Facilities & Services
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

University of Illinois at Urbana-Champaign
Machine Guarding Guidelines

Prepared by:
Facilities & Services
Division of Safety and Compliance
Occupational Safety and Health Department
1501 S. Oak St.
Champaign, IL 61820
(217) 265-9828

University of Illinois at Urbana-Champaign
Machine Guarding Guidelines

Contents

University of Illinois at Urbana-Champaign
Machine Guarding Guidelines

PURPOSE

The University of Illinois at Urbana-Champaign (University), through the Division of Safety and Compliance, Occupational Safety and Health Department (OSH), has established these Machine Guarding Guidelines to protect the health of university students, faculty, and staff and to assure compliance with State and Federal occupational safety and health standards.

These Guidelines provide the minimum requirements for guarding against mechanical and physical hazards. It is expected that campus units will utilize these Guidelines to assess equipment and develop unit-specific standard operating procedures (SOP).

POLICY

It is the policy of the University to protect its students, faculty, and staff from mechanical and physical hazards. This is accomplished with effective machine guarding, employee training, and administrative controls.

These Machine Guarding Guidelines apply to all students, faculty, and staff who perform work that expose them to mechanical and physical hazards as part of their employment. Specific requirements for machine guarding are based on the type of work performed and machinery to which the individual is exposed.

RESPONSIBILITIES

Occupational Safety and Health (OSH)

OSH is responsible for the administration of these Guidelines, which includes general awareness training, assisting in the identification of mechanical/physical hazards, and assisting with the evaluation of equipment not specifically addressed in the Appendix. OSH maintains copies of all records for services provided by OSH pertaining to these Guidelines. An OSH Program Coordinator is designated to provide guidance, regulatory interpretation, and oversight for these Guidelines and to review these Guidelines annually.

Deans, Department Heads, and Directors (Campus Units)

Campus Units shall ensure Supervisors have the resources and support to implement these Guidelines and unit-specific SOPs.

Supervisors of Affected Employees (Supervisors)

Supervisors and Principle Investigators (PIs) are responsible for enforcing proper work practices and safe use of equipment under their responsible charge in accordance with these Guidelines and unit-specific SOPs. They shall assist in the development and annual review of unit-specific SOPs. They shall ensure that all their personnel who may be exposed to mechanical/physical hazards receive training appropriate for the hazards to which they are exposed. They shall conduct assessments of hazardous equipment to insure appropriate machine guarding and policies are in place for their employees.

Employees

Employees shall follow the requirements of these Guidelines, unit-specific SOPs, and training. They shall not perform work with equipment not properly guarded. They shall identify and have in use the proper

machine guards in place or adhere to unit-specific SOPs prior to beginning work. Hazards that the employee cannot guard against shall be reported to their supervisor.

PROCEDURES

General

Moving machine parts have the potential to cause severe workplace injuries; such as, crushed fingers or hands, amputations, burns, or blindness. Safeguards are essential for protecting workers from these preventable injuries. When the operation of a machine or accidental contact injures the operator or others in the vicinity, the hazards must be eliminated or controlled.

Assessment Guide

Each Campus Unit shall conduct machine guarding assessments utilizing these Guidelines, manufacturer instructions, national consensus standards, applicable federal or state regulations, or other appropriate guidance or recommendations. Safeguards must protect the operator and other employees in the machine area from hazards; such as, those created by point of operation, in-running nip points, rotating parts, flying chips, and sparks. In addition, they must meet these minimum general requirements:

- Secure: Workers should not be able to easily remove or tamper with the safeguard because a safeguard that can easily be made ineffective is no safeguard at all. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must be firmly secured to the machine.
- Protect from falling objects: The safeguard should ensure that no objects can fall into moving parts. A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.
- Protect from flying chips and sparks: When cutting, shaping, and/or milling various materials, flying chips and/or sparks can be generated. To address this hazard, a combination of physical barriers (fixed or adjustable) and proper personal protective equipment may be needed. Retro-fitting some equipment may also require custom (or fabricated) barriers; such as, machining turn-of-the-century equipment that predates machine-guarding regulations and concepts.
- Allow safe lubrication: If possible, one should be able to lubricate the machine without removing the safeguards. Locating oil reservoirs outside the guard with a line leading to the lubrication point will reduce the need for the operator or maintenance worker to enter the hazardous area.
- Create no new hazards: A safeguard defeats its own purpose if it creates a hazard of its own; such as, a shear point, a jagged edge, or an unfinished surface which can cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges.
- Create no interference: Any safeguard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury.

Machine guarding checklists for specific pieces of equipment and a general machine guarding assessment checklist is included in the Appendix.

Below are links for machine guarding compliance inspection tools. These tools can be used to evaluate existing machine guarding compliance and provide direction for proper machine guarding.

