

ASH HANDLING SYSTEM

The Ash Handling Plant consists of three Screw Conveyors, Submersible Ash Conveyor, Bucket Elevator, Ash Conditioner, Rotary Air Lock Valve, and a manual Slide Gate.

The SC-1 Screw Conveyors is for the ash collecting from bottom bank / Economizer / air heater hopper and SC-2 Screw Conveyor is for the ash collecting from the bottom of ESP hoppers for continues removal of ash. The SC-1 & SC-2 Screw Conveyors will feed the ash to SC-3 Screw Conveyor, this Screw Conveyor SC-3 discharges ash to the Bucket Elevator BE-1. The BE-1 Bucket Elevator discharges the Fly ash to the Ash Silo..

SCREW -CONVEYOR

DESCRIPTION:

Screw conveyors are one of the bulk-material transporting devices capable of handling a great variety of materials, which have relatively good flow ability. Flow ability denotes the degree of freedom of individual material particles to move past each other. This characteristic is important in case of screw operation as the screw helix, mounted on a central pipe or shaft, rotates within a fixed trough or tube, pushes the material along the bottom and sides, shearing the material in the radial clearance between the helix and the trough and causing the material to tumble upon itself as the moving face of the helical flight tends to lift the material. Screw conveyors may be operated horizontally, or an incline or vertically. Frequently inclined screw conveyors simplify the conveying system because they can do in one conveyor assembly what otherwise would require a more elaborate combination of horizontal and vertical units.

ADVANTAGES:

Among the many advantages of the screw- conveyors it is the feasibility of numerous feed and discharge openings. This facility lends itself to the use of screw conveyors to receive and distribute bulk materials for in plant material storage in such a manner that different grades or different kinds of materials may be conveyed to or from the proper storage bins. Screw conveyors like wise may be used for unloading materials from cars, bins or piles, feed mills, cereal-processing plants and chemical plants. Screw conveyors are very adaptable to the volume control of materials from the bottom of bins, hoppers, bag dumps, storage piles and the like. In this use they are termed as screw feeders. In the

handling of some toxic materials, screw conveyors lend themselves very well because the enclosing trough can be made tight to contain toxic dusts or vapors, thus reducing personal hazards

Moreover screw- conveyors can be arranged for cooling or heating of the material in transit. Another use is the blending of several ingredients to make a finished product or to make a pre - mix of some product. The conveyor screw can be so fashioned that materials are well- blended or mixed while in transit.

SCREW - FEEDER COMPONENTS

TROUGH

The conveyor trough is U OR flared in shape made out of 8mm thick ms plate, angle flanged type. The radius of the lower part, the trough height and length have been arranged to make a convenient and rigid closure for the conveyor.

TROUGH COVERS

Made up of 4mm thick ms plate shaped and bent to accuracy for perfect dust tightness. Covers are provided with gaskets and bolted to the angle flanged trough with provision for the attachment of inlet spouts through which material to be introduced into the conveyor.

SCREW FLIGHTS

Each flight is blanked, die-pressed and formed into a helix from 6mm thick mild steel plate. The flights are then welded to the center pipe. They are continuously welded on the carrying side and hard faced up to 50 mm depth with a hardness of 350 to 400 BHN. The flights are stitch welded on the other side to the pipe. Seamless internal collars in each end have been provided to accommodate the shafts. Opposite hand flights have been added to the conveyor screw beyond the discharge point, to oppose the flow of material that tend to carry past the discharge spout and pack at the trough end plate & forces the material back to the spout for discharge.

TROUGH-ENDS.

The shelf type trough end is of 10thick mild steel plate construction with an out-

INITIAL START-UP WITH MATERIAL

1. Check that the conveyor discharge is clear before feeding the material.

2. Increase feed rate gradually until rated capacity is reached.
3. Stop and start the conveyor several times and allow operating for several hrs.
4. Shut off conveyor and lockout power supply. Remove covers and check coupling bolts for tightness. Check hanger bearings, realign if necessary and retighten mounting bolts. Replace covers.

EXTENDED SHUT-DOWN-

If conveyor is to be inoperative for a long period of time, it is advisable to permit it for a period of time after the feed has been cutoff in order to discharge as much material as possible from the trough. However, there is a nominal clearance of 5mm 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, hygroscopic or has a tendency to harden or set-up the trough should be cleaned completely after the conveyor is shut down and power is locked out.

MAINTENANCE OF SCREW CONVEYOR

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

1. Lock out power to motor before doing any maintenance work, preferably with a pad lock on control.
2. Do not remove padlock from control, nor operate conveyor until covers and guards are securely in place.
3. Servicing of conveyor components involves removing an unserviceable part & installing a replacement. Specific instruction for the removal of various conveyor components follow as given below.
 - a. To remove a section or sections of conveyor screw, proceed from the end opposite to the drive.
 - b. 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.
 - c. Replace couplings and hanger bearings when wear in either part exceeds 3mm. Replace coupling bolts when excessive wear causes play. Remember that all coupling bolts are high tensile.

LUBRICATION

Frequency of lubrication depends on factors such as the nature of the application bearing materials and operating conditions. Weekly inspection and lubrication is advisable until sufficient experience permits establishment of longer interval. Lubricate the drive following manufacturer's instructions provided for the gearbox and the other drive components requiring lubrication. Gearboxes are generally transported without oil. Care should be exercised that when speed reduction unit is inclined because of direct connection to the conveyor shaft, that the oil seal on the speed reducer will retain the lubricant properly, that the tilted oil supply still will properly lubricate the gearing, that the oil level gauge will not be rendered inoperative and that the oil filler and drain opening is not made too inconvenient for servicing. The lubrication of motor must be checked for the inclined position.

Plummer blocks are furnished in the trough ends. Lubricate in accordance with manufacturer's instructions provided.

