

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 27: General Housekeeping Guidelines

Good housekeeping benefits everyone in your manufacturing establishment by creating safe and clean surroundings. Keeping floors clean and clear reduces the chance that employees will trip or fall. Uncluttered work areas leave more room to work with and less irritation from trying to find misplaced items.



- ✓ **Start by Cleaning Up:**
Begin with a thorough housecleaning. Remove all trash, accumulations of scrap, and unused materials.
- ✓ **Make Housekeeping an Ongoing Effort:**
Employees should understand that housekeeping is a priority and that each person is accountable for making sure their area remains clean and well-kept.
- ✓ **Properly Dispose of Trash:**
Provide and instruct employees to use proper containers for trash and waste. Liquids and chemicals must be stored in approved containers. Empty out trash and waste containers often enough to prevent overflow onto the floor. Please refer to Chapter 2 for further information on the storage and disposal of hazardous waste.

The MIOSHA standard contains some specific requirements for housekeeping in the workplace, [General Industry Safety Standards - Part 1, General Provisions, Rule 15](#). These include:

- Stacking, piling, or placing scrap and debris in a container in a way that does not create a hazard to an employee.
- Keeping aisles, exits, and stairs clean and orderly by ensuring they are free from hazardous accumulations of scrap, debris, water, oil, grease, and other slip and trip perils, and maintaining a clear aisleway for walking and transporting materials.
- Providing drainage or a false floor, platform, or mat in wet process areas.
- Providing a slip-resistant surface where employees are required to walk on a wet surface.
- Keeping storage areas free from accumulations of materials that could create a hazard from fire, explosion, or pest infestation.

In manufacturing facilities, some common housekeeping problems include wet and slippery floors, broken pallets laying around aisle ways, overflowing trash containers, and soiled cleaning rags left around the work place.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 28: Machine Guarding Requirements

MIOSHA requirements include rules for general machine guarding. These include standards which address the safe maintenance and operation of machinery and other equipment in the manufacturing industry.



MIOSHA requires that parts of equipment which transmit power be safeguarded so that employees do not become entangled, pinched, or caught in moving parts. Belts and pulleys, flywheels, chains, sprockets, and gears must all be guarded. These areas are commonly referred to as pinch points.

A pinch point means a point at which it is possible to be caught between the moving parts of a machine, between the moving and stationary parts of a machine, or between material and any part of a machine. A point of operation refers to the point on a machine where work is performed.

In manufacturing industries, employees can become exposed when machine guards are removed to service or provide maintenance and then not replaced when the service or maintenance is completed.

MIOSHA requires guarding of these hazards that may exist in manufacturing industries:

- A point of operation or pinch point.
- Feedrolls and rollers.
- A revolving barrel, container, or drum exposed to contact.
- Belts and pulleys seven feet or less above a floor or platform.
- Blades of a fan, within seven feet, used for cooling or ventilation.
- A horizontal belt more than seven feet above the floor or platform if it is located over a passageway or work area.
- A band or circular saw ([Part 1, General Provisions](#); [Part 26, Metalworking](#); and [Part 27, Woodworking Machinery](#)).
- Gears, sprockets, shafting, and chain drives exposed to contact.
- An extractor, parts washer, or tumbler manually controlled.

If safeguarding one of these hazards requires that you make a guard, the guard should be durable and not result in a new hazard to employees, such as burrs or sharp edges.

There are specific requirements for various types of materials and clearances that must be followed when guarding machines. For example, expanded metal used to guard a moving part less than four inches away from the pinch point cannot have openings larger than one-half inch. The [MIOSHA General Industry Safety Standards – Part 1, General Provisions](#) and [Part 7, Guards for Power Transmission](#) contains a table listing size and clearances for a variety of materials. Other standards such as [Part 23, Hydraulic Power Presses](#); [Part 24, Mechanical](#)

SECTION TWO: MIOSHA Regulations

[Power Presses; Part 26, Metalworking Machinery](#); and [Part 27, Woodworking Machinery](#) have provisions for machine guarding.

The [MIOSHA General Industry Safety Standards – Part 1, General Provisions](#) also includes specific applications you may need to review.

Below are some of the MIOSHA safeguarding requirements that apply in a manufacturing facility:

- Provide training to each newly assigned employee regarding the operating procedures, hazards, and safeguards of the job.

Machine Controls:

- Powered electrical equipment must have an on/off switch.
- When unexpected motion can cause injury, an actuating machine control (except for an emergency device for a powered fixed or transportable machine) must be guarded or located to prevent accidental actuation.
- Unless its function is self-evident, each operating control device shall be identified as to its function.
- Equipment that is operated in a series so that one piece of equipment automatically supplies another shall be interlocked so that when any equipment in the series is stopped for any reason, the initial stopping causes the upstream equipment to stop if continued operation would create a hazard. Reactivation requires a separate, positive action by the employee who initiated the stop.