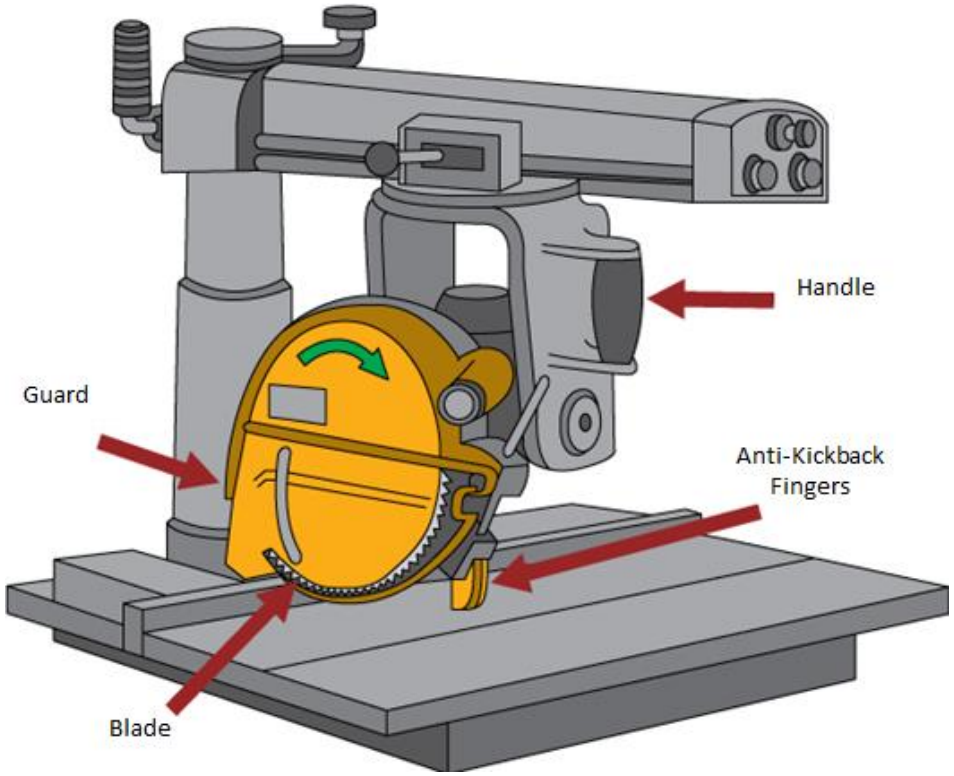
https://www.osha.gov/SLTC/etools/machineguarding/generalrequirements.html
https://www.osha.gov/SLTC/machineguarding/new-grinder-checklist.html

APPENDIX – MACHINE GUARDING CHECKLISTS

Table Saw		
Building:	**Location:**	**Unit:**

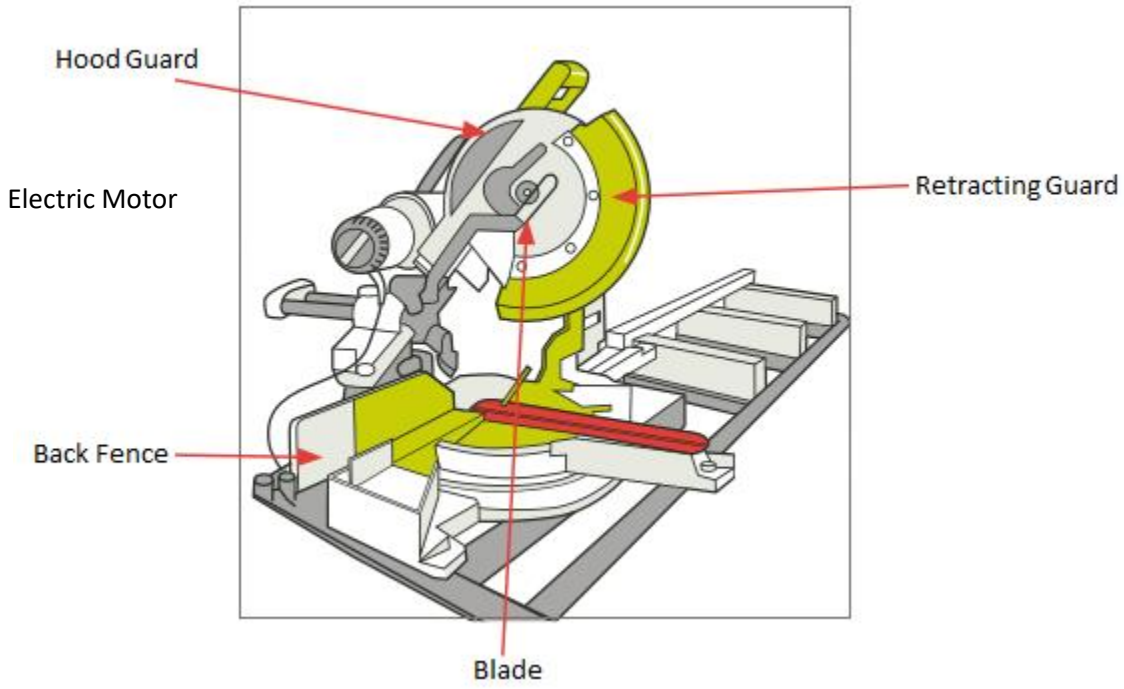
General Requirements for Machine Guarding	Y	N	NA	Comments
Guards are installed and adjusted to cover the upper portion of the blade (above the table) as well as to prevent inadvertent contact with the lower portion of the saw blade?				
Gears, sprockets, pulleys, and flywheels guarded?				
For ripping operations, are anti-kickback fingers installed (and properly adjusted) to help prevent the wood from kicking back towards the operator if the saw blade gets bound?				
Safeguards permit safe, comfortable, and relatively easy operation of the machine?				
Machine controls within easy reach of the operator?				
Procedures established to ensure machine is shut down before guard is removed?				
Saw is fixed to the floor or movement is limited according to manufacturer instructions?				

