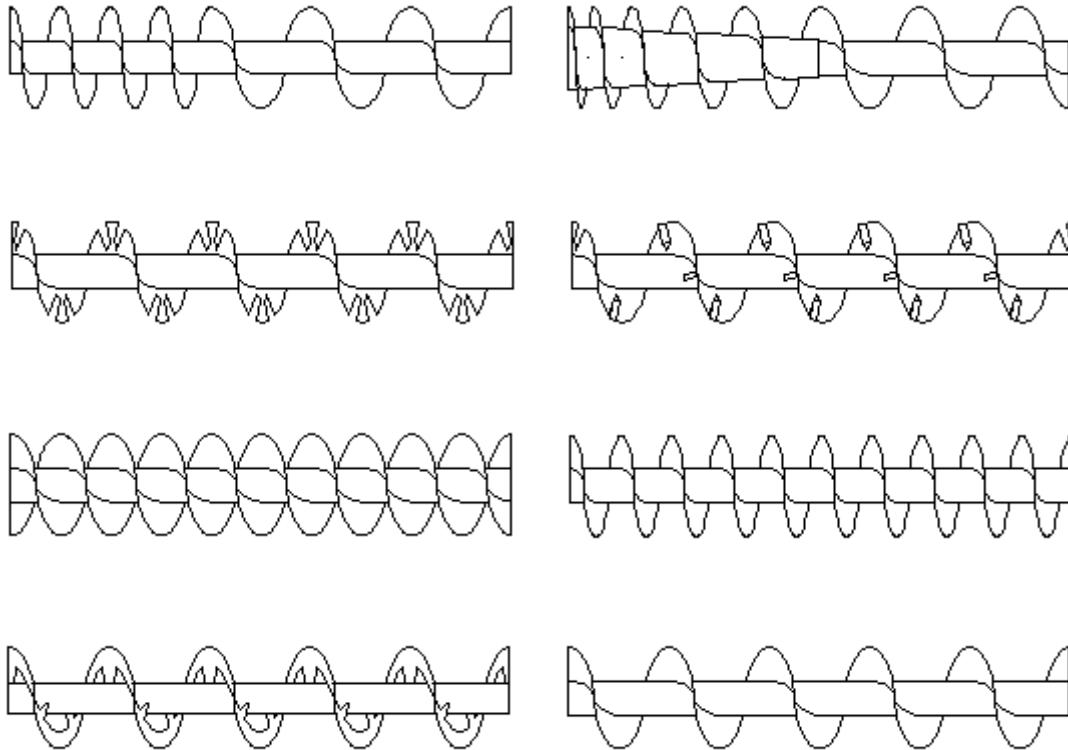


# SCREW CONVEYOR MANUAL

## Installation / Operation / Maintenance



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*NOTE – Safety instructions contained within are basic guidelines and should be considered as minimum provisions. Additional information shall be obtained by the purchaser from other sources including the latest editions of American Society of Mechanical Engineers; Standard ANSI B20.1; Standard ANSI B15.1; Standard ANSA A12.1; Standard ANSI MH4.7; Standard ANSI Z244.1-1982.*

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## INTRODUCTION

This manual contains complete instructions for the installation, operation, and maintenance of screw conveyors as manufactured by Continental Screw Conveyor. Performance, reliability, and service life of this equipment depends to a large extent on the care taken in installing and otherwise preparing this equipment for its intended use.

Most conveyors can be assembled by owners or contractors who purchased the necessary components to accommodate their own design. Many other conveyors however are purchased such that they are completely assembled, fitted, match marked, and then disassembled for shipment. Still other conveyors require Engineering drawings to describe them completely and these usually involve the fabrication of special hoppers, supports, drive equipment or other features to be with or as a part of the screw conveyor assembly. These Engineering drawings serve the dual purpose of detailing the special parts or components to be manufactured and to identify what is to be furnished for the buyer and installer. They are not to be considered design drawings for the concept of a process or system.

All screw conveyor components are manufactured to the standards of the Conveyor Equipment Manufacturers' Association. (CEMA)

## SAFETY

Conveyor assemblies or components must be installed, maintained, and operated in such a manner as to comply with the Occupational Safety and Health Act, all state and local regulations, and the American National Standard Institute safety code. It is the owner/installer's responsibility to insure that this requirement is followed.