Machine Guards and Devices:

- Two hand-control devices must be the anti-tie down and located in a manner to prevent bridging. Operation shall require manual activation of both controls until a point is reached in the cycle where the operator cannot remove his or her hands and place them within a pinch point.
- Guards need to be secured requiring a tool for removal or electrically interlocked. The guard must not create a hazard in itself.
- A point of operation guard or device must be as prescribed in a specific standard or, in the absence of a specific standard, must be designed and constructed when required to prevent the machine operator exposed to the hazard from having any part of his or her body in the hazardous area during the operating cycle.
- Blades of a fan, located within seven feet of a floor or working level and used for ventilation or cooling of your employee(s), must be guarded with a firmly affixed or secured guard. Any opening in the guard shall not have more than one of its dimensions more than one inch, and the distance to the blade must not be less than that prescribed in Table 1 of Part 1, General Provisions.

Air Under Pressure:

- Air pressure at the discharge end of a portable air blow gun or portable air hose must be less than 30 pounds per square inch gauge when dead-ended. If used in metalworking, air pressure at the discharge end of a portable air blow gun must be less than 30 pounds per square inch static flow.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 29: Openings in Floors and Walls

29.1 Openings in Floors and Walls

The [MIOSHA General Industry Safety Standards – Part 2, Floor and Wall Openings, Stairways, and Skylights](#) provides rules for safeguarding openings in floors and walls. This is to prevent persons falling into, from, or through walking or working surfaces or into vats.



Open-Sided Floors:

If your manufacturing facility includes areas where employees are exposed to open-sided floors, platforms, or runways (e.g., an access platform along the back of machines and equipment), you must provide a standard barrier as described in Chapter 29.2 when the following conditions exist:

- An open-sided floor or platform is four feet or more above the floor or ground level.
- An open-sided floor, walkway, platform, or runway is above or adjacent to dangerous equipment. In this circumstance the standard barrier must include a toeboard.

NOTE: Loading docks are exempt from this requirement.

29.2 Standard Barriers and Toeboards

Standard Barrier:

A standard barrier must be constructed not less than 42 inches high. A standard barrier consists of a top rail, an intermediate rail, and supporting posts. It can be of any construction that meets the basic dimension requirements as long as it can withstand 200 pounds applied in any direction, at any point.

Toeboards:

A toeboard at least four inches high must be added to a standard barrier when:

- People can pass or walk by.
- There is moving machinery.
- There is equipment in which falling material could be a hazard.

In This Chapter...
• 29.1 – Opening in Floors and Walls
• 29.2 – Standard Barriers and Toeboards
• 29.3 – Stairways and Railings
• 29.4 – Maintenance of Floors, Platforms, and Stairs
• 29.5 – Aisle Widths
• 29.6 - Skylights

29.3 Stairways and Railings

MIOSHA requires that employers provide for the safety of employees who are attempting to gain access to other elevations of 16 inches or more. Access can be provided by stairways; a ramp; a fixed ladder; or, for temporary access, a portable ladder.

If you provide a stairway and it has four or more risers, you must provide handrails. Handrails must be able to withstand a 200-pound load. The handrail must be mounted so that the top of the handrail is 30 to 34 inches above the surface of the tread.



29.4 Maintenance of Floors, Platforms, and Stairs

Maintain all floors, platforms, stair treads, and landings to keep free from broken, worn, splintered, or loose pieces that could cause an employee to trip or fall.

When repairing or replacing any of the above, assure that materials being used meet design strength requirements.

29.5 Aisle Widths

When mobile equipment and your employees share the same aisle, dock, or doorway, clearances must be provided and maintained to assure safe passage for the equipment and employee.

- An aisle and passageway must be marked or otherwise identified.
- A floor shall be maintained free of holes, loose boards, and protruding objects that could be a hazard to your employees.
- The maximum designed safe load limit of a floor or roof must not be exceeded.

29.6 Skylights

If employees have any exposure to working around skylights, you must provide adequate protection.

- A skylight guard shall be designed and constructed to withstand a 200-pound load that is applied at any area on the screen.
- The guard construction shall be of the grillwork design.



SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 30: Fire Safety

This section provides general information regarding precautions that can be taken to prevent fire hazards in your manufacturing facility. In addition, some of the most common MIOSHA rules regarding fire exits and provision of portable fire extinguishers are explained.



30.1 General Fire Safety Precautions

To eliminate hazards, look for potential sources of fire ignition which may exist in your facility:

- ✓ *Electrical Failures and Misuse of Electrical Equipment:*
You can reduce these hazards by ensuring proper installation, maintenance, and use; conducting regular inspections; and providing job training to employees. Also, be sure to replace worn or damaged electrical cords and avoid overloading electrical circuits.
- ✓ *Friction:*
You can lessen the potential for friction through proper maintenance, lubrication, and frequent inspections of your equipment.
- ✓ *Housekeeping and Maintenance:*
You can reduce the potential for fires through attention to housekeeping. Immediately dispose of flammable wastes and scrap in covered metal containers with metal lids. Avoid excessive stockpiling, and put trash and paper in proper containers.