HAND OF A SCREW

A conveyor is left hand or right hand is determined by how the helical flighting is formed. The hand of a screw may be easily and clearly ascertained by looking at the end of the screw as given in the picture.

The screw pictured to the left has the helical flighting wrapped around the pipe in a counter clockwise direction. This is arbitrarily termed as a "LEFT HAND SCREW".

The screw pictured to the right is has the helical flighting wrapped around the pipe in a clockwise direction. This is termed as a "**RIGHT HAND SCREW**".

A conveyor screw viewed from either end will show the same configuration.

The arrows in the following fig indicate which way the material will move if right or left hand screws are rotated as indicated.

It could be noted that "**RIGHT HAND SCREW**" has been supplied by **M/S BEVCON** and the conveyor should be rotated in the counter clockwise direction when viewed from inlet end. Any replacements must be of the **same hand** to avoid disastrous result.
GLAND-SEALS

FEET

Supporting feet of 12mm thick plate have been provided for aligning and fastening the trough to the floor or existing structure at the trough joints. The feet permit the removal of a trough without disturbing the entire unit.

The male and female type gland seal made out of cast iron over the shaft opening protect the bearing and guard against dusting out of material.

HANGER BEARING

Hanger of style 226 made out of cast iron is provided which offers least possible obstruction compared to all other styles. Both hangers have wide top bars mounted across through flange joints.

CHAIN CASING

Chain casing is fabricated out of 16 gauge mild steel and of splitted type for ease of access and installation.

OPERATION OF SCREW CONVEYOR

1. Guards, access doors, and covers must be securely fastened before operating the conveyor.
2. Lockout power before removing guards, access doors and covers.
3. Do not place hands or feet in conveyor opening.
4. Never walk on conveyor covers or gratings.
5. Do not put conveyor to any other use than that for which it was designed.
6. Avoid poking or prodding material in conveyor with bar or stick inserted through openings.
7. Always have a clear view of conveyor loading and unloading points and all safety devices.

8. Keep area around conveyor, drive and control station free of debris and obstacles.
9. Never operate conveyor without covers, grating, guards and other safety devices.

Only persons completely familiar with these 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 the equipment.

SAFETY PRECAUTIONS FOR SCROW CONVEYOR

Since in its usual application a screw conveyor is enclosed, it is fundamentally a “safety machine”. However as with any power-operated equipment, certain precautions should be exercised to ensure that the natural safety provisions of a conveyor assembly are utilized. A conveyor assembly and drive is for the most part custom designed to fulfill its application, therefore, the provisions to ensure a safe installation will differ from transaction to transaction.

1. A conveyor must not be put under power until the trough and cover is in place and secured and power transmission guards in place and closed.
2. If the conveyor cover or housing is to be opened, the motor must first be locked-out electrically in such a way that it cannot be restarted by anyone either in the vicinity or remote from the conveyor.
3. Open feed hoppers or spouts for shovel, front end loader or other manual or mechanical loading must incorporate a grating.
4. Electrical controls, machinery guards, walkways, machinery arrangement, training of personnel etc are all necessary considerations in the creation of a safe, practical installation and is not a part of HITEC ENGINEERING WORKS.”

INITIAL START-UP WITHOUT MATERIAL

1. Remember that screw conveyor drive is generally transported without oil. Add oil to drive in accordance with manufacturer’s instruction and maintenance manual.
2. Make sure before initial start-up that the conveyor is empty, that end bearings and hangers are lubricated and that all covers, guards and safety equipment are properly installed.
3. If conveyor is the part of a material handling system. Make certain that conveyor controls are interlocked with those for units in system.
4. Check direction of conveyor rotation in each unit to assure correct flow of material.

5. Operate conveyor while empty for several hours, making a continuous check 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 the supply of lubricant. Either too little or too much lubricant can cause high operating temperatures.
 - b. Lockout power supply and check for misalignment in trough ends, screws and hangers. Loosen and readjust or shim as necessary. If unable to eliminate the misalignment, check the parts for possible damage during transportation.
 - c. Check assembly and mounting bolts.

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LUBRICATION

Frequency of lubrication depends on factors such as the nature of the application bearing materials and operating conditions. Weekly inspection and lubrication is advisable until sufficient experience permits establishment of longer interval. Lubricate the drive following manufacturer’s instructions provided for the gear-box and the other drive components requiring lubrication. Gearboxes are generally transported without oil. Care should be exercised that when speed reduction unit is inclined because of direct connection to the conveyor shaft , that the oil seal on the speed reducer will retain the lubricant properly, that the tilted oil supply still will properly lubricate the gearing , that the oil level gauge will not be rendered inoperative and that the oil filler and drain opening is not made too inconvenient for servicing. The lubrication of motor must be checked for the inclined position.

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Hard Iron bushed bearing is provided in hangers. Lubricate regularly to minimize the wear and temperature-rise developed due to friction.

LUBRICATION SCHEDULE

S. NO	Part name	Lubricant	Frequency
1.	Geared motor	Servogem3	once in 6months
2.	Plummer blocks	Servogem3	weekly once
3.	Hanger bearings	Servogem3/ oil	Daily thrice

LIST OF SPARES FOR SCREW CONVEYORS

S. No	Item Name	Size	Qty.
1.	Plummer blocks	SN 519	3 nos
2.	Bearings	22219CK	2 nos
3.	Locating rings	FRB 10/170	4 nos

4.	Sleeves	H 3139	2 nos
5.	Gland seals	****	2 sets
6.	Geared motor	7.5 Hp X 1440 rpm	1 no

ROTARY AIR LOCK VALVE

Rotary air lock valve is widely adopted in the powdery materials as equipment for measuring, blending as well as feeding and discharging of materials. The rotary air lock valve is simple in structure, reliable in performance and compact. Therefore relatively small in size.

