

## Safety



Read manual before installing or using product. Failure to follow instructions and safety precautions in manual can result in death or serious injury. Keep manual in a safe location for future reference.



On safety decals, this symbol and the signal words Danger, Warning, Caution and Notice draw your attention to important instructions regarding safety. They indicate potential hazards and levels

of intensity.



**RED - DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**ORANGE - WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**YELLOW - CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



**BLUE - NOTICE** alerts you to practices unrelated to personal injury, such as messages related to property damage.

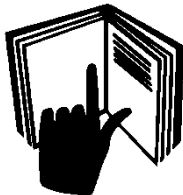
**IMPORTANT:** To prevent serious injury or death to you or your family, it is essential that safety decals are clearly visible, in good condition, and applied to the appropriate equipment.

### FOLLOW MANUAL & SAFETY DECAL MESSAGES

Carefully read this manual and all safety decals on your

equipment. Safety decals must be kept in good condition. Replace missing or damaged safety decals by contacting Sukup

Manufacturing Co. via mail at PO Box 677, Sheffield, Iowa USA, 50475; by phone at 641-892-4222; or by e-mail at [info@sukup.com](mailto:info@sukup.com).



It is the responsibility of the owner/operator to know what specific requirements, precautions, and work hazards exist. It is also the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of hazards and safety precautions that need to be taken to avoid personal injury or death. Always keep children away from bins and vehicles with flowing grain.

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit in good working condition. Keep shields in place. Replace worn or missing shields free of charge by contacting Sukup Manufacturing Co.

### GRAIN BIN SAFETY

Owners/operators are responsible for developing site-specific confined space entry procedures. OSHA's confined space entry procedures (29CFR 1910.146) can be found at [www.osha.gov](http://www.osha.gov).

#### If you must enter bin for repair or maintenance:

- Use a safety harness, safety line and respirator
- Station another person outside of bin
- Avoid the center of the bin
- Wear appropriate personal protective equipment
- Keep clear of all augers and moving parts



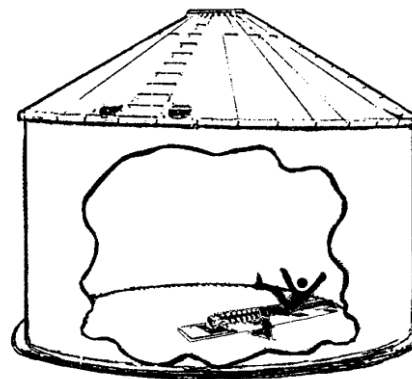
**DANGER:** Never enter bin unless all power is locked out and another person is present.



**Rotating augers can kill or dismember!**

#### NEVER enter bin when augers are running!

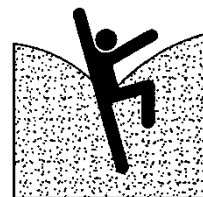
When bin is nearly empty, sweep auger will travel at an increasingly fast speed. Keep away from sweep and sump augers to avoid entanglement.



Failure to follow precautions above will result in death or serious injury.



**DANGER:** Flowing grain may trap and suffocate. If you enter a bin of flowing grain you can be completely submerged in grain in about 8 seconds.



Failure to heed this warning will result in death or serious injury.

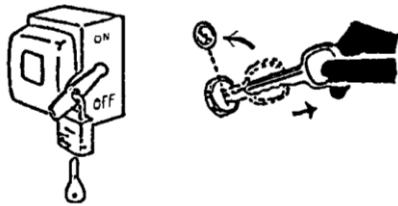
## Safety

To avoid electric shock or electrocution, all equipment must be properly wired and grounded according to electrical codes. Have unit wired by qualified electrician.



Have an electrician install a main power disconnect switch capable of being locked only in OFF position. Mark disconnect clearly as to equipment it operates. Always lock out main power disconnect switch whenever equipment is not in use.

### Service Disconnect



**WARNING:** When servicing equipment, never enter bin unless all power is locked out and another person is present. Always LOCK OUT all power and always check with voltage meter before servicing.