30.2 Fire Exits

Employers must provide a means of egress for employees' to use in case of fire, explosion, or natural disaster. A means of egress refers to the route your employees are to follow through the building, the exit door, and away from the building.

- ✓ *Exit Doors:*
A door designated as a means of egress must be maintained so that employees can easily exit. MIOSHA requires that these rules be followed:
 - Do not lock exit doors; doing so prevents escape from inside the building. Doors shall never be chained, barred, bolted, or latched when the building is occupied.

In This Chapter...

- 30.1 – General Fire Safety Precautions
- 30.2 – Fire Exits
- 30.3 – Portable Fire Extinguishers
- Fixed Fire Equipment

SECTION TWO: MIOSHA Regulations

- Prohibit the use of locking devices that are difficult to open against door pressure (examples: slide bolts, hasps, hooks and eyes).
- Prevent the door from being blocked by debris, surplus stock, mechanical equipment, or ice and snow.
- Maintain all door components in working condition.

✓ *Exit Signs:*

Be sure that exits are designated by a sign that is readily visible and identifiable from the distance that employees will have to travel. Exit signs must have letters at least six inches high and three-fourths inches wide and must be illuminated by a light source or internally illuminated.



✓ *Path of Travel:*

Do not store flammable material in any part of a means of egress.

If the path that your employees must travel to leave the building is not immediately apparent from any point, mark the route with directional signs.

30.3 Portable Fire Extinguishers

Under the [MIOSHA General Industry Safety Standards - Part 8, Portable Fire Extinguishers](#), there are rules which establish minimum requirements for provision and maintenance of portable fire extinguishers.

Different types of extinguishers are required based on the type of hazard at the location. As the employer, you must be aware of circumstances in your work place that determine whether unique conditions exist which create a greater fire hazard. Contact your local fire department, fire marshal, or the Michigan Department of Licensing and Regulatory Affairs to obtain additional information or assistance with this determination.

30.3.1 Choosing an Extinguisher

The type of fire extinguisher needed depends on the type of fire hazard present. A fire is classified based on what fuels it. Extinguishers are rated to tell which types of fire they can put out:

Class of Fire	Type of Fuel	Approved Fire Extinguisher
A	Wood, Paper, Cloth	Type A; Type A-B; Type A-B-C
B	Gasoline, Paints, Oil	Type A-B; Type B-C; Type A-B-C
C	Electrical, Wiring, Fuse Box	Type B-C; Type A-B-C

ABC extinguishers are a good choice for establishments with fire potential from a variety of fuel types.

30.3.2 *Location of Extinguishers*

Fire extinguishers must be located where they can be easily seen and readily accessible along a normal path of travel. If the view of an extinguisher is blocked and the obstruction cannot be moved, you must install a sign, color symbol, or other means to indicate the location of the fire extinguisher.

30.3.3 *Maintaining Extinguishers*

Portable fire extinguishers must be maintained in proper working order. MIOSHA requires that:

- Extinguishers and hoses be inspected monthly, or at more frequent intervals if required, to be sure the extinguisher:
 - ✓ Is in its proper location.
 - ✓ Has not been used or tampered with.
 - ✓ Does not have obvious damage (e.g., physical damage, external corrosion, or other impairments).
- Extinguishers be thoroughly inspected at least once a year to ensure working order and have a tag be attached showing the inspection date.
- Defective extinguishers be removed from service and repaired before being put back into service.
- Extinguishers are properly recharged with recharging material of the class specified on the extinguisher nameplate or recommended by the manufacturer.

30.3.4 *Employee Training*

Train employees on evacuation procedures to follow in case of a fire or other emergency. Also, provide directions on proper use of fire extinguishers. Most fire extinguishers follow this technique:

- P** 1. Pull: Pull the pin or release other locking device.
- A** 2. Aim: Aim the extinguisher nozzle (horn or hose) at the base of the fire.
- S** 3. Squeeze: Squeeze or press the handle.
- S** 4. Sweep: Sweep from side to side at the base of the fire. Watch for reflash. Discharge the contents of the extinguisher.

Check the instructions for the extinguishers in your facility, as foam and water extinguishers require slightly different action.

HOW MOST FIRE EXTINGUISHERS WORK

1. Pull
Pull the pin or release other locking devices.

2. Aim
Aim the extinguisher nozzle (horn or hose) at the base of the fire.

3. Squeeze
Squeeze or press the handle.

4. Sweep
Sweep from side to side at the base of the fire. Watch for re-flash. Discharge the contents of the extinguisher. Foam and water extinguishers require slightly different action. Read the instructions.

Remember:

- If there's a fire, call the fire department first.
- Get everyone outside.
- Then fight a small fire only.
- If the fire gets too large, get away from the area.
- Close doors to slow the fire's spread.

A SAFETY MESSAGE FROM
MIOSHA
Consultation Education & Training Division
and the
National Fire Protection Association
Paid in part with federal OSHA funds.