It consists of a rotor with the pockets and a fixed casing suitable for discharging particles and small size materials with better flow-ability and low abrasion. When the motor drives the rotor, it rotates in the drum shaped casing. The particles falling from the upper hopper enter the rotor pockets through the inlet and are driven to the outlet where they are then discharged. The discharging or feeding of material can be continuous without any interruption in the process. Since the rotor and casing are closely matched, the discharge is to a certain extent air tight, thus reducing air leakage during operation. For this reason the **Rotary Feeder** is also known as Rotary Air Lock Valve.

COMPONENTS OF ROTARY AIRLOCK VALVE

The rotary feeder consists of the following parts.

ROTOR

The rotor is made out of either MS or CI. Basically the rotors are categorized into two types. One is closed end rotor and other is open-end rotor. These rotors consist of shallow pockets varying four to twelve in number. In an exceptional case, wear tips are also provided to the vanes for wear resistance application. The rotor is welded to the drive shaft.

HOUSING

The housing consists of inlet, outlet and an inspection door made out of MS / CI. The internal surface of housing is precision machined to maintain closure tolerance with rotor for airlock applications. In exceptional cases hot chrome

plating is made on inside surface of housing. Either ends of the housing are being fitted with outboard bearing housings to accommodate easy maintenance.

DRIVE ARRANGEMENT

The drive comprises of geared motor mounted on a channel frame. The shaft of the geared motor is coupled to the rotary air lock valve by Sprockets with chain.

For replacing rotor blades, remove the end covers and withdraw the rotor vane assembly from the airlock housing. Remove the bolts from the blades and withdraw the blades from the rotor. Insert new blades into the rotor and loosely install the bolts. Replace the assembly into the airlock and reinstall the end cover. Blade clearances must not be adjusted from the bottom opening of the airlock. The blade tip clearances should be adjusted to a maximum of 0.2mm clearance on the discharge side .The maximum axial clearance should be 0.5mm.

1. If a bearing is to be replaced, do not take the new bearing out of its package until immediately before it is to be mounted. Wipe over the outside diameter and the bore with white spirit and dry with a clean lint-free cloth. Lightly smear the bearing seating with thin oil prior to mounting. This is done to avoid damage to the shaft during mounting. Normally the bearing has a life span of 2100hrs under standard conditions. Preferably use puller for bearing removal.
2. The maintenance of the speed reducer and the motor should be done as per the manufacturer's installation and operation manual.
3. Check periodically the quality of lubricant in the geared motor.
4. Adjust the wear tips at regular intervals and reset the gap between the rotor and the housing as per the requirement.
5. Clean the rotary valve bearings with pneumatic air through the air purged holes.
6. In case of rotor maintenance, care has to be taken for dismantling of end housing or bearing housing as there is a chance of mismatching.

MAINTENANCE:

1. All the rotary valves or feeders have to be tested on no load to ensure free movement of the rotor.
2. Ensure that no foreign particles are present inside the rotary valve, which may damage the rotor housing.
3. Ensure the alignment of couplings before starting the equipment.
4. Check that the drive guard is in position. Don't put hand inside the equipment while it is in running condition.
5. Check for the perfect matching and bolting of the inlet and the outlet flange with the corresponding flanges to avoid dust or air leakage.
6. Ensure the terminals of the drive unit are safely covered and earthing has been done.
7. Handle the equipment with care to avoid damage and misalignment.

TROUBLE SHOOTING:

Some of the possible faults and corrections are given below which may be helpful to overcome the problems.

ROTOR JAMMING

If rotor jams, disconnect all electrical and drive connections. Isolate the gate above the rotary valve to ensure no flow of material into the equipment. Take-out all the materials from the rotor and verify for foreign particles stocked between the rotor and the housing. Flush pneumatic air to clean them. Trial the rotor manually with the help of a rod inserting in the hole provided at the non-drive end of the rotor shaft. Reconnect the power and run the RAV for few minutes and observe the current drawn. Subsequently connect the feed chute for the material trials. In spite of above efforts, if the rotor jams, kindly contact the manufacturer for necessary service help.

MOTOR TRIPPING

1. Check for material jamming in the rotor. Subsequently check the bearing temperature. Find out the tightness of the gland seal.
2. Check for the jamming of material in the discharge chute.

MATERIAL IS NOT COMING OUT

1. This is mainly due to the high cohesiveness of the material, which forms at the hopper outlet point, and affects the capacity. To overcome this problem, provide pocking hole on the bottom end of the hopper.
2. In some cases, material may not flow in the hopper due to insufficient angle in the hopper walls or more moisture content. In such cases, the present slope should be increased. One more reason may be the high RPM of the rotor than what is recommended. If the peripheral speed is more and the particle is light, then discharging is a problem.

ASH BUCKET ELEVATOR

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The Bucket Elevator, defined broadly, is a specialized type of conveyor to lift bulk material in a vertical or nearly vertical plane through the use of carrying buckets. It will handle nearly any loose material that doesn't contain lumps too big for the buckets and is not too sticky to be discharged.

Typically, a Bucket Elevator consists of three basic components, a head end, a foot end and an intermediate section. The head end assembly includes the head shaft and pulley, bearings, Plummer blocks; drive assembly, supporting structure and the maintenance platform.

The foot end includes the foot shaft and the pulley, bearings with take-up screws and nuts, supporting structure, bottom plate and the feeding chute.

The intermediate sections are normally considered to consist of the elevator structure and casing and top and bottom flanges for assembling each other. In most of the cases, elevator is used to support the machinery and control thee dusting. Endless belt is fixed in between head end pulley and tail end pulley with buckets.