Failure to do so could result in death or serious injury.

Owners/operators are responsible for developing site-specific Lockout/Tagout procedures based on equipment at their work site. See OSHA's typical minimal lockout procedures (29CFR 1910.147 App A) at [www.osha.gov](http://www.osha.gov).

**WARNING: KEEP CLEAR OF ALL MOVING PARTS.**

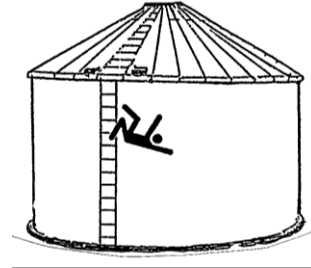
Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation.

Keep away from all moving parts. Keep all shields in place. **SHUT OFF AND LOCK OUT** all power before servicing.

Failure to follow precautions above could result in death or serious injury.



**WARNING:** Metal is slippery when wet. To avoid falls, never carry items if climbing on bin. Maintain secure hand and foothold if climbing on bin. Failure to do so could result in death or serious injury.



**CAUTION:** Metal edges are sharp. To avoid injury, wear protective clothing and handle equipment and parts with care.

Failure to do so may result in minor or moderate injury.

### PERSONAL PROTECTIVE EQUIPMENT



Owners/Operators are responsible for developing site-specific personal protective equipment standards. OSHA's personal protective equipment standards (29CFR 1910.132) can be found at [www.osha.gov](http://www.osha.gov).

### EMERGENCIES – KNOW WHAT TO DO

Have emergency numbers and written directions to work site readily available in case of emergency. An area for emergency phone numbers to be recorded is provided below and at end of this manual.

**Ambulance • Fire • Police: 9-1-1**

Bin rescue team: \_\_\_\_\_

Emergency medical squad: \_\_\_\_\_

Address of work site: \_\_\_\_\_

Directions to work site: \_\_\_\_\_

**IMPORTANT** – A bucket elevator is generally used to move grain for storage in grain bins. Be aware of dangers inherent in grain bins. Do not enter a bin if grain has stopped flowing normally or has bridged, as shown in Fig. 1. Grain can collapse without warning and trap, bury and cause suffocation.

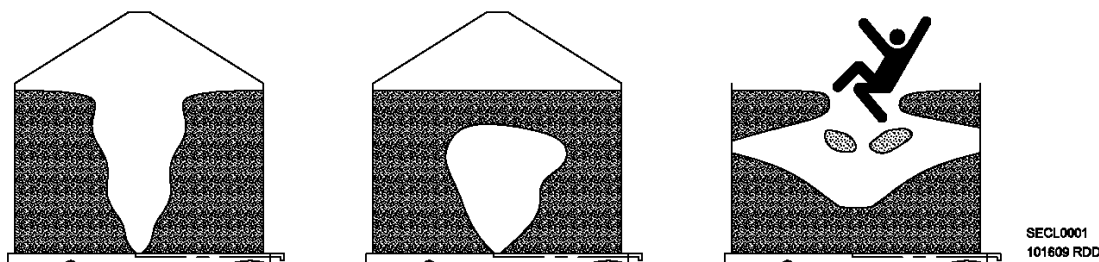


Fig. 1 – Obstructed-flow, bridged grain, collapsed bridge of grain in bin

**Basic Safety Rules**

1. Be certain that all covers, grates, and guards are in place and securely fastened.
2. Never step or walk on conveyor covers, grates or guards.
3. Lock out all power before removing covers, grates or guards. Before working on any part of bucket elevator or conveyor, secure all chains and belts to prevent movement.
4. Do not modify or redesign bucket elevator without first obtaining written approval from Sukup Manufacturing Co. Unauthorized modifications to components may impair the function and/or safety and affect machine life.



**FOLLOW A PROPER LOCKOUT PROCEDURE**

This suggested procedure must be performed **EVERY TIME** bucket elevator is to be worked on. Following these steps will assist in preventing accidents.

