

Safeguarding Machinery and Equipment

General Requirements

**Some Common
Safeguarding Applications:
Conveyors**



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This section focuses on two common types of conveyors:

- Belt conveyors
- Screw (auger) conveyors

Belt conveyors

Injuries associated with unguarded belt conveyors generally involve one of two moving parts:

- The power transmission drive (V-belt or chain-sprocket drive and transmission)
- The conveyor belt itself where it engages around the head or tail spool (also known as the drum)

Guarding of the power transmission drive is done using the safeguarding methods described earlier for typical power transmission drives. Guarding of the in-running nip point between the running belt and the head or tail spool is achieved by fully enclosing access to the belt and spool for a minimum of 1 metre (3.3 feet) back from the centreline of the spool. In industry, this is often referred to as a “boot.” Figure 4.4B shows a typical belt conveyor tail spool boot. The boot must be designed and fabricated to permit tracking adjustments, which must be done when the belt is moving, to be performed without removing the boot.

Where access to the running conveyor belt is not prevented by guardrails or enclosure, a typical safeguarding device consists of an emergency trip wire running the entire length of the conveyor. This safety device must be installed using the safety criteria described under “Grab wire and pull wire devices” (page 41 from *Safeguarding Machinery and Equipment*).

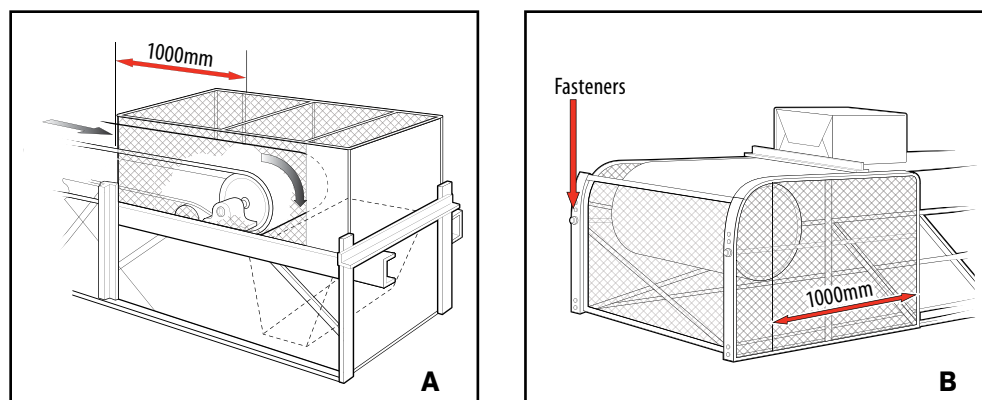
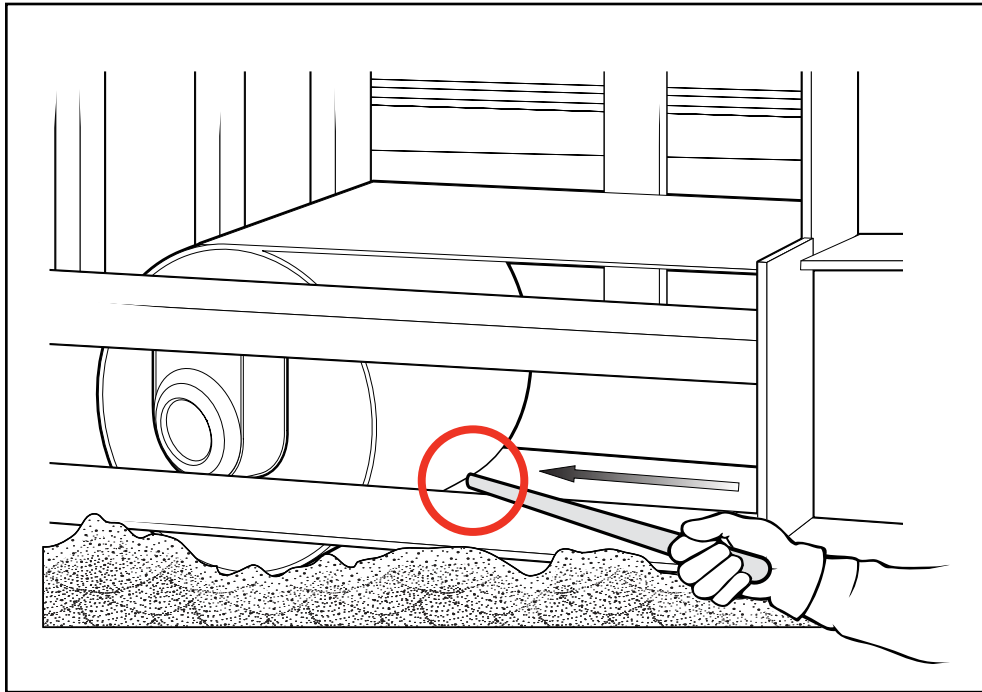


Figure 4.4. Typical belt conveyor boot guards. (A) Head spool guard. (B) Tail spool guard.