Radial Arm Saw		
Building:	**Location:**	**Unit:**



General Requirements for Machine Guarding	Y	N	NA	Comments
Machine safeguards prevent worker's hands, arms, or other body parts from making contact with the blade?				
Anti-kickback guard is in place?				
Safeguards are firmly secured and not easily removable?				
Radial arm saw is properly mounted to the working surface?				
Machine controls within easy reach of the operator?				
Procedures established to ensure machine is shut down before guard is removed?				
Saw is properly mounted to stand/bench/floor or movement is limited according to manufacturer instructions?				

Chop Saw (miter saw)		
Building:	**Location:**	**Unit:**

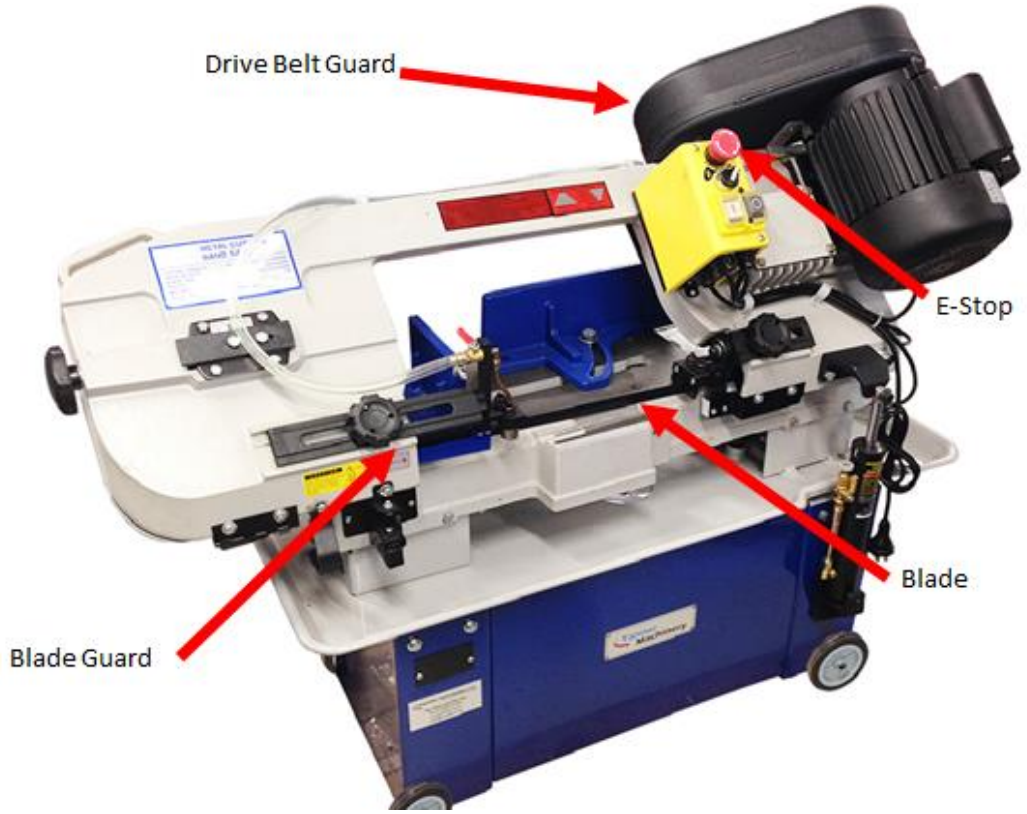


General Requirements for Machine Guarding	Y	N	NA	Comments
The blade guard is present and properly installed?				
The guard automatically adjusts itself to the thickness of the material being cut in order to provide continuous protection from the blade?				
Safeguards are firmly secured and not easily removable?				
Saw is properly mounted to stand/bench or movement is limited according to manufacturer instructions?				