- Each worker must have his/her own lock and the only key to that lock.
- Make sure elevator is not operating before turning off power.
- Notify all affected employees that elevator will be locked out for service.
- Authorized employee shall refer to the facility procedure referencing the power source for the elevator.
- Shut down bucket elevator in a normal manner.
- All energy sources that could activate elevator must be de-activated.
- Each person who will be working on bucket elevator must put a lock on all energy sources that could provide any power to elevator.
- Confirm that power has been deactivated by trying to re-start elevator.
- Turn all controls for elevator back to “off” position.
- **NO ONE** is to return power to bucket elevator until all work on it has been completed and all locks have been removed.

Facility management needs to proactively train employees to ensure use of proper lockout procedures while working on bucket elevator. Management also needs to inspect unit for any covers or guards not in their proper place. It is everyone’s responsibility to report any missing grates, guards, equipment failures or failures of others to lock out. Make certain that no cover is removed unless power is locked out.

### Grain Dust Explosions

Any facility that stores and handles any type of grain is susceptible to a grain dust explosion. Grain dust is not dirt. It is not inert, but highly flammable and can be very explosive in a confined area. Seven elements may work together and produce a potentially deadly explosion.

**Air** - Air must be present to provide the oxygen necessary for combustion.

**Fuel** - In this case the fuel is the grain dust. Finer dust will provide easier ignition.

**Suspension** - A pile of grain dust will not explode, it must be suspended in air to provide proper fuel/air concentration.

**Minimum Concentration** - There must be a minimum concentration of grain dust suspended in air. Current tests indicate that minimum concentration is about 0.4 oz/ft.<sup>3</sup>.

**Low Moisture** - Grain dust must be of relatively low moisture content. Ambient air moisture, or relative humidity, has no bearing on potential for an explosion.

**Ignition Source** - The ignition source could come from a fire, an overheated bearing, welding or cutting sparks, debris, hot metal, electrical failure or other source.

**Confined Area** - An explosive action must take place within a confined area.

Recognizing this hazard, Sukup Manufacturing Co. believes that we all need to work together to prevent grain dust explosions in order to protect lives, jobs, property and profits. A number of preventive measures should be taken to reduce the likelihood of an explosion. Following are some suggestions.

### CONTROL THE DUST

- Employ methods to clean grain to reduce fines.
- Use equipment to minimize breakage, such as decelerators. Corn that is broken exposes grain starch. **NOTE:** Cornstarch is the most explosive element of grain.
- Use an outside bag filter to capture dust.
- Use an air system on bucket elevator to reduce dust inside grain elevators and conveyors.
- Spraying edible mineral oil on grain significantly reduces airborne dust when handling grain.
- Equipment finishes in the facility should be provided with slick coatings in order to prevent dust accumulation.
- Enclose all conveyors in an effort to keep dust from escaping.

### CONTROL IGNITION SOURCE

- A “no smoking” policy shall be implemented in all potentially hazardous areas.
- Only explosion-proof lights shall be used.
- All welding and cutting shall take place outside of facility.
- Properly lubricate bearings on all equipment at required intervals.
- Magnets shall be used to trap metal that might be mixed in with grain.
- Check lagging on bucket elevator head pulley and replace it if it is showing signs of wear or is smooth.
- Use recommended safety devices such as heat detectors on bearings, motion sensors on boot shaft, belt alignment sensors, or limit switches to shut down system if leg is choked. Make certain all electrical wiring, lights and outlets meet local codes.



**WARNING: Do not repeatedly start and stop elevator to remove obstruction. Doing so could overheat belt or head pulley, possibly causing an explosion resulting in death or serious injury.**

### GRAIN DUST EXPLOSION MYTHS

Several myths have surfaced in regard to grain dust explosions. These are some of the most common:

**Myth:** *Grain dust explosions do not occur in times of high humidity.*

**FACT:** Dust explosions have been known to occur during rainstorms.

**Myth:** *Grain dust explosions do not occur in wooden elevators.*

**FACT:** Wooden elevators are no less susceptible to grain dust explosions than any other construction type.

**Myth:** *Grain dust explosions do not occur in small country elevators.*

**FACT:** 70% - 80% of grain elevator explosions occur in small country terminals.

**Myth:** *There are only two (2) explosions that occur, a primary and a secondary.*

**FACT:** Up to thirteen (13) explosions have been documented during one (1) single incident.

### PRESSURE RELIEF VENTING

Pressure relief vents for trunking can be supplied as optional equipment for all models of bucket elevators. Pressure relief vents for heads are standard on all models with a 36” pulley and larger, and optional on smaller units. These vents, should an explosion occur within a leg, may minimize damage to leg and prevent a secondary explosion.