### GENERAL SAFETY PRECAUTIONS

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

1. **COVERS and GRATINGS:** Use rugged gratings in all loading areas and solid covers in other areas. Covers, guards, and gratings at inlet points must be such that personnel cannot be injured by the screw.
2. **GUARDS.** For protection of the operator and other persons in the working area, purchaser should provide guards for all exposed equipment such as drives, gears, shafts, couplings, etc.

AS SHOWN IN THE WARNING LABEL IN FIGURE 1, DO NOT STEP OR WALK ON CONVEYOR COVERS OR GRATING OR POWER TRANSMISSION GUARDS.

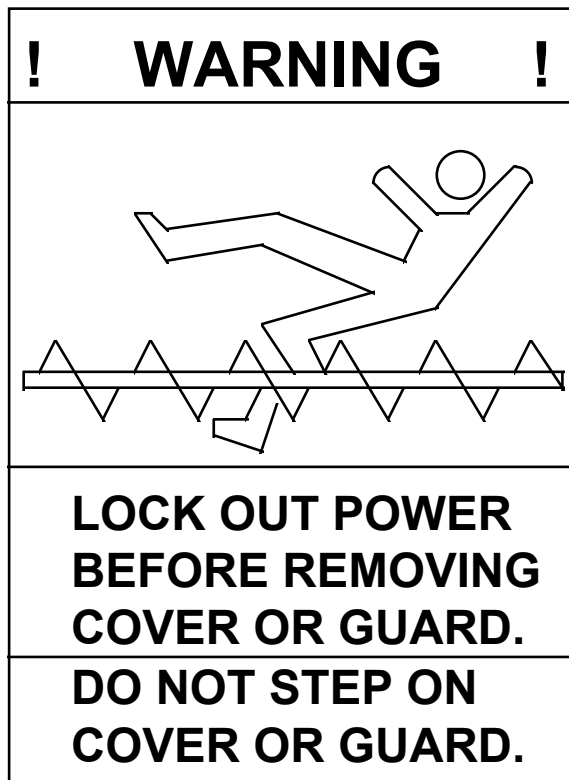


FIGURE 1

## PRECAUTIONS FOR HAZARDOUS OPERATIONS

Standard screw conveyors are not equipped to operate under conditions which may be hazardous, nor with hazardous materials. The manufacturer should be consulted if there is any indication that a hazardous condition or material is involved. Several situations may create these conditions, with some examples being:

### HAZARDOUS CONDITIONS

Where the product area is under pressure or vacuum, or the trough is provided with jackets for heating or cooling, special requirements are required. Consult the factory for additional information, as standard components are not designed for this service.

### HAZARDOUS MATERIALS

These may be explosive, flammable, toxic, noxious, etc. As special provisions for safety are required, please consult the factory for additional information, as standard components are not designed for this service.

### HANDLING FOODSTUFFS

Subjects conveyors to special codes for materials, construction, location, and/or accessibility. Investigate before ordering standard components. Food grade conveyors often require hinged access doors for inspection or drop-bottom troughs for cleaning. Special precautions should be taken for protection of personnel against contact with the screw. Extensive use of padlocks, with keys in the hands of management is one means frequently used. Contact the factory for additional information on other options.

## ELECTRICAL

Conveyor component manufacturers generally do not provide electrical equipment to control the conveyors. In selecting electrical control equipment to be used with any conveyor installation, the purchaser must use equipment conforming to the National Electrical Safety Code and other local or national codes. Consideration should be given to some or all of the following devices and to others which may be appropriate.