Band Saw (vertical)		
Building:	**Location:**	**Unit:**

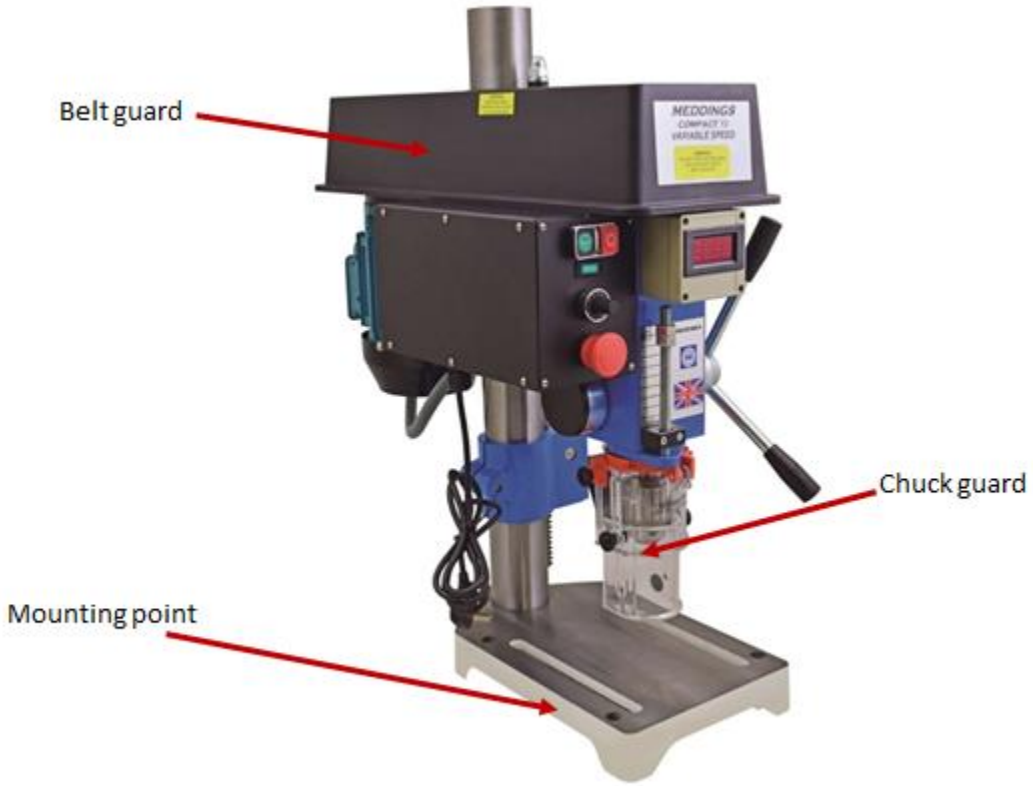
General Requirements for Machine Guarding	Y	N	NA	Comments
Machine safeguards worker's hands, arms, or other body parts from making contact with the blade?				
Wheels and blade are properly guarded?				
Chip guard is in place (only if eye and face protection are not in use)?				
Safeguards are firmly secured and not easily removable?				
Saw is properly mounted to stand/bench/floor or movement is limited according to manufacturer instructions?				
Machine controls within easy reach of the operator?				
Procedures established to ensure machine is shut down before guard is removed?				

Band Saw (horizontal)		
Building:	**Location:**	**Unit:**



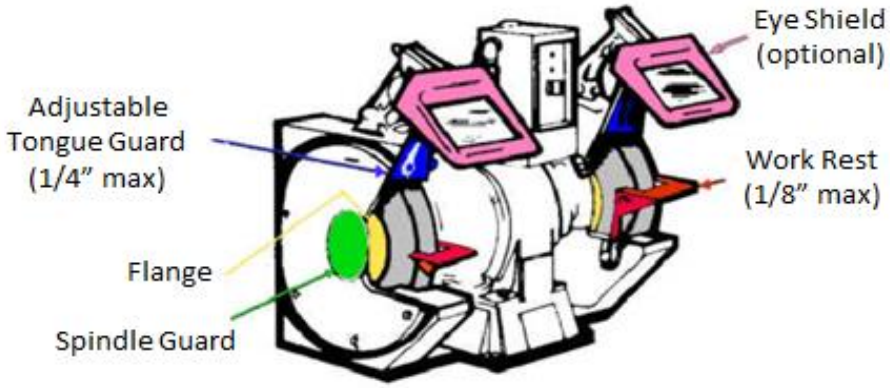
General Requirements for Machine Guarding	Y	N	NA	Comments
Machine safeguards worker's hands, arms, or other body parts from making contact with the blade?				
Wheels and blade are properly guarded?				
Safeguards are firmly secured and not easily removable?				
Machine controls within easy reach of the operator?				
Procedures established to ensure machine is shut down before guard is removed?				
Saw is properly mounted to stand/bench/floor or movement is limited according to manufacturer instructions?				