**Remember: Good housekeeping practices and correct safety procedures will help protect lives, jobs, property and profits.**

<p><b>IMPORTANT:</b> When changing head pulley assembly or motor, do not set on platform if total weight on platform will exceed 500 lbs. Total weight on any platform cannot exceed 500 lbs. unless otherwise noted.</p>
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## Bucket Elevator Safety Decals

It is essential that the following safety decals be mounted on your bucket elevator to warn and remind of potential hazards. Decals on Sukup bucket elevators are factory-mounted, but may need to be replaced if they become damaged or unreadable.

Order replacement safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at PO Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com. Please specify computer number. Use the decal placement drawing on Page 12 to determine location of decals if replacement is necessary.

1. **Decal L0112 – DANGER:** Explosion release will cause serious injury or death!



2. **Decal L0113 – WARNING:** Falling from heights may cause serious injury or death.



3. **Decal L0271 – DANGER:** Shield missing, do not operate!



4. **Decal L01135 – WARNING:** Platform collapse can cause serious injury or death.



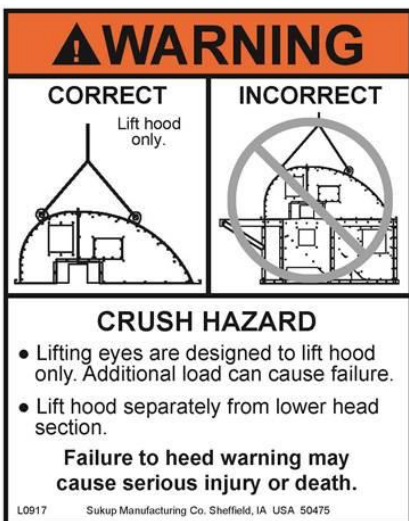
5. **Decal L0114 - WARNING:** Exposed buckets or flights may cause serious injury or death.



6. **Decal L0164 – WARNING:** Failure to heed these warnings may cause serious injury or death.



7. **Decal L0917 – WARNING:** Crush hazard



8. **Decal L0281 - WARNING:** To avoid serious injury or death:



9. **Decal L0284 - WARNING:** Keep away from all moving parts



10. **Decal L02612 – WARNING:** Flying material can cause serious injury!



## Bucket Elevator Safety Decal Placement

Check that all safety decals are in place according to Fig. 2 and are legible after elevator is installed.

**NOTE:** These decals must never be removed, tampered with, painted over or obscured in any way. If decal replacement becomes necessary, use locations below. Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position.