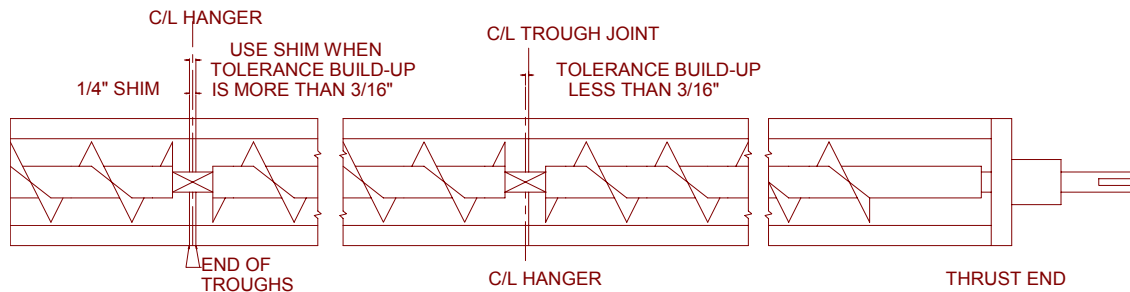
1. **OVERLOAD PROTECTION:** Devices such as shear pins, torque limiters, etc., to shut off power whenever operation of the conveyor is stopped as a result of excessive material, foreign objects, excessively large lumps, etc.
2. **NO-SPEED PROTECTION:** Devices such as zero speed switches to shut off power if any incident which might cause a conveyor to cease operating.
3. Safety shut-off switch with power lockout provision at conveyor drive.
4. Emergency stop switches readily accessible wherever required.
5. Electrical interlocking to shut down feeding conveyors whenever a receiving conveyor stops.
6. Signal devices to warn personnel of imminent start up of conveyor, especially if started from a remote location.
7. Special limit enclosures for motors and controls for hazardous atmospheric conditions and surroundings.
8. Limit switches at cover openings.

## INSTALLATION

### RECEIVING

Check all assemblies and parts against shipping papers, and inspect for damage on arrival. Look for dented or bent trough and bent flanges, flighting, pipe or hangers. Minor damage incurred in shipping can be readily repaired in the field.

For severely damaged parts, file an immediate claim with the carrier. Before proceeding with erection, make sure that all supplementary instructions are included. If anything is missing, consult the supplier.



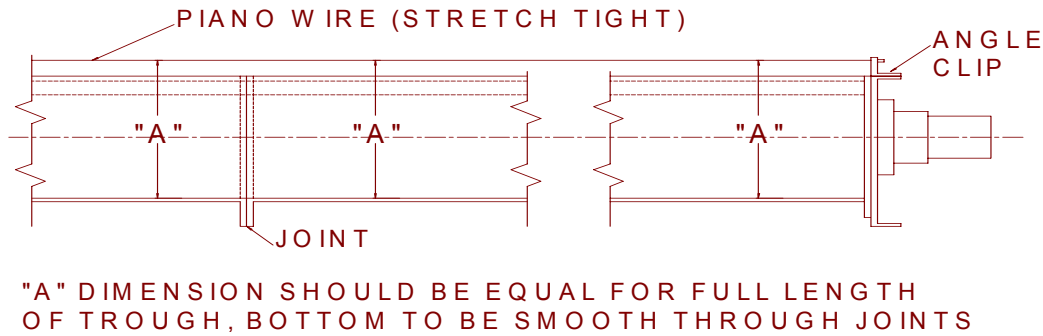
**FIGURE 2**

### ERECTION

Screw conveyor troughs must be assembled straight and true with no distortion. If anchor bolts are not in line, either move them or slot the conveyor feet or saddle holes. Use shims under feet as required to achieve correct alignment. Do not proceed with installation of shafts and screws until trough has been aligned and bolted down.