Drill Press		
Building:	**Location:**	**Unit:**



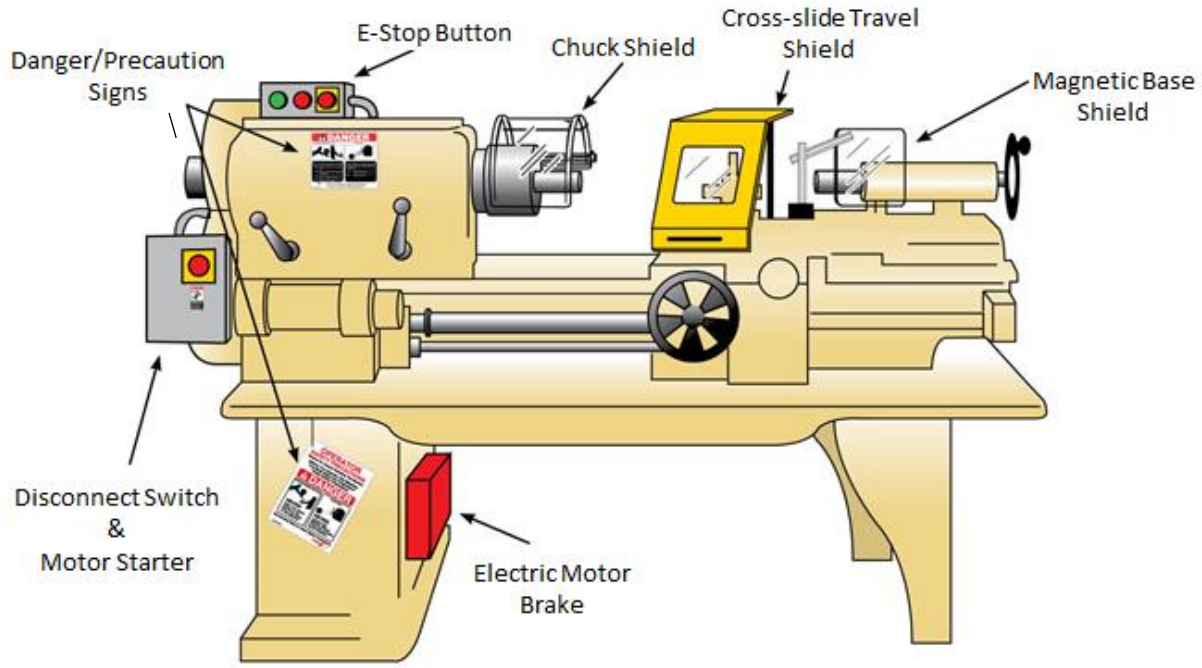
General Requirements for Machine Guarding	Y	N	NA	Comments
Machine safeguards prevent worker's hands, arms, or other body parts from making contact with the drill bit or point of operation?				
Pulleys and belts are properly guarded?				
Safeguards are firmly secured and not easily removable?				
Drill press is properly mounted to stand/bench/floor or movement is limited according to manufacturer instructions?				
Machine controls within easy reach of the operator?				
Procedures established to ensure machine is shut down before guard is removed?				

Abrasive Wheel Equipment Grinder		
Building:	**Location:**	**Unit:**



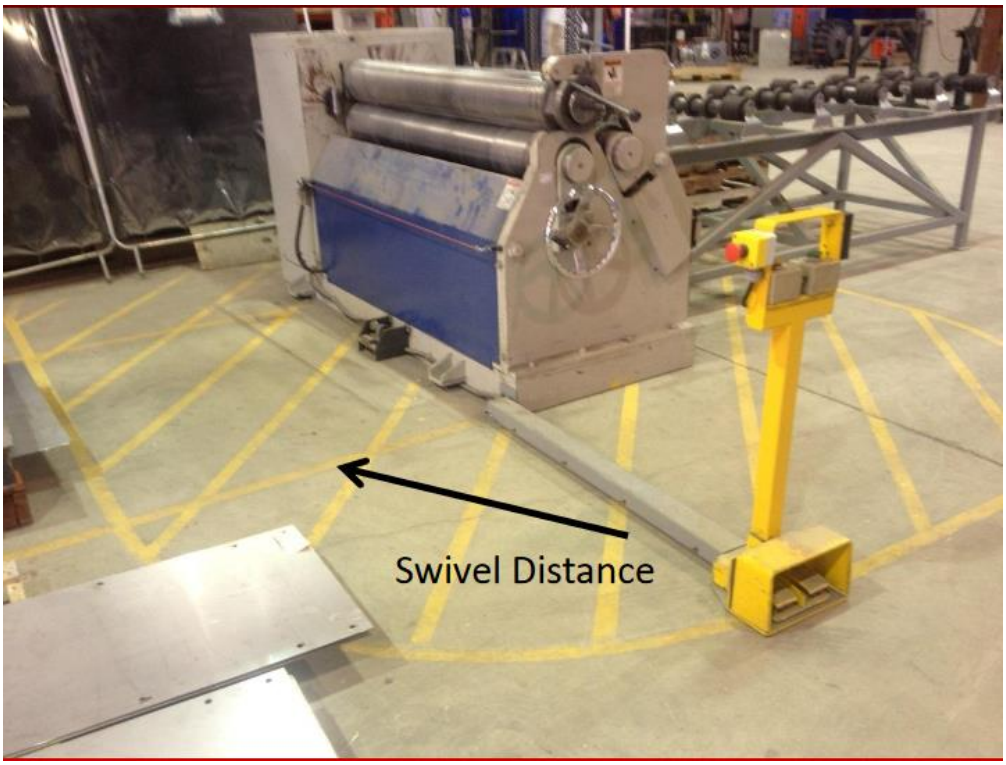
General Requirements for Machine Guarding	Y	N	NA	Comments
Do side guards cover the spindle, nut and flange, and 75% of the wheel diameter?				
Is the work rest used and kept adjusted to within 1/8-inch (0.3175cm) of the wheel?				
Is the adjustable tongue guard on the top side of the grinder used and kept to within 1/4-inch (0.6350cm) of the wheel?				
Is the maximum RPM rating of each abrasive wheel compatible with the RPM rating of the grinder motor?				
Before new abrasive wheels are mounted, are they visually inspected and ring tested?				
Abrasive wheel is properly mounted to stand/bench?				