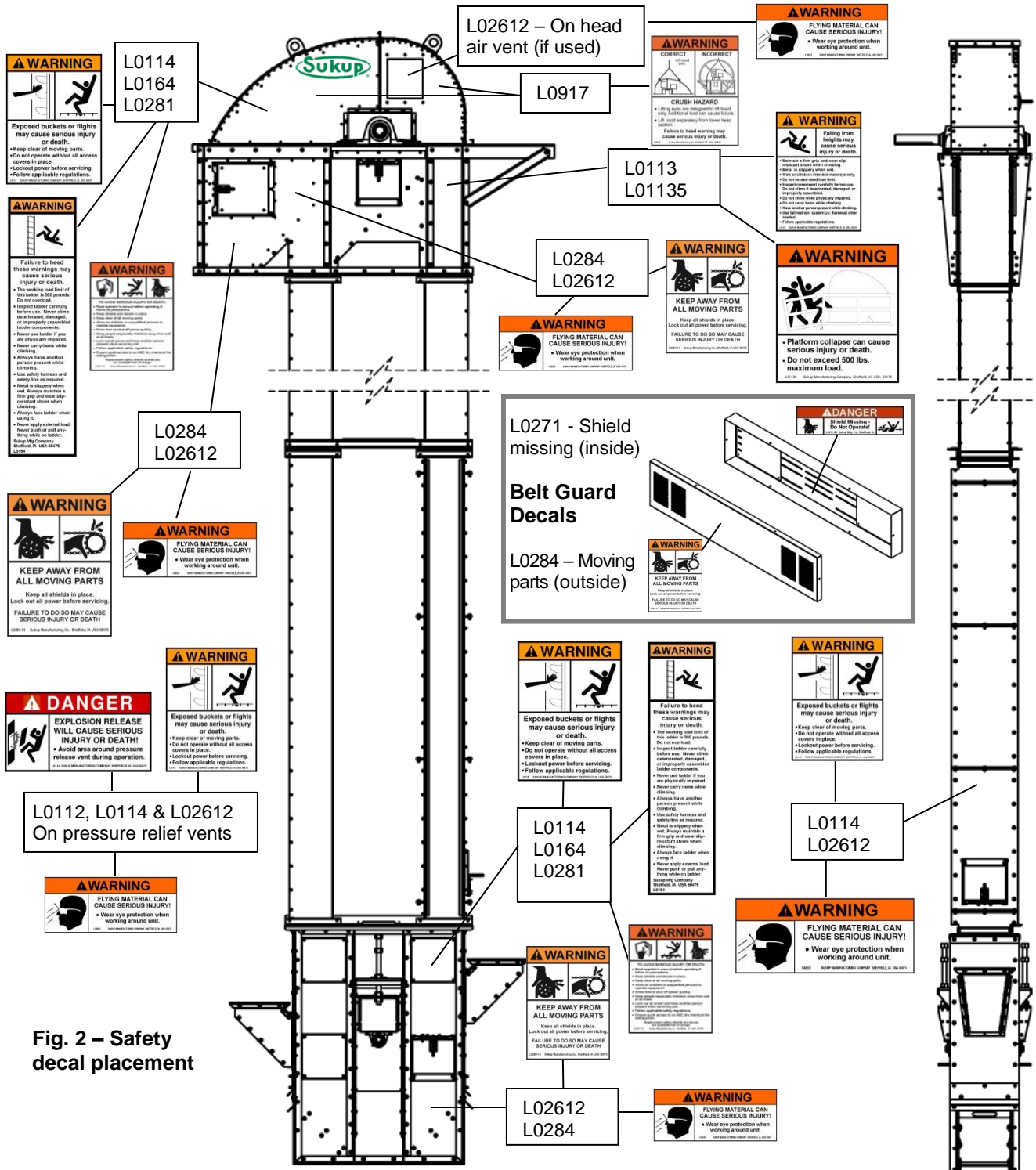


Fig. 2 – Safety decal placement

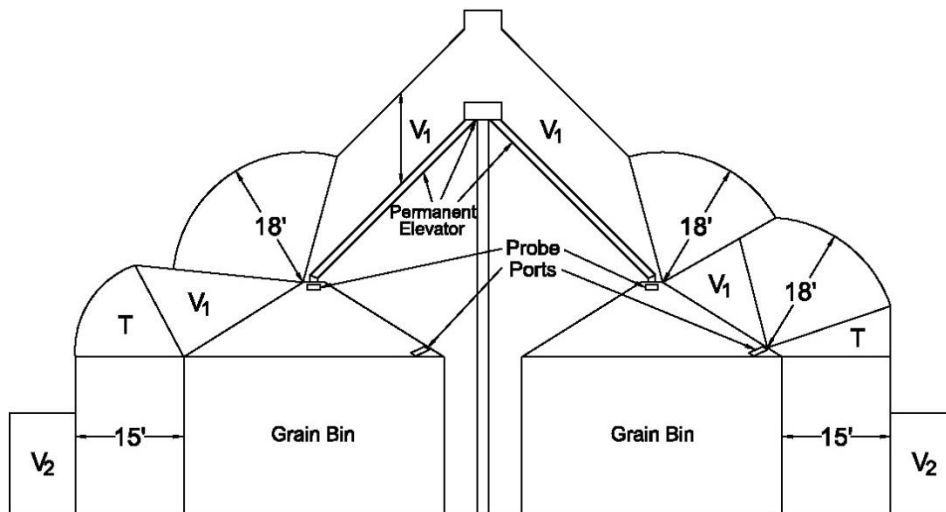


### Electrical Wire Clearances

Your local electric utility may be able to provide assistance in planning a safe environment for working around grain bins. State codes may vary regarding specific clearances for electrical lines around grain bins. Be certain your local electric utility is in accordance with your state's regulations. **To prevent overhead safety issues, bury electrical lines.**

The American National Standards Institute (ANSI) provides clearance envelopes, shown in Fig. 3, for grain bins filled by permanently installed augers, conveyors or elevators in (ANSI) C2 2007 "National Electrical Safety Code," Rule 234, Page 120.

**NOTE:** An electric utility may refuse to provide electrical service to any grain bin built near an existing electric line that does not provide clearance required by ANSI and the National Electrical Safety Code.



- V<sub>1</sub> = Vertical clearance above a building required by Rule 234C (Table 234-1)
- V<sub>2</sub> = Vertical clearance above land required by Rule 232
- T = Transition clearance

Fig. 3 – Electrical wire clearances

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## General Instructions

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### Reducer Oil

Gear reducers are shipped without oil. Use high-grade petroleum-based, rust- and oxidation-inhibiting (R & O) gear oil. See oil recommendations in Dodge Torque Arm II Speed Reducers section to determine correct viscosity of oil for reducer. Follow instructions on reducer nameplate, warning tags and in installation instructions attached to reducer. Oil should be changed after an initial operation of about two weeks. After initial break-in period, lubricant should be drained, magnetic drain plug cleaned, and gear case flushed and refilled every 2,500 hours of operation. Change oil every one to three months when operating in conditions of extreme dirt and temperature.