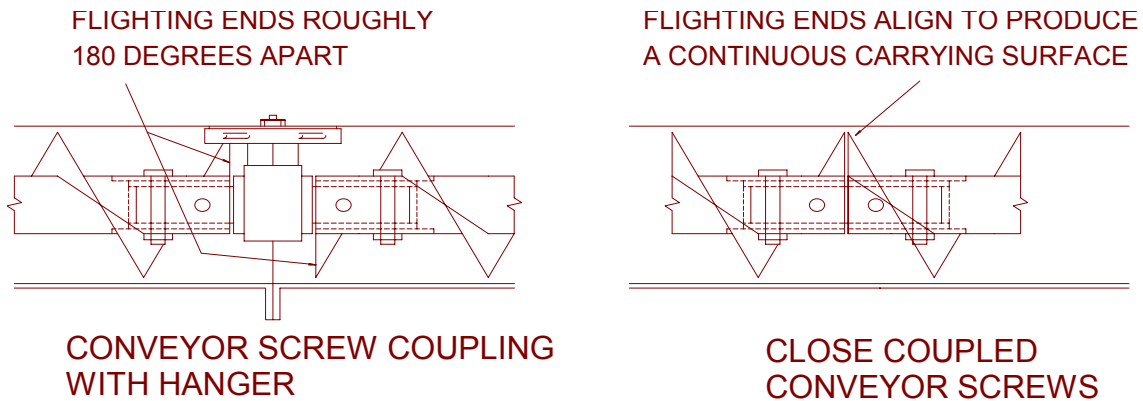
### CONVENTIONAL CONVEYOR SCREWS

1. When shipped as loose parts, assemble bearings to trough end plates.
2. If trough ends are factory assembled with trough, check bearings and seals for possible misalignment which may have occurred during shipment. Realign if necessary.
3. Place trough ends in proper sequence with discharge spouts properly located. Connect the joints loosely, without tightening the bolts. Align the trough bottom and centerline perfectly using piano wire, as shown in Figures 2 and 3. Then tighten joint bolts and all anchor bolts.
4. Begin assembly of screw sections, working from the thrust end. (Drive shaft and thrust bearings are normally at the discharge end to place the conveyor screw in tension.)



**FIGURE 3**

5. Place the first screw section in the trough, fitting it onto the end shaft. Install coupling bolts. If reinforcing lugs are on the ends of flighting install screw so they are opposite the carrying side of the flights.
6. Insert coupling shaft into opposite end of conveyor pipe; install coupling bolts.
7. If screws are not close coupled, slide hanger over coupling and bolt to trough.
8. Pull conveyor screw away from discharge end of conveyor to seat the thrust connection and remove any play in coupling bolts.

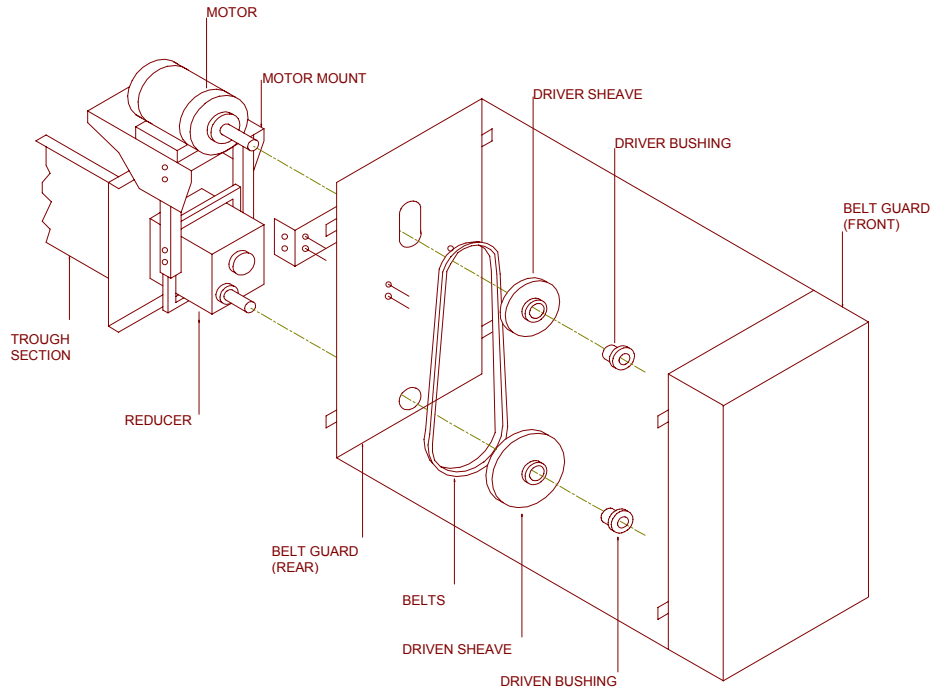


**FIGURE 4**

9. Place next screw section in trough and fit into coupling so that flighting end is about 180 degrees from end of flighting of the first section. (See Figure 4). Install coupling bolts.  
(For close coupled conveyors without hangers: Assemble screws so that flighting at adjoining ends of screw sections align to provide a continuous surface. In the case of material supplied on orders for 'component only' the coupling bolt holes are drilled in only one end of the coupling shafts and it will be necessary to mark and drill the other end in the field. Remove shaft from screw before drilling; DO NOT USE SCREW PIPE AS DRILL JIG.)