The Elevator Buckets are bolted to endless belt with required spacing. Material loaded into the buckets via a hopper and loading at the bottom "boot" in a continuous elevator or is scooped up by the buckets as they round the tail pulley or bottom boot pulley in a centrifugal discharge elevator. The material is discharged by the centrifugal force as the buckets overturn at the head pulley. It is therefore, a comparatively high-speed elevator. The average centrifugal discharge elevator head pulley speed varies with the diameter of the head pulley and nature of the material, but is usually between 35 and 50 rpm.

A bucket elevator is equipment, which carries a material from a given level upwards, and discharges at a required height. This equipment consists of boxes of MS angle frame fully covered on four sides provided with top and bottom flanges. These boxes may vary in length and size. The bottom box has the take-up assembly, which consists of tail pulley, take-up bearings and adjusting take-up screw. Over this, the plain boxes

Are assembled and finally the top box is assembled. The top box consists of head pulley which is rubber lagged and mounted on two self-aligning bearings housed in

Plummer blocks. The shaft is driven by a motor after the speed being reduced by a reduction gearbox. Connecting the top and bottom pulley is the rubber belt on which buckets are fitted. When the bucket elevator runs, the buckets carry the material to the top and discharge it through an outlet provided in the top box.

General

This section of the manual provides a brief description of the belt elevator & its various components

The elevator assembly is consists of the head, boot, & intermediate casings, Inspection door, and belt and buckets.

Head

The head is the topmost component in the elevator leg. It consists of a steel housing, which supports the drive pulley/coupling, discharge, motor and drive reducer (gearbox).

Boot

The boot is the bottom component of the elevator. It receives the material to be elevated, and contains the lower belt pulley. The take-up is normally located on the boot, and is used for belt tracking and belt tensioning.

Casing

Casing is manufactured in sections. It forms the structure for supporting the head, maintenance platforms, ladder & cage, etc., while also providing a dust-tight and waterproof enclosure for the elevator belt and buckets. Casing may be of single/dual design. The inspection door in a casing section allows access for servicing the belt and buckets.

Elevator Drive

Most of the BEVCON elevator heads are electric motor-driven through shaft-mounted reducers. Large units use a motor-gear drive unit. Additional information may be found in a manual, which is supplied with each speed reducer.

Maintenance Platform for Head

A work area for performing routine inspection and maintenance on the elevator head, head drive and motor.

Ladder

Ladders provide access to the maintenance platforms. Brackets are provided to install the ladders to the elevator casing.

Hoist Assembly

A proper hoist assembly is an option that provides an extended arm which pivots to aid in raising or lowering heavy head components from elevator during maintenance.

Elevator Belts and Buckets

Material is carried from the boot to the head in elevator buckets which are bolted to the belt.

Elevator Buckets

Designed with proportioned body contour and high bucket ends which minimize spilling. "Wraparound ends" add extra strength for digging material and at both ends of the bucket body.

Belting

This component carries the filled buckets from the boot to the head. The standard belting provides strong bolt holding ability and stretch resistance. It is resistant to oil and abrasives and has a cover compound which resists static charges.

Vent in Head

Provides an exhaust for air which may enter the elevator through the spouting. Head vents are standard and installed at the factory. Elevators can have inspection door at head end.

12.1. Safety

Safety must be considered a basic factor in machinery operation at all times. Most accidents are the result of carelessness or negligence. The following safety instructions are basic guidelines and should be considered as minimum provisions.

It is the responsibility of the contractor, installer, owner and user to install, maintain, and operate the bucket elevator and elevator assemblies manufactured and supplied by M/S Supriya Engineering in such a manner as to comply with the Occupational Safety and Health Act in INDIA and with all state and local laws and ordinances.

PRECAUTIONS:

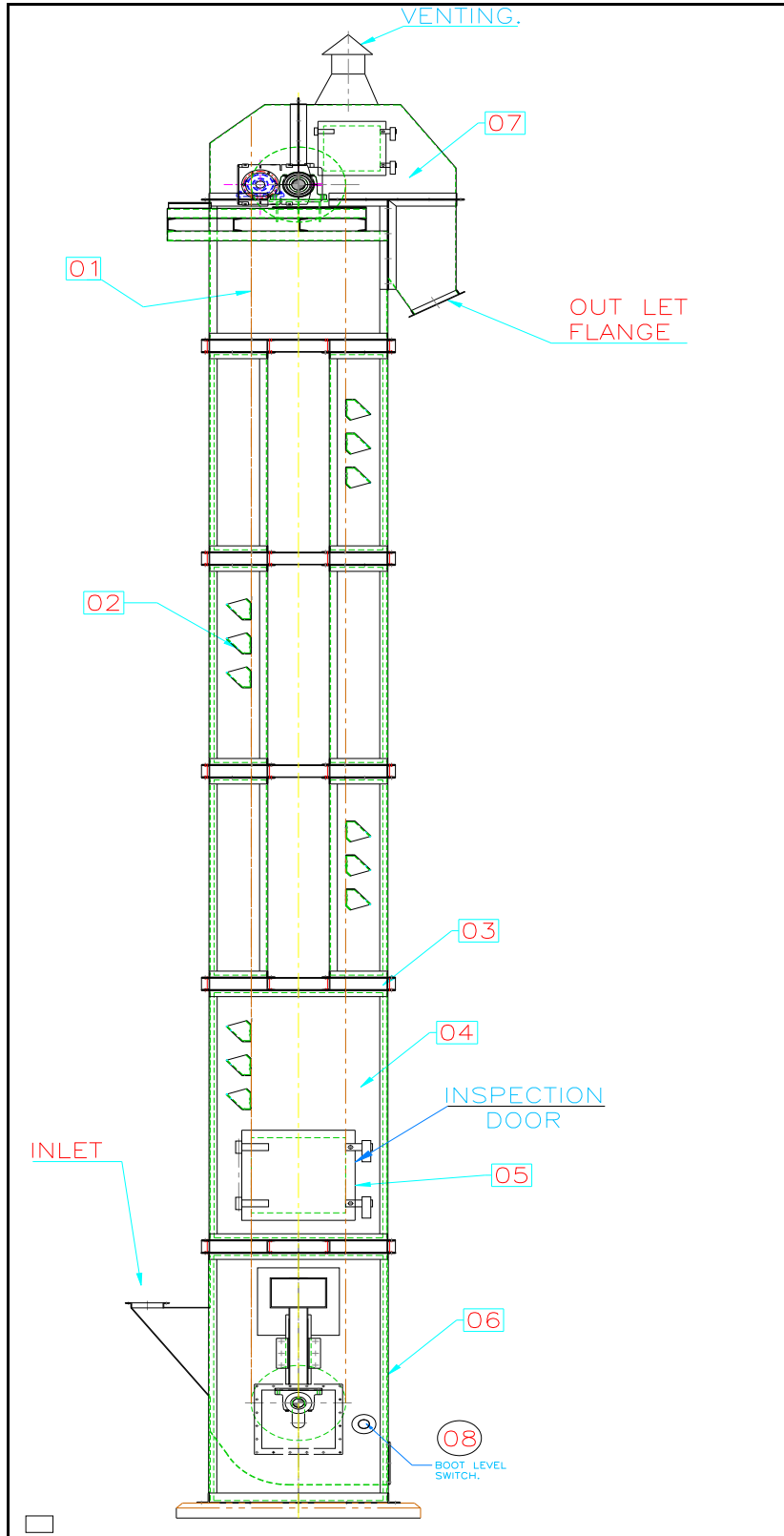
01. MAINTAIN a safety training and safety equipment operation/maintenance program For all employees.
02. BUCKET ELEVATORS shall not be operated unless the elevator housing Completely encloses the elevator moving elements and power transmission guards are in place. *If the elevator is to be opened for inspection, cleaning or observation The motor driving the elevator is to be locked out electrically in such a manner that it cannot be restarted by anyone, however remote from the area, unless the elevator*

housing has been closed and all other guards are in place.

03. IF THE elevator must have an open housing as a condition of its use and application, the entire elevator is then to be guarded by a railing or fence.
04. ALL ROTATING equipment such as drives, gears, shafts and couplings must be guarded by the purchaser/owner as required by applicable laws, standards and good practices.
05. SAFETY DEVICES AND CONTROLS must be purchased and provided by the purchaser/owner as required by applicable laws, standards and good practices.
06. PRACTICE good housekeeping at all times and maintain good lighting around all equipment.
07. KEEP ALL operating personnel advised of the location and operation of all emergency controls and devices. Clear access to these controls and devices must be maintained.
08. FREQUENT INSPECTIONS of the controls and devices, covers, guard, and equipment to insure proper working order and correct positioning.
09. DO NOT walk on elevator hood, guards.
10. DO NOT poke or prod material in the elevator.
11. DO NOT place hands, feet or any part of the body or clothing in the elevator or opening.
12. DO NOT overload elevator or attempt to use it for other than its intended use.
13. INLET and DISCHARGE openings shall be connected to other equipment in order to completely enclose the moving elements of the elevator.
14. BEFORE POWER is connected to the drive, a pre-startup safety check shall be performed to insure the equipment and area are safe for operation and all guards are in place and secure.
15. BUCKET ELEVATORS are not normally manufactured or designed to handle materials that are hazardous to personnel. These materials which are hazardous include those that are explosive, flammable, toxic or otherwise dangerous to personnel. Elevators may be designed to handle these materials. Elevators are not Manufactured or designed to comply with local, state, codes for unfired pressure vessels. If hazardous materials are to be conveyed OR IF the elevator is to be

subjected to internal or external pressure, Supriya Engineering, should be consulted prior to any modifications.

16. ALL EQUIPMENT shall be checked for damage immediately upon arrival DO NOT attempt to install a damaged item.



Bucket elevator parts

1. Belt
2. Buckets
3. Support frame
4. Intermediate casing
5. Inspection door
6. Boot assembly
7. Top Box
8. Level switch

NOTE:

It is the purchaser's responsibility to provide a suitable foundation and bolts to receive the elevator.

RECEIVING:

It is important to carefully examine incoming shipments for condition and completeness. Shortages and damage must be reported immediately to the transportation company. **DO NOT ATTEMPT TO INSTALL A DAMAGED ELEVATOR OR COMPONENTS.** Normally head and boot sections are factory assembled and include sprockets or pulleys; take-up, Plummer blocks, etc. belt, buckets, gaskets, nuts and bolts, special fittings, etc. are usually packed in wooden boxes. Intermediate casings are shipped separately.

MACHINERY (Belt Type)

IB. Remove boot pulley access door. Drop a plumb line from head end pulley to boot pulley.