The Michigan Department of Energy, Labor & Economic Growth is an equal opportunity employer/program. Auxiliary aids, services and other reasonable accommodations are available upon request to individuals with disabilities.

MIOSHACT #0304 (Rev. 1/10)

30.4 Fixed Fire Equipment

The MIOSHA General Industry Standards - Part 9, Fixed Fire Equipment sets forth general rules which apply to the installation, use, maintenance, and testing of fixed fire extinguishing systems in, around, or about a place of employment. Manufacturing establishments should be familiar with the requirements and the employer and employee responsibilities therein.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 31: Electrical Safety

31.1 Training and Work Practices

The [MIOSHA General Industry Safety Standards - Part 40](#) contains rules covering electrical safety-related work practices. You must provide training on safe work practices and the specific requirements of each job assignment where the employee will face a higher than normal risk of injury from electrical shock. This includes the following employees:



- Employees intentionally exposed to live parts (electricians, electrical troubleshooters, general maintenance workers).
- Employees who may be exposed to a known, limited electrical hazard related to a specific job assignment (e.g., a janitor cleaning in an electrical room or changing light bulbs).
- Employees who are not assigned to any electrical work but whose jobs place them in a position where they need to be mindful of casual exposures to exposed live parts (machine operators, material handlers, janitors).
- Employees who use or handle electrically operated equipment.
- Training for employees can be either classroom or on-the-job.

31.1.1 Selection and Use of Work Practices

You must ensure that employees performing work near or on equipment or circuits that are, or may become, energized utilize electrical safety-related work practices. These practices are intended to prevent electrical shock or other injuries to your employees resulting from either direct or indirect electrical contacts.

De-energize live parts to which an employee may be exposed before allowing an employee to work on or near those parts. Work on or near live parts is permissible if it can be demonstrated that de-energizing isolates the parts and protects the employee from coming in contact either directly or indirectly with some other conductive objects.

31.1.2 Work Practices/Procedures

If you ask employees to work on or near an exposed de-energized part and the employees may be exposed to electrical shock if equipment is re-energized, MIOSHA requires that you develop and utilize a procedure to lockout and tag equipment at the electrical source to prevent re-energizing the equipment. Chapter 32 provides further detail on lockout and tagout procedures.

SECTION TWO: MIOSHA Regulations

If a lock cannot be used or the employer can demonstrate that tagging procedures will provide safety equal to a lock, a tag may be used without a lock. In these cases, all of the following must occur:

- The tag must be of a distinctive employer design that clearly prohibits unauthorized energizing of the circuits and removal of the tag.
- A tag shall not be used without an additional safety measure such as the removal of an isolating circuit element, the blocking of a controlling switch, or the opening of an extra disconnecting device.
- All persons who have access to controlling devices shall be trained in, and familiar with, the employer's tagging procedures. [Part 40](#) requires the employer to develop a written lockout procedure.
- The situation must meet the requirements of the [MIOSHA General Industry Safety Standards - Part 37, Accident Prevention Signs and Tags](#).

31.1.3 Cord- and Plug-Connected Equipment

If you use cord- and plug-connected equipment or extension cords in your manufacturing establishment, you must follow these safety requirements:

- Handle equipment in a way that does not cause damage. Extension cords must not be attached with staples or in any manner that causes damage to the outer jacket or insulation.
- Visually inspect extension cords and cord- and plug-connected equipment at the beginning of each shift for external defects such as loose parts, deformed and missing pins, or damage to the outer jacket or insulation, and for evidence of possible internal damage such as a pinched or crushed outer jacket.
- Remove defective or damaged items from service, and do not allow employees to use them.
- Use attachment plugs or receptacles that provide proper continuity of the equipment-grounding conductor.
- Be sure that portable electric equipment and extension cords used in highly conductive work locations are approved for those locations. Examples of highly conductive work locations are areas where employees are likely to contact water or conductive liquids.
- Employees must not have wet hands when plugging and unplugging flexible cords when energized equipment is involved.

31.1.4 Electric Power and Lighting Circuits

Do not allow the use of nonload-breaking-type cable connectors, fuses, terminal plugs, and cable splice connections to open or close circuits under load conditions.

After a circuit is de-energized by a circuit protective device, the circuit must not be manually re-energized until it has been determined that the equipment and circuit can be safely energized.

31.2 Equipment Maintenance and Installation

Minimum electrical safety requirements are established by [MIOSHA General Industry Safety Standards - Part 39, Design Safety Standards for Electrical Systems](#). These rules provide for practical safeguarding of employees in their work places. The rules cover design safety standards for electric utilization systems and include all electric equipment and installations used to provide electric power and light for employee work places. See Chapter 37.2 for electrical licensing requirements.



Common electrical hazards that might be found in manufacturing facilities include missing covers on junction boxes, inadequate clearance and working space around electrical disconnects, electrical disconnects not clearly labeled, and extension cords with broken or exposed wiring.