Lathe		
Building:	**Location:**	**Unit:**



General Requirements for Machine Guarding	Y	N	NA	Comments
Chuck is properly guarded and used during operation?				
Cross slide shield is in place and can be adjusted to cover the point of operation (woodworking)?				
Safeguards are firmly secured and not easily removable?				
Lathe is properly mounted to stand/bench/floor or movement is limited according to manufacturer instructions?				

Metal Rollers		
Building:	**Location:**	**Unit:**

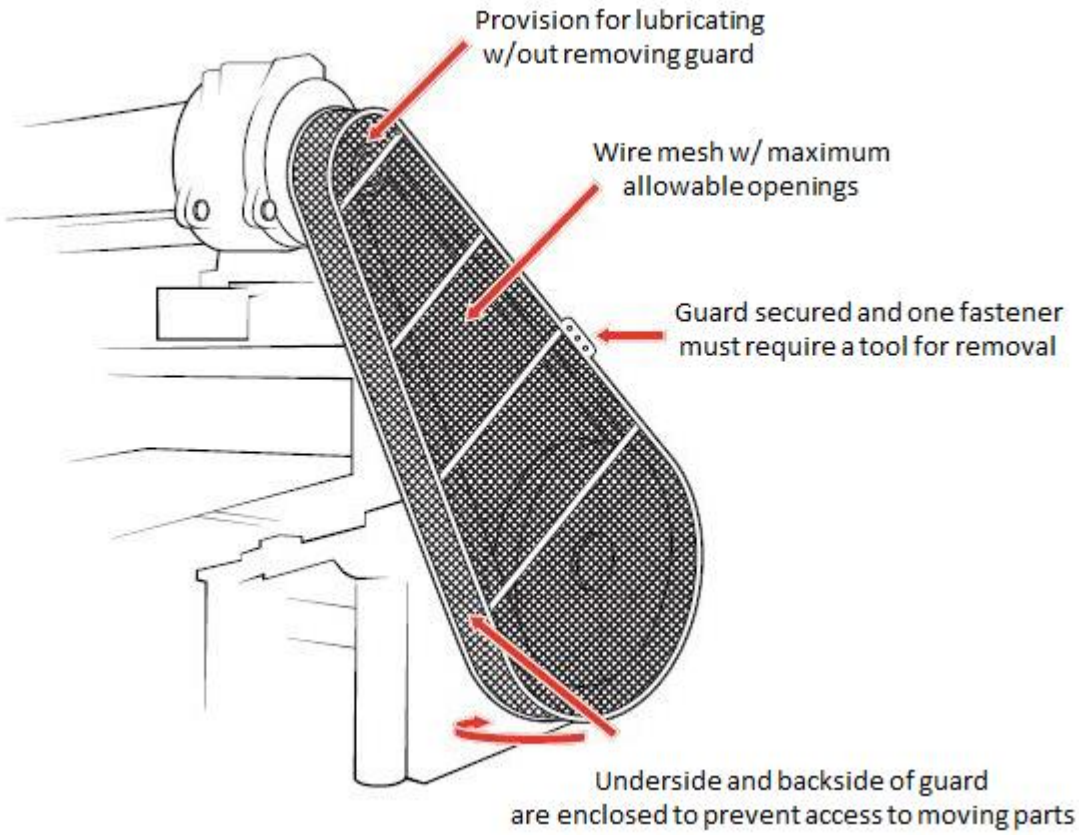


General Requirements for Machine Guarding	Y	N	NA	Comments
A safe proximity has been established on three sides?				
Controls for the equipment are outside the established proximity?				
Internal gears are guarded properly?				
Metal roller is properly mounted to floor or movement is limited according to manufacturer instructions?				