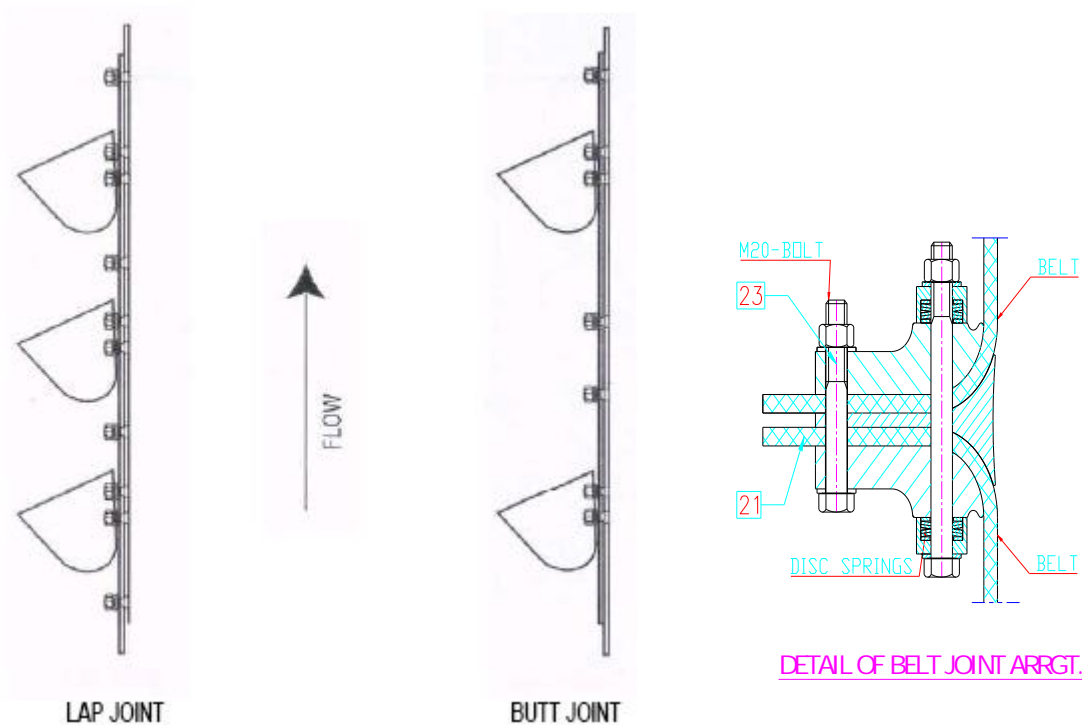
Insure that pulleys are centered in casing and are exactly in line with each other. Pulleys should be in line when viewed from the narrow side of the casing. Head and boot shafts are generally offset when viewed from the wide dimension of the casing.

JB. Move boot take-up to its uppermost position (head end take-up to lowest position.) Make these adjustments uniformly to both sides at the same time. Many bearings will

not accommodate much misalignment. Severe damage to internal bearing parts and seals can occur if this procedure is not followed.

KB. It is recommended, especially in cool environments, that the belt be draped over the head pulley and allowed to hang for at least 24 hours. This will relieve stresses resulting from being rolled up and tend to achieve initial stretch common to belting. If rubber covered belt with unequal thickness covers is used, the thicker cover should be installed on the pulley side.

LAP JOINT BUTT JOINT



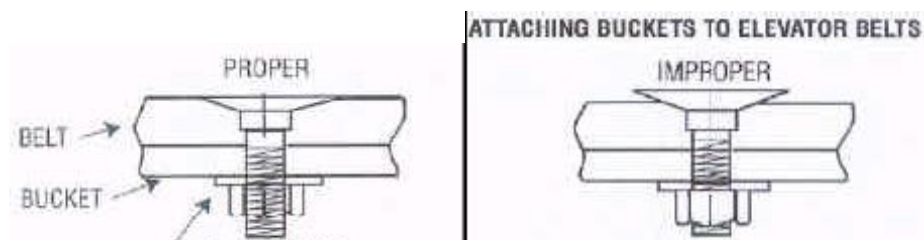
LB. Select the type of splice to be used from illustrations above.

MB. Clamp belt several feet from both ends using clamping angle irons and pull ends until a snug tension is achieved. Splice belt by installing elevator bolts, nuts, and washers. Often it is desirable to add one or more rows of additional bolt holes between buckets in the splice area. This is accomplished by drilling the holes while the belting is clamped in the pretension condition. If clamp splice is used follow instructions supplied with clamps.

MOUNTING ELEVATOR BUCKETS ON BELT

Elevator buckets are generally secured to belts by means of flat head bolts known as elevator bolts number 1 head (also called Norway bolts). They also serve to reduce accumulation of material between the bucket and belt, and help seal the bolt holes against moisture. One washer is used per bolt. The belt carrying the buckets should be at least 1 inch wider than the bucket for length up to 16 inches, and 2 inches wider than the bucket for length 16 inches and over. When two lines of buckets are used on the same belt they should be staggered with respect to each other.

BUCKET ATTACHMENTS



BELTS

Normally a flat head type of bolt is used to attach the buckets to the belt. The flat or oval head is placed on the pulley side of the belt with the attachment to the bucket made by use of a lock washer and nut. Normally the bucket will have a pliable washer between the bucket and the belt.

NB. Remove belt clamps and adjust take-ups uniformly to both sides to remove any slack in the belt. Use caution to avoid over tightening the belt as this can cause premature failure of: Belting, shafts, bearings, etc. At this point it is advisable to "run in" the belt for a period of several hours to observe belt tracking and any further initial stretch. The responsibility to do the splice correctly lies with the installer.

OB. Install buckets using bolts, nuts and lock washers provided. It is a good idea to peen the bolt threads after the buckets are securely in place. If plastic buckets are being installed, use care to avoid over tightening. Large diameter steel flat washers or fender washers are frequently used with plastic buckets.

PB. Adjust Bibb to provide up to 3/4" to 1" clearance to buckets. Install upper hood front and back section.

QB. After satisfactory alignment and trial operation, weld stops at each end of head shaft pillow blocks to prevent bearing movement. Stops can be angle iron, channels, key stock material, etc.

NOTES (Belt Type)

AA. If elevator is equipped with gravity take-up, use a come-along or other means to raise take-up box to the upper most position when splicing the belt. Add weight (concrete or steel stampings) to weight box as required for smooth operation. Weight must be uniformly distributed in weight box and sufficient to remove slack from belt.

BB. During normal operations, avoid starting and stopping any elevator when loaded with material.