31.2.1 General Requirements

General requirements for guarding electrical equipment in your manufacturing facility include:

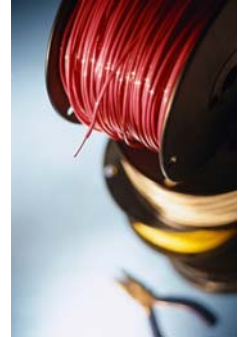
- Installing and using equipment according to the instructions.
- Enclosing parts that could produce sparks, arcs, or flames during normal operation.
- Marking disconnects to identify their purposes unless located so that the purpose is obvious. Markings should be durable enough to withstand the environment in which they are located.
- Providing and maintaining sufficient access and working space above all electrical equipment to permit ready and safe operation and maintenance.
- Guarding live parts of electrical equipment operating at 50 volts or more with an approved cabinet, enclosure, or other approved means to protect against accidental contact.

31.2.2 Wiring Design and Protection

- Prohibit attachment of a grounded conductor to any terminal or lead that reverses designated polarity on equipment installed or modified after March 15, 1972.
- Ensure that fuses or circuit breakers are located or shielded so that employees will not be burned or otherwise injured by their operation.
- Provide a ground on exposed noncurrent-carrying metal parts of cord- and plug-connected equipment which may become energized such as refrigerators, freezers, and air conditioners, including those in employee break rooms.

31.2.3 *Wiring Methods, Components, and Equipment*

These requirements apply to wiring methods, components, and equipment but do not apply to the conductors that are part of factory-assembled equipment.



- Ensure that metal raceways, cable armor, and other metal enclosures for conductors are metallically joined together and connected to all boxes, fittings, and cabinets in a way that provides effective electrical continuity.
- Provide approved covers on pull boxes, junction boxes, and fittings.
- Surround switches, circuit breakers, and switchboards with weatherproof enclosures when located in wet locations.
- Use flexible cords and cables that are approved and suitable for conditions of use and location.

Do not allow use of flexible cords and cables for any of the following situations:

- As a substitute for fixed wiring of a structure
- Run through holes in walls, ceilings, or floors
- Run through doorways, windows, or similar openings
- Attached to building surfaces
- Concealed behind building walls, ceilings, or floors

Use flexible cords in continuous lengths without splice or tap. Connect flexible cords to devices and fittings so that strain relief is provided and prevents pull from being directly transmitted to joints or terminal screws.

In all wet or damp locations, install light fixtures that are approved for use in that environment.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 32: Lockout/Tagout

The [MIOSHA General Industry Safety Standards - Part 85, Lockout/Tagout](#) requires that employers develop a lockout/tagout program to protect employees during machine and equipment servicing or maintenance where unexpected machine energization, start-up, or release of stored energy could cause injury to employees.

Energy sources include electrical, pneumatic, hydraulic, mechanical, and thermal. There may also be stored and/or residual energy that may remain once the primary energy source is shut down. Stored energy may result from steam, air pressure, water pressure, compression of springs, or gravity.

Manufacturing facilities, like other establishments, may perform servicing and maintenance of equipment or contract with an outside contractor to perform these functions. Either way, it is mandatory that all workers understand that a potentially dangerous condition exists when a machine is being serviced and that the people who normally operate the equipment are aware of the servicing activity.

The lockout/tagout standard does not apply to normal production operations and to maintenance work on cord- and plug-connected electrical equipment for which exposure to the hazards of unexpected energization or start-up of the equipment can be controlled by unplugging the equipment from the energy source. The plug must be under the exclusive control of the employee performing the maintenance.



32.1 Employer Responsibility

MIOSHA requires that you plan for the control of energy during servicing and/or maintenance of machines and equipment by doing the following:

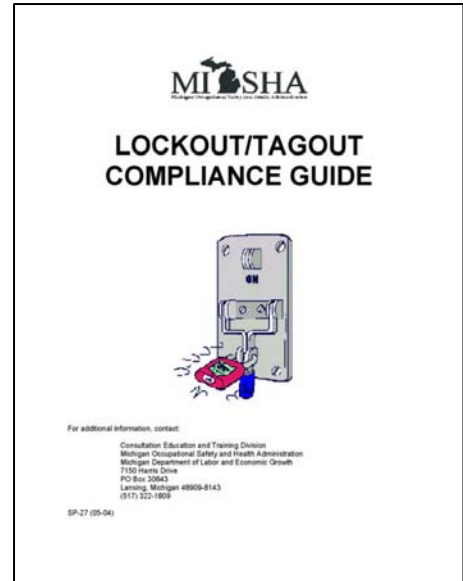
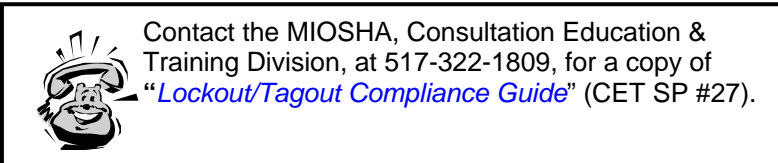
- Establish an energy control program.
- Develop, document, and utilize lockout/tagout procedures.
- Conduct periodic inspections.
- Provide appropriate training to employees.
- Provide equipment required by the lockout/tagout procedures at no cost to employees.