10. Insert coupling shaft into opposite end of pipe; install coupling bolts. Install hanger and pull out on pipe to remove any play. (See step 8)
11. Go back to hanger installed previously; center the bearing between ends of pipes, and tighten hanger mounting bolts. Revolve screw to check alignment. If screw does not turn freely, adjust hanger mountings until it does. Then proceed with installation of next screw section.
12. Alternately assemble screw sections, couplings, and hangers as in steps 9 - 11 until all but the last screw section has been installed. Remove the trough end to install last screw section.
13. Install tail shaft through end bearing and fasten into last screw section with coupling bolts. Check freedom of rotation of entire screw.
14. When trough end seals are used, be sure shafts are centered in seal openings.
15. Tighten collar set screws in any anti-friction bearings in trough ends and hangers. Check and tighten all hanger assembly and mounting bolts.
16. Tighten packing gland type seals only enough to prevent leakage. If tightened excessively they may impose a drag on the conveyor and wear rapidly.
17. Fill waste packed type seals with waste packing loosely but sufficiently to cover the shaft and fill the corners, to keep the packing from rotating with the shaft.
18. Remove all debris from trough (bolts, shipping materials, etc.). Install covers in proper sequence to locate inlet openings. Handle covers with care to avoid warping and bending, and attach with fasteners provided. Do not over tighten, especially when using gaskets, as permanently kinked covers may leak.
19. Install drive at proper location in accordance with separate instructions provided and as shown in Figure 5. After electrical connections have been made and before handling any material, check screw rotation for proper direction of travel. Incorrect screw rotation can result in serious damage to conveyor and to related feeding, conveying, and drive equipment. If rotation is incorrect, have electrician reverse motor rotation. When looking at the conveyor from the inlet towards the discharge, a right hand screw should rotate counter clockwise. A left hand screw section should rotate clockwise when viewed from the same perspective.
20. Lubricate drive and all bearings in accordance with manufacture's instructions. DRIVES ARE GENERALLY SHIPPED WITHOUT OIL.
21. MAKE SURE HAZARD LABELS AFFIXED TO TROUGHES AND/OR COVERS ARE IN PLACE AND NOT OBSCURED.

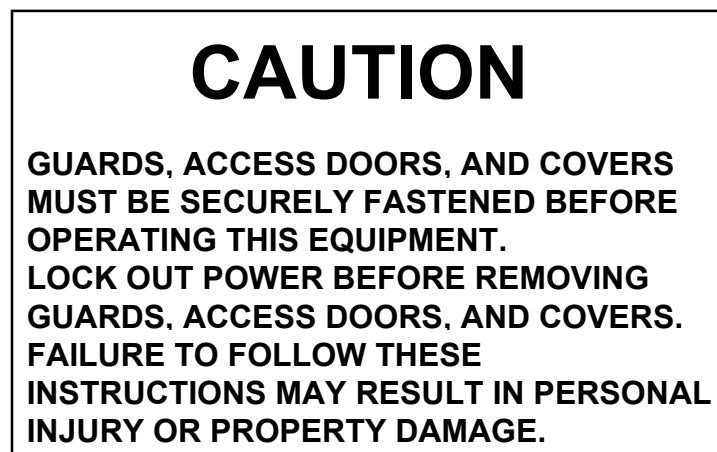


**FIGURE 5**

## OPERATION

Only persons completely familiar with the following precautions should be permitted to operate the conveyor. The operator should thoroughly understand these instructions before attempting to use the conveyor.

Failure to follow these precautions may result in serious personal injury or damage to equipment.



**FIGURE 6**

1. ALWAYS operate conveyor in accordance with these instructions and those on hazard labels shown in Figures 1 and 6.
2. DO NOT place hands or feet in conveyor opening.
3. NEVER walk on conveyor screws or gratings.
4. DO NOT put conveyor to any use other than for what it was designed.
5. AVOID poking or prodding material in conveyor with bar or stick inserted through openings.
6. ALWAYS have a clear view of conveyor inlets/discharges and all safety devices.
7. Keep area around conveyor, drive, and control station free of debris and obstacles.
8. NEVER operate conveyor without covers, guards and all safety devices in place.