Fans		
Building:	**Location:**	**Unit:**

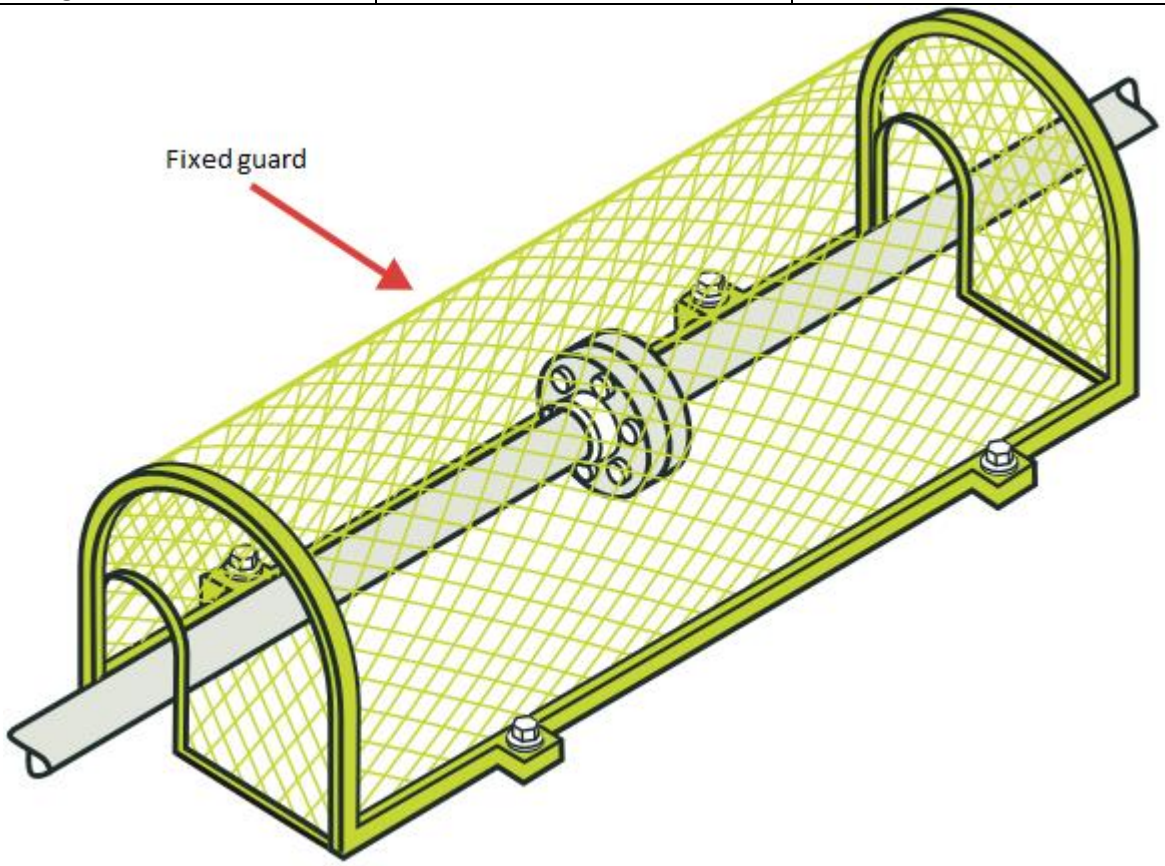
General Requirements for Machine Guarding	Y	N	NA	Comments
Blades are guarded with openings that are no larger than a ½ inch, front and back?				
Safeguards are firmly secured and not easily removable?				
*Note: Fans at or above 7 feet from the working surface do not require guarding unless operations place an employee closer.				

Belts, Pulleys, Gears, Sprockets, and Chains		
Building:	**Location:**	**Unit:**



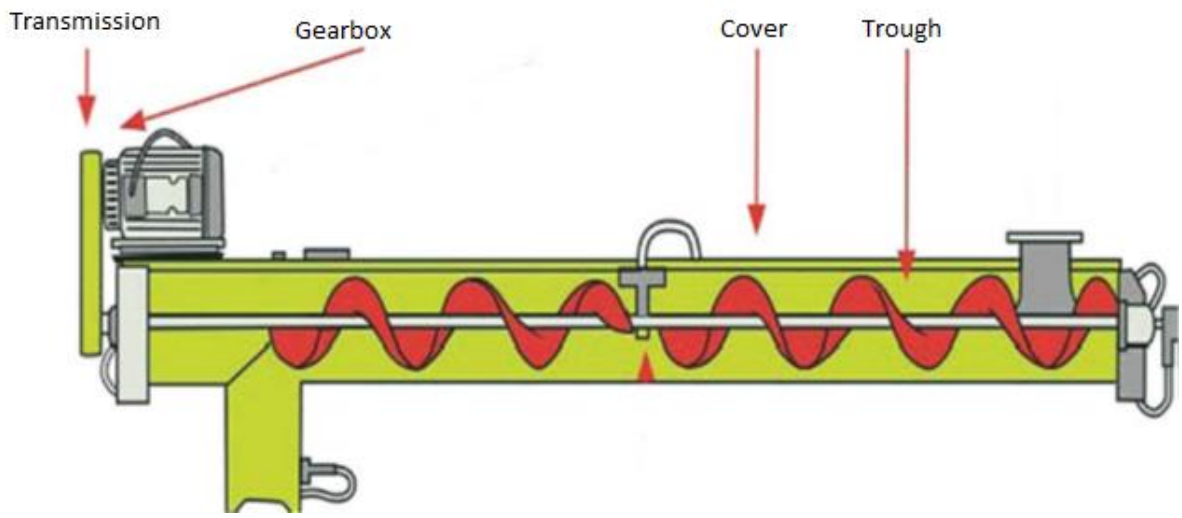
General Requirements for Machine Guarding	Y	N	NA	Comments
Belts, gears, pulleys are properly guarded with a fixed guard?				
Safeguards are firmly secured and not easily removable?				