Before filling reducer with oil, install magnetic drain plug in hole closest to bottom of reducer (as mounted on elevator). Remove tape covering filter/ventilation plug in shipment and install plug in topmost hole. Of two remaining plugs on sides of reducer; lower one is the minimum oil level plug; upper one is the level to which oil should be filled.

**NOTICE:** Proper amount of oil must be added to reducer prior to running elevator. Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly.

### Final Check

Check all parts to ensure no foreign objects or tools have been left in elevator. All guards, inspections doors and removable plates should be checked for proper placement. Check for loose or missing buckets. Drive should be turned by hand to check for proper rotation and clearance. Rotate belt a full rotation to check for any obstructions. Make any necessary adjustments. Check all setscrews and pulley hub bolts to ensure they are tightened.

**IMPORTANT:** Do not operate bucket elevator until all bolts are fully tightened.

### Initial Test Run

Elevator **should be run without load for approximately eight hours**. During this time, particular attention should be given to:

1. Loud or unusual noise – Check for loose buckets, an improperly adjusted throat wiper, or trash materials/tools inside elevator.
2. Excess vibration – Drive equipment may not be adequately braced or elevator may not be plumb.
3. Bearings overheating – Check bearing lubrication; check for extreme shaft misalignment at head and boot shafts, for a severe overhung load condition at the drive, or that take-ups are too tight.
4. Drive unit over-heating – **Reducer is shipped without oil. It must be filled prior to operation.** Check belt alignment. Motor may be improperly wired or there may be incorrect voltage going to motor.
5. Evidence of belt not tracking in center of pulleys – Check that elevator is plumb, that pulley shafts are level, take-ups are properly adjusted, and head bearings are shimmed appropriately.

Once material is run through elevator, belt tracking needs to be checked again. Make sure material is flowing properly into boot. Improperly flowing material can push belt to one side and make it very difficult to properly track the belt. Final tensioning of belt will be done under load.