## INITIAL STARTUP (WITHOUT MATERIAL)

1. REMEMBER that the screw conveyor drive is generally shipped WITHOUT oil. Add oil to drive in accordance with manufacturer's instructions.
2. MAKE SURE before initial startup that conveyor is empty, that end bearings and hangers are lubricated, and that all covers, guards, and safety equipment in place.
3. If conveyor is part of a material handling system, make certain that conveyor controls are interlocked electrically with those for other units in system.
4. Check direction of conveyor rotation in each unit to assure correct flow of material. (See conventional conveyor screws, Item 19)
5. Operate conveyor while empty for several hours, continuously checking for heating of bearings, misalignment of drive, and noisy operation. If any of these occur, proceed as follows:
  - A. If anti-friction bearings are used, check supply of lubricant. Either too little or too much lubricant can cause high operating temperatures.
  - B. Lock out power supply and check for misalignment in trough ends, screws, and hangers. Loosen and readjust or shim as necessary. If unable to eliminate misalignment, check for possible damage during shipment.
  - C. Check assembly and mounting bolts.

## INITIAL STARTUP (WITH MATERIAL)

1. CHECK that the conveyor discharge is clear before feeding material.
2. Increase feed rate gradually until rated capacity is reached.
3. Stop and start conveyor several times, and allow to operate for several hours.
4. Shut off conveyor and lock out power supply. Remove covers and check coupling bolts for tightness. Check hanger bearings, realign if necessary and retighten mounting bolts.
5. Replace covers.

## EXTENDED SHUT DOWN

If conveyor is to be inoperative for a long period of time, it is advisable to permit it to operate for a period of time after the feed has been cut off in order to discharge as much material as possible from the trough. However, there is a nominal clearance of 1/2" between the screw and the trough and this procedure will allow a small amount of material to remain in the trough. Therefore, if the material is corrosive, or hygroscopic, or has a tendency to harden or set up, the trough should be cleaned completely after the conveyor is shut down and power locked out. Consult factory for long term shutdown / storage instructions.

## MAINTENANCE

Establish routine periodic inspection of the entire conveyor to insure continuous maximum operating performance. Practice good housekeeping. Keep the area around the conveyor and drive clean and free of obstacles to provide easy access and to avoid interference with the function of the conveyor or drive.

1. Lock out power to motor before doing any maintenance work - preferably with a padlock on the control.
2. Do not remove padlock from control, nor operate conveyor until covers and guards are securely in place.

## SERVICING OF CONVEYOR COMPONENTS

In most cases this involves removing an unserviceable part and installing a replacement. The installation procedures are outlined in the 'ERECTION' section of this manual. Specific instructions for the removal of various conveyor components follow.

### CONVENTIONAL CONVEYOR SCREWS

To remove a section or sections of conventional conveyor screw, proceed from the end which is opposite the drive.

Remove trough end, conveyor screw sections, coupling shafts, and hangers until all screw sections have been removed, or until damaged or worn section is removed.

To reassemble, follow above steps in reverse order or see Pages 5-7

Sections of conventional conveyor screw equipped with split flight couplings may be removed individually with a minimum of disturbance to adjacent sections.

### COUPLINGS AND HANGERS

Replace couplings and hanger bearings when wear in either part exceeds 1/8". Replace coupling bolts when excessive wear causes play.

### LUBRICATION

Frequency of lubrication will depend on factors such as the type of application, bearing materials, and operating conditions. Weekly inspection and lubrication is advisable until sufficient experience permits establishment of a longer interval.

### DRIVE

Lubricate the drive following manufacturer's instructions provided for the speed reducer and the other drive components requiring lubrication. Speed reducers are generally shipped WITHOUT oil.

### BALL OR ROLLER BEARINGS

Ball and roller bearings may be furnished in trough ends or hangers. Lubricate in accordance with manufacturer's instructions provided.

### BABBITTED OR BRONZE BUSHED BEARINGS

Babbitted or bronze bushed bearings may be furnished in trough ends or hangers. Lubricate in accordance with manufacturer's instructions.

### OTHER BEARINGS

For oil less or graphite bronze, hard or chilled iron, oil impregnated wood, or plastic laminate hanger bearings, no lubrication is required.

## OTHER STANDARDS TO OBSERVE

It is recommended that the following standards be referred to in making a conveyor installation.

B20.1-1984 American National Standard Safety Code for conveyors and related equipment.

B15.1-1972 American National Safety Standard for Mechanical Power Transmission Apparatus.

A12.1-1967 American National Standard Safety requirements for floor and wall openings, Railings and Toeboards.

MH4.7-1973 American National Standard on Screw Conveyor acceptable engineering practices and dimensional standards.