In This Chapter...

- 32.1 – Employer Responsibility
- 32.2 – Lockout/Tagout Program
- 32.3 – Lockout/Tagout Procedures
- 32.4 – Other Requirements
- 32.5 – Training and Communication
- 32.6 – Periodic Inspections

32.2 Lockout/Tagout Program

Your lockout/tagout program must include documented energy control procedures, employee training, and periodic inspections. This ensures that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start-up, or release of stored energy could occur and cause injury, the machine or equipment will be isolated from the energy source and rendered inoperative.



32.3 Lockout/Tagout Procedures

Procedures addressing how potentially hazardous energy will be controlled during machine or equipment servicing and maintenance must be developed, documented, and used. Employers must also make sure that the established procedures are followed.

Procedures DO NOT have to be documented for a particular machine or equipment when ALL of the following eight conditions are met:

1. The machine/equipment has no potential for stored or residual energy after shutdown which would endanger an employee.
2. The machine or equipment has a single energy source that can be identified and isolated.
3. The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment.
4. The machine or equipment is isolated from that energy source and locked out during service or maintenance.
5. A single lockout device will achieve a locked out condition.
6. The lockout device is under the exclusive control of the authorized employee performing the service or maintenance.
7. The servicing or maintenance does not create hazards for other employees.
8. The employer using the exception has had no accidents involving the unexpected activation or energization of the machine or equipment during service or maintenance.

When a documented procedure is required, it must include the following actions and elements which must be accomplished in sequence:

1. **Preparation for Shutdown**
All authorized employees must know the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy before the employee turns off a machine or equipment.
2. **Machine or Equipment Shutdown**
Procedures must be established for turning off or shutting down each piece of equipment. An orderly shutdown should be used to avoid additional or increased hazards to employees as a result of the equipment stoppage.
3. **Machine or Equipment Isolation**
Locate and apply all energy-isolating devices needed to control the energy of the machine or equipment so that the machine or equipment is isolated from the energy source.
4. **Lockout or Tagout Device Application**
A lockout device is defined as a device, such as a key or combination lock that utilizes a positive means or holds an energy-isolating device in a safe position and prevents the energizing of a machine or equipment. A tagout device is defined as a prominent warning apparatus to identify the energy-isolating device and equipment being controlled. A tag used without a lock shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by the use of a lock. This includes opening an additional disconnecting device, removal of an isolating circuit element, blocking of a controlling switch, or the removal of a valve handle to reduce the likelihood of inadvertent energization.

Lockout or tagout devices should be applied as follows:

- Only authorized employees should place the lockout or tagout device on each energy-isolating device.
 - Lockout devices need to be affixed properly so they will hold the energy-isolating devices in a safe or off position.
 - Tagout devices, when used, must be placed to clearly indicate that operation or movement of energy-isolating devices from the safe or off position is prohibited.
5. **Stored Energy**
All possible hazardous stored or remaining energy needs to be relieved, disconnected, restrained, and otherwise rendered safe after the lockout or tagout device has been put in place.

If there is a possibility of stored energy gathering to a hazardous level, proof of isolation must be continued until the servicing or maintenance is completed or until the possibility of such energy gathering no longer exists.
 6. **Proof of Isolation**
Before starting work on a machine or equipment that has been locked out or tagged out, the authorized employee needs to show that the machine or equipment has been isolated or de-energized.

SECTION TWO: MIOSHA Regulations

Your documented procedure must also address how you will perform start-up once maintenance or servicing is complete. Follow this procedure to release the equipment or process from lockout or tagout:

- ✓ Machine or Equipment
 - Inspect the work area to ensure that unnecessary items have been removed and that machine or equipment parts are intact.
- ✓ Employees
 - Employees must be safely positioned or removed from the work area. Tell affected employees that the lockout or tagout devices are being removed before removing the lockout or tagout devices and before energizing machines or equipment.
- ✓ Lockout or Tagout Device Removal
 - The employee who applied the lockout or tagout device must be the person to remove the device. (If that employee is not available to remove the device, then it may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented, and incorporated into your energy control program.)

32.4 Other Requirements

32.4.1 *Outside Contractors*

Outside contractors doing maintenance or repair work on any equipment at your facility must share their lockout/tagout procedures with all affected employees. You must also share information on your lockout/tagout procedures with the outside contractor.

32.4.2 *Group Lockout or Tagout*

There are special procedures for servicing or maintenance performed by two or more people:

- Responsibility
Designate one employee with primary responsibility for the project. This employee will remain responsible throughout the project.
- Multiple Individual Locks
Each authorized employee will place a personal lockout or tagout device on the group lockout device, group lockbox, or similar mechanism when he or she begins work. Each employee removes their device when finished working on the machine or equipment being serviced or maintained.
- Shift or Personnel Changes
If a shift or personnel change occurs before the maintenance or servicing is finished, one employee must be designated as responsible for the specific procedures to ensure that lockout/tagout protection is continued. This employee will provide for the orderly transfer of lockout or tagout devices between out-going and incoming employees.