CC. If elevator components are to be stored at the job site for a period of time prior to erection, insure that components are protected from the elements. It is not advisable to cover elevator components tightly with polyethylene. Condensation will collect and cause corrosion to elevator components and possibly premature motor failure due to moisture in the windings.

DD. If elevator is to be erected but not used for a long period of time, it should be run for at least one hour per week.

DRIVES (All Types)

If drive is not factory assembled, install at this time.

1. Gear box and motor Drive

Align the input coupling and output coupling with respect to head pulley.

Fill reducer with proper lubricant and install driver sprocket.

Recommended oil is generally indicated on the reducer name tags.

Set reducer in position and line up drive sprockets.

Lock base of reducer into position.

Check all mounting bolts for tightness.

Install coupling guard

If possible, rotate motor by hand to determine whether the back stop is correctly installed. (See reducer manufacturer's instructions for additional details.)

Other types of backstops are frequently used. (See manufacturer's instructions.)

2. Shaft Mounted Gear Reducers

Assemble back stop to reducer. (See manufacturer's instructions.) Assemble reducer to head shaft using bushings and keys if provided.

Bolt motor in place and install driver and driven couplings

Check for alignment.

Add oil to reducer. Recommended oil is generally indicated on the reducer name tag.

Install coupling guards.

Connect electric motor.

12.4. Operation

START UP (All Types)

Check to insure elevator is free of foreign materials before connecting power.

Check to insure all guards, covers, safety devices and controls are in place and operating correctly.

Initial start up of elevator should commence with several short jogs gradually lengthening in duration without material.

Check take-up adjustment after 8 hours.

Re-tighten all fasteners.

Check and realign sprockets/pulleys as necessary.

Gradually begin feeding material to the elevator. Increase feed rate slowly until reaching design capacity.

Empty elevator.

LOCK OUT ALL POWER.

Check for loose fasteners.

Check alignment of sprockets/pulleys.

Primary to satisfactory elevator operation is uniform material feed rates—not surge loading and excessive boot flooding.

When consulting the factory regarding a specific elevator, refer to the purchase order number, year of manufacture if known, and equipment number if appropriate.

Regular inspection and maintenance will insure uninterrupted and satisfactory elevator performance.

PROBLEM

Elevator Vibrates

POSSIBLE CAUSE

1. Foreign matter in boot
2. Excessively tight chain/belt
3. Excessively loose chain/belt
4. Loose or broken buckets
5. Buckets hitting breaker plate
6. Misaligned elevator head and boot shaft
7. Elevator is not adequately braced.
8. Chain/belt hitting inside of casing when casing is not plumb

Elevator Will Not Start

1. Obstruction in boot
2. Electrical problem
3. Backstop incorrectly installed
4. Broken V-Belts or drive couplings
5. Reducer failure
6. Boot excessively plugged with material
7. Excessively tight chain/belt

Pillow Blocks Get Hot

1. Over lubrication

- 2. Under lubrication
- 3. Excessive chain/belt tension
- 4. Misalignment of head shaft pillow blocks
- 5. Misalignment between head and boot shaft

Elevator Not Discharging Properly

- 1. Speed incorrect - consult factory
- 2. Air cushion - vent compartment being discharged into
- 3. Light fluffy materials - reduce speed up to 15%
- 4. Certain materials may require perforated buckets*
- 5. Some materials may be affected by static electricity*

*Consult Factory

12.5. Maintenance

Periodic inspections must be performed to determine the wear rate of all chains, buckets, belts and bearings. During these inspections the alignment of sprockets, pulleys and all drive components shall be checked. Retightening of fasteners and checks to insure guards, covers, gratings, contrails, and safety devices are in place, secure, and operating correctly.

Keep a good supply of spare parts. When ordering, refer to our Service Manual and furnish the part identification as well as original order number.

WARNING: Removal of backstop may cause unexpected machinery movement as indicated in "Safety" If backstop is installed as part of shaft mount reducer removal of torque arm may also cause unexpected machinery movement.

BUCKET ELEVATOR TROUBLES & THEIR REMEDIES

S. No	Trouble	Cause	Remedy
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1	Bucket knock against casing walls. A Belts runs off pulleys or skids on drive pulley.	<ol style="list-style-type: none"> 1. Belt is slack 2. Pulley skewed. 3. Faulty lacing of belt 4. Material comes between belt & pulley. 	<ol style="list-style-type: none"> 1. Take-up slackness 2. Eliminate skew 3. Check lacing & replace if necessary 4. Feed material uniformly, avoid clogging boot
2	Abnormal Stretching & wear of belt	Excess strain on belt	Eliminate clogging of boot.
3	Spillage of material in return casing	Faulty setting or wear out of discharge plate at elevator head	Adjust position of plate or replace if worn out
4	Knocking in casing	Faulty casing assembly Bucket fastening broken	Casing to be strictly vertical Inspect bucket fasteners & replace broken ones.

Buckets and is not too sticky to be discharged.

Typically, a Bucket Elevator consists of three basic components, a head end, a foot end and an intermediate section. The head end assembly includes the head shaft and pulley, bearings, Plummer blocks, drive assembly, supporting structure and the maintenance platform.

The foot end includes the foot shaft and the pulley, bearings with take-up screws and nuts, supporting structure, bottom plate and the feeding chute.

The intermediate sections are normally considered to consist of the elevator structure and casing and top and bottom flanges for assembling each other. In most of the cases , elevator are used to support the machinery and control thee dusting. Endless belt is fixed in between head end pulley and tail end pulley with buckets.

