotating element in such a manner that it is possible to nip, pinch, squeeze, or entrap a person or objects coming into contact with one of the two members. The same definition holds for the similar point with respect to two rotating parts or two converging parts in linear movement.

operator's station - location at which actuators are placed for the purpose of starting, stopping, reversing, or otherwise controlling the conveyor or system of conveyors in the course of normal operation

overload device - a mechanical or electrical device designed to disconnect the driven equipment from the driving equipment in event of an overload on the conveyor

platform - a working space for persons, elevated above the surrounding floor or ground (such as a balcony) for the operation of machinery and equipment

prevent - when used in a context such as prevent access or prevent physical contact, means to impede or block; when used in a context such as prevent injury, means to reduce the chances of, but does not imply that an injury cannot occur

qualified person - a person who, by possession of a recognized degree or certificate of professional

standing, or who, by extensive knowledge, training, and experience has successfully demonstrated his ability to solve problems relating to the subject matter and work

rail -

(a) one of the longitudinal members in a conveyor frame

(b) the supporting surface under the wheels or rollers of a chain conveyor

(c) the supporting track for equipment mounted on wheels, such as belt tripper, weigh larry, etc.

(d) the vertical members that guide the pendant trays, cars, or carriers in a suspended vertical tray conveyor

rail clamp - an attachment or device for clamping a mobile conveyor or belt tripper to the rail to hold it in a fixed location

rail stop - a stop mounted on the conveyor rails to limit the travel of traversing machinery

railing guard - a structure consisting of rails and posts, including top rail, center rail, posts, and, where required, toeboards

rated capacity - the capacity at the rated speed, as established by the manufacturer or a qualified person, at which safe and satisfactory service can be expected

rated speed - the speed of the conveyor, as established by the manufacturer or a qualified person, at which safe and satisfactory service can be expected

remote control - any system of controls in which the actuator is situated in a remote location

remote location - any location, with respect to the conveyor, from which the presence or position of personnel relative to the conveyor cannot be readily determined from the operator's station

roller -

(a) a revolving cylinder or wheel over which something is moved. The face may be straight, tapered, crowned, concave, or flanged, corrugated, ribbed, or fluted

(b) a component part of a roller chain in which it may serve only to reduce frictional loss occurring as the chain passes over the sprockets. Rollers may also serve as the rolling support for the chain and the load being conveyed

(c) the rotating element upon which a conveyor belt or chain or the object being transported is carried

roller turn - a series of vertical rollers mounted in a frame to guide conveyor chain around a horizontal curve

safety device - a mechanism or an arrangement placed in use for the specific purposes of preventing an unsafe condition, preventing the continuation of an unsafe condition, warning of an unsafe condition, or limiting or eliminating the unsafe effects of a possible condition

shall - as used in the context of a provision of this Standard, indicates that the provision is mandatory

and must be followed

shear point or line - the point at which, or the line along which, a moving part meets or passes close enough to a stationary or moving part or object so that part of the human body can be caught, trapped, or pinched between them

shield guard - a full or partial enclosure or cover, either framed or solid, made from material sufficiently rigid to prevent accidental contact with moving parts

should - as used in the context of a provision of this Standard, indicates a recommendation, the advisability of which depends on the facts in a particular situation

skip bucket - the tub or bucket used for containing the material conveyed by a skip hoist

skip hoist - a bucket or car operating up and down a defined path receiving, elevating, and discharging bulk materials

slat - a member supported between chains in a slat conveyor; the series of slats form the conveying medium

snub roller - any pulley used to increase the arc contact between a belt and drive or tail pulley

spillguard - a stationary device of sufficient strength and capacity to catch, retain, and contain any reasonably foreseeable spillage from a conveyor passing over-head that might cause personal injury

stacker - a conveyor adapted to piling or stacking bulk materials, packages, or objects

switch -

(a) a device for connecting two or more continuous package conveyor lines

(b) an electrical control device

(c) a mechanism that transfers a trolley, carrier, or truck from one track to another at a converging or diverging section

switch, slack cable - a device installed to automatically shut off the power supply when the hoisting cable becomes slack or has slack due to accident or jamming

take-up - the assembly of the necessary structural and mechanical parts that provides the means to adjust the length of belts, cables, chains, etc., to compensate for stretch, shrinkage, or wear, and to maintain proper tension

terminal - a term normally applied to the extreme ends of a belt system, i.e., head and tail pulleys

towpin - a movable or fixed member of a truck, dolly, or cart used to engage a pushing or pulling dog on a floor-mounted towconveyor

tracks - the beams, shapes, or formed section on which trolleys, rollers, shoes, or wheels roll or slide while being propelled

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transfer car - any wheeled device used for transferring loads from one conveyor line to another; may be manually or automatically operated

transfer mechanism - any mechanism that transfers objects onto or off a conveyor line or from one conveyor line to another

tray - a car, carrier, or pallet, usually suspended from the moving element of the conveyor, used to carry conveyed loads

tread plate - a plate of suitable size fitted between conveyor rollers to permit persons to use it as a working or walking surface

trolley - an assembly of wheels, bearings, and brackets used for supporting and moving suspended loads or for carrying load connecting and conveying elements such as chain, cable, or other linkage

truck (also known as a cart) -

(a) an assembly that supports another unit in either a fixed or adjustable position and that provides mobility

(b) a wheeled vehicle that can be detached from a conveying medium (usually chain) and pushed by hand

walkway - an elevated passageway for persons above the surrounding floor or ground level, including catwalks, footwalks, runways, and elevated walkways

work station - a physical location where a person is normally positioned which is located by design and supported with facilities necessary for a person to perform prescribed work duties. This position would not apply to a maintenance location.

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