32.5 Training and Communication

The lockout/tagout requirements include training for employees based on the duties performed by the employee. Employees are categorized as:

Authorized Employees

An authorized employee is a person who locks out or tags out a machine or equipment in order to perform service or maintenance on that machine or equipment. An affected employee becomes an authorized employee when duties include performing service or maintenance while exposed to potentially hazardous energy.

Authorized employees must receive training in how to recognize a hazardous energy source, the type and extent of energy available in the work place, as well as the methods and means necessary for energy isolation and control.

Affected Employees

An affected employee is one whose job requires:

- Operation or use of a machine or equipment which is being serviced or having maintenance performed under lockout or tagout.
- Working in an area where servicing or maintenance is being performed under lockout or tagout.

Affected employees need instruction in the purpose and use of the energy control procedures.

Other Employees

Other employees are those classified as employees whose work operations are or may be in an area where energy control procedures may be utilized. They must be instructed about the procedure. These employees must also be aware that attempts to restart or re-energize machines or equipment which are locked out or tagged out are prohibited.

32.5.1 Tagout Systems

When tagout systems are used, employees must also be trained in the following limitations of tags (29 CFR 1910.147[c][7][ii][A-F]):

- Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
- Tags are only warning devices placed on energy-isolating devices and do not provide physical restraint on devices such as provided by a lock.
- Once a tag is attached to an energy-isolating means, it is not to be removed without permission from the authorized person responsible for it.
- A tag should never be bypassed, ignored, or otherwise defeated.
- Tags must be legible and easily understood by all authorized employees, affected employees, and all other employees whose work operations are in or near the area.

SECTION TWO: MIOSHA Regulations

- Tags and their means of attachment must be made of materials that will withstand the environmental conditions encountered in the work place.
- Tags must be securely attached to energy-isolating devices so that they cannot be accidentally detached during use.

32.5.2 Employee Retraining

Authorized and affected employees must be retrained whenever the following occurs:

- A change in their job assignments.
- A change in machines, equipment, or processes that present a new hazard.
- A change occurs in the energy control procedures.

Certify that employee retraining has been completed and is kept up to date. The certification should contain each employee's name and dates of training.

32.6 Periodic Inspections

At least annually, you must conduct an inspection of the energy control procedure to make sure the procedure and the standard requirements are being followed.

32.6.1 Minor Adjustments and Servicing Exception

Lockout/tagout requirements do not apply to minor adjustments or servicing tasks which take place during the normal production procedures if the activities are routine, repetitive, and integral to the use of the equipment for production. When more than one employee performs a particular servicing or maintenance operation on a machine or equipment, the servicing or maintenance generally is not considered minor in nature, and the machine or equipment must be locked out.

In order for the aforementioned exception to apply, the work must be performed in a way which prevents exposure, such as by the use of special tools and/or alternative procedures that keep the employee's body out of the areas of potential contact that could cause harm.

Thus, lockout or tagout is not required by this standard if the alternative protective measures enable the servicing employee to clear or unjam, or otherwise service, the machine without being exposed to unexpected energization or activation of the equipment or release of stored energy.

Compliance with the machine guarding requirements is an example of such alternative measures. An employer who requires employees to perform routine maintenance and/or servicing while a machine or process is operating in the production mode must provide employee safeguarding under the applicable machine guarding requirements. Operations such as lubricating, draining sumps, servicing filters, and inspecting for leaks and/or mechanical malfunctions are examples of routine operations which often can be accomplished with effective production-mode safeguards. However, the replacement of machine or process equipment components such as valves, gauges, linkages, support structures, etc., **is not** considered to be a normal routine maintenance function which can safely be accomplished during machine or process equipment operation.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 33: Powered Industrial Trucks

Powered industrial trucks are used throughout the manufacturing industry. Their primary usage allows a variety of tasks associated with material handling to be performed quickly, efficiently, and economically. The hazards commonly associated with powered industrial trucks vary depending on the type of operations and how the operator drives the vehicle. Among these hazards are:



- Falling loads caused by overloading or unbalanced loading.
- Operator has an obstructed view in the direction of travel.
- The vehicle is being operated at an excessive rate of speed.

There are other hazards related to the use of powered industrial trucks that are caused or enhanced by characteristics of the work place. These hazards include the following:

- Operating in areas where there are narrow aisles.
- Operating where there are employees working in or adjacent to the path of travel of the powered industrial truck.
- Loading or unloading trailers and failing to assure that the trailer floor will support the imposed load.
- Failure to assure the wheels are properly blocked with wheel chocks.

Due to the heavy volume of powered pallet jacks, it is important to alert operators that this equipment may be dangerous and they must be instructed in safe equipment operation. used at all times. Permits are optional, but training must be given in order to ensure that operators know how to use the equipment.