Drive Shafts		
Building:	**Location:**	**Unit:**



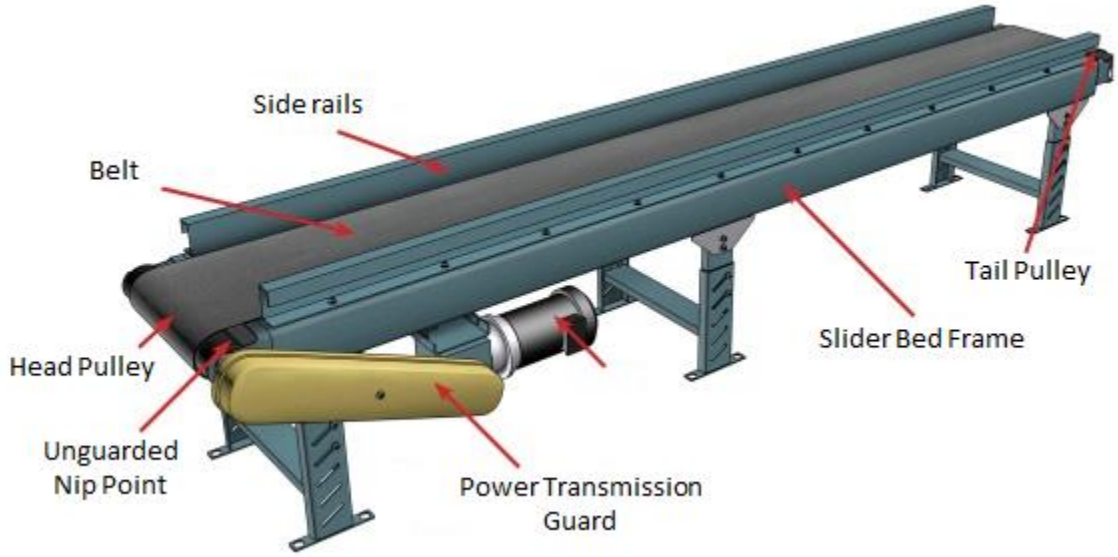
General Requirements for Machine Guarding	Y	N	NA	Comments
Drive shaft is properly guarded with a fixed guard?				
Safeguards are firmly secured and not easily removable?				

Augers		
Building:	**Location:**	**Unit:**



General Requirements for Machine Guarding	Y	N	NA	Comments
Gears and transmission are properly guarded with a fixed guard?				
Safeguards are firmly secured and not easily removable?				
Guards are in place to prevent limbs and clothes from being caught and pulled into the auger?				

Conveyers		
Building:	**Location:**	**Unit:**



General Requirements for Machine Guarding	Y	N	NA	Comments
Transmission and belts are properly guarded?				
Safeguards are firmly secured and not easily removable?				
Nip points at the Head and Tail pulleys are guarded or safe proximities are established?				
Conveyor is properly mounted to floor?				

Revolving Barrels, Containers and Drums		
Building:	**Location:**	**Unit:**

General Requirements for Machine Guarding	Y	N	NA	Comments
Properly guarded by an enclosure or appropriate administrative control?				
Interlocks are in place and properly maintained?				
Operating controls require the operator to be outside the enclosure to activate the equipment?				
Revolving barrel/container/drum is properly mounted to floor or movement is limited according to manufacturer instructions?				

General Machine Guarding Assessment				
Description:				
Building:	**Location:**			**Unit:**
General Requirements for Machine Guarding	**Y**	**N**	**NA**	**Comments**
Machine safeguards prevent worker's hands, arms, or other body parts from making contact with moving parts?				
Safeguards are firmly secured and not easily removable?				
Safeguards permit safe, comfortable, and relatively easy operation of the machine?				
Machine controls within easy reach of the operator?				
Procedures established to ensure machine is shut down before guard is removed?				
Machine is properly mounted to stand/bench/floor or movement is limited according to manufacturer instructions?				
Guarding of Mechanical Hazards	**Y**	**N**	**NA**	**Comments**
Point-of-operation guards provided and in place?				
Gears, sprockets, pulleys, and flywheels guarded?				
Belts and chain drives guarded?				
Physical barriers are in place?				
Exposed set screws, key ways, collars, and the like guarded?				
Guards provide for any other hazardous moving part of machine?				

Note: This is a general assessment for machine guarding that is not specifically addressed by a checklist in this guide.

DOCUMENT REVISIONS

Revision Dates	
March 29, 2020	Initial
April 23, 2021	Review, update format, and minor grammatical edits