

# Michigan Municipal Workers' Compensation Fund

## Safety and Health Resource Manual

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### Machine Safeguarding: Using the Quarter-Inch Rule

#### Protecting Employees from Point Of Operation & Mechanical Hazards

#### Where Hazards Occur

Any machine part, function, or process that might injure the operator or other workers must have a safeguard. When the operation of a machine or accidental contact with it can injure the operator or others in the vicinity, you must either control or eliminate the hazards.

There are three areas where mechanical hazards occur:

**Point of Operation:** The area on a machine where the employee performs work on the material, such as cutting, boring, or forming of stock.

**Power Transmission Apparatus:** All mechanical systems that transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, and gears.

**Other Moving Parts:** All parts of the machine that move while the machine is working. These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

Machinery hazards are as varied and complex as the types of equipment that you can find in your operations. However, there is one rule you can apply to determine if the hazard has adequate guarding. Mechanical hazards must have guarding unless you can reduce the opening or access to the hazard to one-quarter inch or less.

#### The Quarter-Inch Rule

Under Part 24 Mechanical Power Presses, Part 23 Hydraulic Power Presses Part 26, Metalworking Machinery, and Part 27, Woodworking Machinery one quarter inch or less is the allowable opening that an MIOSHA inspector will accept when evaluating machinery hazards. By definition, MIOSHA does not consider an opening of a quarter inch or less to be a hazard.

Simply put, if the exposure to the operator at the point of operation is one-quarter inch or less, you do not have to safeguard the exposure. Any opening greater than one-fourth inch requires a safeguard.

According to MIOSHA Part 1, General Requirements R408.10034, Rule 34 (3)

“A point of operation guard or device shall be as prescribed in a specific standard, or in the absence of a specific standard, shall be designed and constructed, when required, to prevent the machine operator exposed to the hazard from having any part of his/her body in the hazardous area during the operating cycle.”

If you need to know what measurements to use in the design of a guard for equipment, refer to Table 1.

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Table 1

Distance of opening from point of operation hazard (inches)	Maximum width of opening (inches)
1/2 to 1-1/2	1/4
1-1/2 to 2-1/2	3/8
2-1/2 to 3-1/2	1/2
3-1/2 to 5-1/2	5/8
5-1/2 to 6-1/2	3/4
6-1/2 to 7-1/2	7/8
7-1/2 to 12-1/2	1-1/4
12-1/2 to 15-1/2	1-1/2
15-1/2 to 17-1/2	1-7/8
17-1/2 to 31-1/2	2-1/8

Table 1 provides appropriate guidance that applies to most machine safeguarding exposures for the point of operation. Whether the hazard is at the point of operation or at a power transmission point, you can usually use the one-fourth inch rule as the standard to determine if the hazard has proper guarding.

### Requirements for Safeguards

Safeguards must meet the following general requirements:

- The safeguard must prevent hands, arms, and any other part of a worker's body from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of the operator or another worker from placing parts of their bodies near hazardous moving parts by reaching over, under, around or through the safeguarding system.
- Workers should not be able to easily remove or tamper with the safeguard. A safeguard that a worker can easily make 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 with a device that requires a "tool" to remove.
- The safeguard should assure that no objects can fall into moving parts. A small tool that a worker drops or knocks into a cycling machine could easily become a projectile that could strike and injure someone.
- 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 that can cause a laceration. The edges of guards, for instance, should have rolled edges or be bolted in such a way that they eliminate sharp edges.
- Any safeguard that 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.

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- Safeguarding should allow for minor equipment adjustments and lubrication when possible. Locating adjustment controls, control devices and lubrication lines outside the area requiring guarding will reduce the need for the operator or maintenance worker to enter the hazardous area. It will also reduce the need to remove the guard. If workers remove guards, they may not replace them.

Although Part 24, Mechanical Power Presses is the major source of information in this document, other MIOSHA standards use similar applications of the principle when discussing means of protecting workers from machinery hazards. MIOSHA requires that tongue guards for abrasive wheels be one-quarter inch from the grinding wheel. A rigid guard for the in-running nip of a printing press should be set one-quarter inch from the surface of the rotating cylinder. The stroke for equipment cutting sheet metal or chopping light gauge scrap is frequently set to a maximum opening of one-quarter inch.

Press break safeguarding applies a variation of the quarter inch rule by using the "two hand down and step through" technique. The operator places his or her hands on the two hand control buttons which bring the knife (sized for the operation) of the press brake down to within one quarter inch of the work piece. The operator then steps on the foot control to bring the knife into contact with the work piece, keeping the hands free to support other steps of the operation.

### Consider Engineering to Reduce Exposure

You can avoid the need to use safeguards by engineering the system to keep exposures to an opening one-quarter inch or less. This can have several advantages:

- You do not have to fabricate or purchase guards; you are not investing time or money.
- If guards are unnecessary, maintenance staff does not have to worry about replacing guards following maintenance work.
- You minimize potentially serious injury to operators from machinery hazards because of substantial engineering control.

### Summary

A citation from MIOSHA for failure to properly guard machinery or equipment can be costly, depending on the number of pieces of equipment and the number of exposed operators. Violations of the requirements for proper guarding, including the quarter inch rule, always receive a rating of "serious" for the point of operation.

You should take time to inspect your machinery for compliance with MIOSHA's guarding requirements. In addition you should ask the following questions:

1. Do you use standardized guidance (Table 1) to determine if all hard guards have been properly fabricated, set, or adjusted for the point of operation?

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2. Do your written procedures for maintaining or servicing equipment include the removal and replacement of safeguards? Remember that MIOSHA requires lockout/tagout if safeguards are defeated or removed.
3. Do you train your operator before they start work with you and thereafter on a scheduled basis in what constitutes good safeguarding practices? Does the training familiarize them with their equipment safeguards, enable them to recognize if the equipment is in good condition before operating, and teach appropriate procedures and how to report deficiencies? Do you document all training?
4. Do you perform and document self-audits of your safeguard practices for both operator and maintenance groups on a periodic basis? Quarterly self-audits are typical.

Even if you cannot adjust your production methods to apply the one-quarter inch rule, a supportable "yes" to each of the four questions indicates an operations management system that will enhance loss control.

### **References**

#### MIOSHA General Industry Standards

1. Part 1, General Rules, R408.10034
2. Part 7, Guards for Power Transmission
3. Part 23, Hydraulic Power Presses
4. Part 24, Mechanical Power Presses
5. Part 26, Metalworking Machinery
6. Part 27, Woodworking Machinery