The Elevator Buckets are bolted to endless belt with required spacing. Material loaded into the buckets via a hopper and loading at the bottom “boot” in a continuous elevator or is scooped up by the buckets as they round the tail pulley or bottom boot pulley in a centrifugal discharge elevator. The material is discharged by the centrifugal force as the buckets overturn at the head pulley. It

is therefore, a comparatively high speed elevator. The average centrifugal discharge elevator head pulley speed varies with the diameter of the head pulley and nature of the material, but is usually between 35 and 50 rpm.

A bucket elevator is equipment which carries a material from a given level upwards and discharges at a required height. This equipment consists of boxes of MS angle frame fully covered on four sides provided with top and bottom flanges. These boxes may vary in length and size. The bottom box has the take-up assembly which consists of tail pulley, take-up bearings and adjusting take-up screw. Over this, the plain boxes are assembled and finally the top box is assembled. The top box consists of head pulley which is rubber lagged and mounted on two self-aligning bearings housed in Plummer blocks. The shaft is driven by a motor after the speed being reduced by a reduction gear box. Connecting the top and bottom pulley is the rubber belt on which buckets are fitted. When the bucket elevator runs, the buckets carry the material to the top and discharge it through an outlet provided in the top box.

TRIAL RUN

Prior to commissioning and test run all safety switches have to be installed. All protection devices must have been arranged and all doors and inspection openings must be closed.

Before commissioning the following items have to be checked.

Correct sense of rotation of the drive motor.

Caution:

For test purposes ensure that the hold back device (ratchet and Paul) should be removed and installed only after the direction of the elevator is correct.

Check the oil level in the gearbox, grease in the head pulley Plumber blocks etc.

Perfect functioning of all the safety devices.

Good working of de – dusting system.

Removal of rubbish from the bottom boot. The first test should be carried out at inching speed. Then the bucket elevator should run with out load for some hrs. If the belt tracking is perfect then material can be fed to the elevator.

LUBRICATION

Frequency of lubrication depends on factors such as the nature of the application bearing materials and operating conditions. Weekly inspection and lubrication is advisable until sufficient experience permits establishment

of longer interval. Lubricate the drive following manufacturer's instructions provided for the gear-box and the other drive components requiring lubrication. Gearboxes are generally transported without oil. Care should be exercised that when speed reduction unit is inclined because of direct connection to the conveyor shaft, that the oil seal on the speed reducer will retain the lubricant properly, that the tilted oil supply still will properly lubricate the gearing, that the oil level gauge will not be rendered inoperative and that the oil filler and drain opening is not made too inconvenient for servicing. The lubrication of motor must be checked for the inclined position.

LUBRICATION SCHEDULE

S. NO	Part name	Lubricant	Frequency
1.	Take up Bearings	Servogem3	Daily thrice
2.	Plummer blocks	Servogem3	weekly once
3.	Hanger bearings	Servogem3/ oil	Daily thrice
4.	Gear box	Servo mesh sp 320	Whenever required.

GUIDELINES FOR SAFE OPERATION & MAINTENANCE

A brief listing is presented here simply to illustrate the type of safety considerations generally applicable to belt conveyor installations and equipment.

1. At a time close to completion and installation, all personnel and supervisors should be given a complete introduction in the use of the system and all of its

- equipment. Field inspection and classroom techniques are two valuable types of training.
2. A formal safety training program for operations, maintenance and supervisory, personnel will go a long way towards establishing and maintaining the highest standards of safety in the world place.
 3. At no time should the conveyor be used to handle material other than that originally specified. Capacity and belt speed design ratings should not be exceeded.
 4. Only trained personnel should be allowed to operate the conveyor system. They should have complete knowledge of conveyor operation, electrical controls, safety and warning devices, and the capacity and the performance limitations of the system.
 5. The location and operation of all emergency controls and safety devices should be made known to all the personnel. Surrounding areas should be kept free of obstructions or materials that could impede ready access and a clear view of such safety equipment at all times.
 6. A program should be established to provide frequent inspections of all equipment. Guards, safety devices, and warning signs should be maintained in their proper positions and in good working order. Only competent and properly trained and authorized persons should adjust or work on safety devices.
 7. A “walking inspection” of a belt conveyor system is a good means by which well trained maintenance personnel can often detect potential problems from any unusual sounds made by such components as idlers, pulleys, shafts, bearings, drives, belts, and belt splices.
 8. Hands and feet should never come in contact with any conveyor component, and no one should be allowed to ride on a moving or operable conveyor. Poking at or prodding material on the belt or any component of a moving conveyor should be prohibited. Contact with, or work on, a conveyor while the equipment is stopped, with the electrical control locked off.
 9. No person should be allowed to ride on, step on, or cross over a moving conveyor, nor to walk or climb on conveyor structures, without using the walkways, stairs, ladders, and crossovers provided.
 10. Good housekeeping is a prerequisite for safe conditions. All areas around a conveyor, and particularly those surrounding drives, walkways, safety devices, and control stations, should be kept free of debris and obstacles, including

inactive or unused equipment, components, wiring, and obsolete or non applicable warning signs.

11. Any conveyor found to be in an unsafe condition for operation, or one that does not have all guards and safety devices in excellent condition, should not be used unless adequate supplementary safety devices are installed.
12. All persons should be barred by appropriate means from entering an area where falling material may present a hazard. Warning signs and barricades can be used.
13. First-class maintenance is a prerequisite for the safest operation of conveyors. Maintenance, including lubrications, should be performed with the conveyor stopped and locked out. Special lubricating equipment, lube extensions, pipes, and the like can be installed so as to permit lubrication of an operating conveyor without any foreseeable hazards.
14. Good lighting contributes to a safe working environment.
15. During the life of a conveyor system, its operational conditions and environment may require changes. There should be a continuing effort to detect and treat promptly any new possible safety hazards associated with these changes. If such a hazard can not be readily eliminated, warning signs, barricades, or pasted instructions should be installed.