Screw (auger) conveyors

Screw conveyors are found in a wide variety of industrial operations, including ice houses, cement plants, pulp mills, grain and feed establishments, and farms. Injuries associated with unguarded screw (auger) conveyors are usually traumatic and extensive, and often result in fatalities from whole-body entrapment.

Think of a screw conveyor as a large meat grinder. It is one of the least forgiving types of powered machinery. As with belt conveyors, there are two main sources of harmful engagement:

- The power transmission drive (V-belt or chain-sprocket drive and associated power reduction unit)
- The rotating auger (also known as the vane), which runs through a trough to move the material

Blatant disregard of safety led to an amputation at this belt conveyor:

- The tail spool was not guarded to prevent access.
- The worker used a stick to clear debris from the underside of the belt.

When the stick got caught in the spool, the worker was unable to let go. The “Golden Retriever instinct” caused him to hold on to the stick, and his arm followed it into the nip point.

The power transmission drive is guarded using the methods described for typical power transmission drives (beginning on page 51 of *Safeguarding Machinery and Equipment*). The auger itself is typically guarded using solid metal covers if no access to the trough is required during operation. When material must be fed into the running auger, such as those located at floor level in ice houses, guarding material such as grating or horizontal members are often used. The following safety measures must be built into the guard design:

- The openings in the guard are small enough to prevent a hand, arm, or foot from engaging the running auger (see “Power transmission guards and enclosures: maximum permissible openings” on page 26 of *Safeguarding Machinery and Equipment*).
- The guards are securely bolted in place using fasteners that require a tool for removal. *Quick-release latches are not permitted.*

Figure 4.5 shows a point-of-operation feed guard for an ice auger located at floor level. Because a worker is present at all times to tend the operation to ensure a flow of ice in the conveyor, the guards may be designed to allow ice to be shovelled onto the conveyor but must prevent any part of the worker’s body from touching the moving auger.

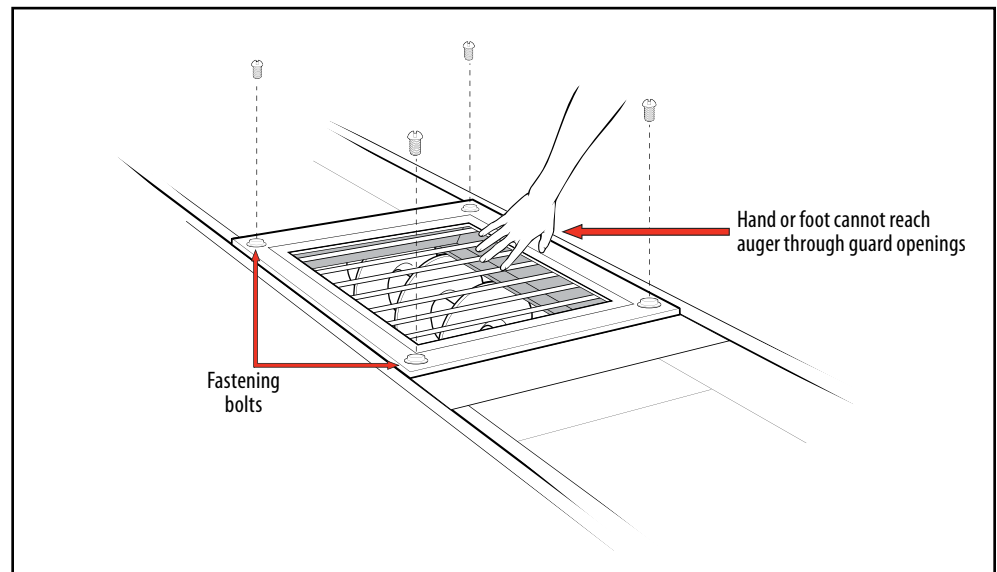


Figure 4.5. Ice auger conveyor with good functional design.

Safe work practices for conveyors

1. Don't perform service on a conveyor until the motor disconnect is **locked out**.
2. Service a conveyor with authorized maintenance personnel only.
3. Keep clothing, fingers, hair, and other parts of the body away from the conveyor.
4. Don't climb, step, sit, or ride on the conveyor at any time.
5. Don't load the conveyor outside of the design limits.
6. Don't remove or alter conveyor guards or safety devices.
7. Know the location and function of all stop/start controls.
8. Keep all stop/start control devices free of obstructions.
9. All personnel must be clear of the conveyor before the conveyor is started.
10. Operate the conveyor with trained personnel only.
11. Keep the area around conveyors clear of obstructions.
12. Report all unsafe practices to your supervisor.

Accidents around conveyors occur most frequently due to:

- Unguarded power transmission parts
- Unguarded nip points
- Unguarded shear points
- Unguarded pinch points
- Unguarded spill points
- Unbarricaded access to areas under counterweights
- Tension take-up points
- Transfer mechanisms
- Absence of safe passage under conveyors