The safe and proper handling of powered industrial trucks is of prime importance to all. The [MIOSHA General Industry Safety Standards - Part 21, Powered Industrial Trucks](#) establishes both employer and employee responsibilities.



Training materials; sample operator permits; and other safety information, such as the “*Powered Industrial Truck Operator’s Manual*” (CET #0116), can be obtained from the MIOSHA, Consultation Education and Training Division. Call 517-322-1809 or go to www.michigan.gov/miosha (select Publications, Forms, & Media” then “General Industry Safety Publications”).



33.1 Employer Responsibility

Only authorized personnel are allowed to operate a powered industrial truck. You must provide training prior to the employee's assignment as an operator and test the potential operator on:

- Operating ability
- Knowledge of the equipment
- Knowledge of [Part 21 Powered Industrial Truck](#) rules (R 408.12171-R 408.12193)
- Knowledge of daily checks

As the employer, you must initiate a performance test to determine whether the employee can operate the assigned truck through the functions necessary to perform the required work. After successfully completing the above requirements, the employer must issue the employee an operator's permit authorizing the use of the equipment that the employee has been trained to operate.

33.2 Employee Responsibility

An operator shall safeguard other employees at all times. If at any time a powered industrial truck is found to be in need of repair, is defective, or in any way unsafe, the truck must be taken out of service until it has been restored to a safe operating condition. All repairs must be made by authorized personnel.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 34: Flammable and Combustible Liquids

This chapter reviews and provides references to [the MIOSHA General Industry Safety Standard - Part 75, Flammable and Combustible Liquids](#). It addresses design and construction of inside storage rooms and safe handling requirements to assure employee safety for all establishments. The standard also makes reference to various tables that can help you understand these provisions. The tables show allowable quantities and maximum size specifications. Refer also to Chapter 6 covering spills and releases to ensure that all appropriate safety precautions are being undertaken at your facility.



The hazards associated with the handling of either flammable or combustible liquids **MUST** be addressed in your Hazard Communication Program (also refer to Chapter 13). You should refer to your material safety data sheets (MSDSs) for assistance in this area. The following are some common terms and definitions that you should be aware of:

- **Flashpoint** - The minimum temperature at which a substance produces enough vapor to promote combustion (be ignited). Generally, the lower the flashpoint, the greater the danger of explosion.
- **Flammable liquid** - Any liquid having a flashpoint below 100° Fahrenheit (F). Flammable liquids are divided into three classes as follows:
 - Class IA - liquids having flashpoints below 73°F and having a boiling point below 100°F
 - Class IB - liquids having flashpoints below 73°F and having a boiling point at or above 100°F
 - Class IC - liquids having flashpoints at or above 73°F and below 100°F
- **Combustible liquid** - Any liquid having a flashpoint at or above 100°F. Combustible liquids are divided into two classes as follows:
 - Class II - liquids having flashpoints at or above 100°F and below 140°F
 - Class III - liquids having flashpoints at or above 140°F

34.1 Safe Practices

Safe practices on the part of employees who handle flammable and combustible liquids are essential in the prevention of fire and explosion hazards. Regardless of the quantities involved, each flammable liquid used should be analyzed to determine the extent of its flammability and any health hazards associated with the liquid so that appropriate control measures can be taken.

In This Chapter...
• 34.1 – Safe Practices
• 34.2 – Design, Construction, and Capacity of Storage Cabinets
• 34.3 – Design, Construction of Storage Rooms
• 34.4 – Housekeeping

SECTION TWO: MIOSHA Regulations

Flammable and combustible liquids are categorized by their ease of ignition. Flammable liquids are more easily ignited than combustible ones. Examples of flammables are:

- Acetone
- Gasoline
- Lacquer thinner

Examples of combustibles are:

- Kerosene
- Fuel oil
- Stoddard solvent
- Mineral spirits

Connections on all drums and piped systems of flammable and combustible liquids must be vapor- and liquid-tight.

When flammable liquids are transferred from one container to another; e.g., from a bulk container to another, they must be effectively bonded and grounded. This practice prevents electrical discharge (sparks) from the accumulation of static charge because of the transfer process.

All spills of flammable or combustible liquids must be cleaned up promptly. With major spills, remove any ignition sources, ventilate the area, and provide respirators if needed. These liquids must not be allowed to enter a confined space such as a pit or sewer because of the possibility of an explosion.

Supplies of flammable and combustible liquids must be stored in approved, fire-resistant, safety containers equipped with flash screens and self-closing lids. All flammable liquids must be kept in closed containers when not in use.

Employers should require that all combustible waste material (e.g., rags and shop towels that have been used for cleaning) and residues in plant or storage areas be kept to a minimum, stored in covered metal receptacles, and disposed of daily.

34.2 Design, Construction, and Capacity of Storage Cabinets

The quantity of liquid that may be located outside of an inside storage room or storage cabinet in a building, or in any one fire area of a building, shall not exceed:

- 25 gallons of Class IA liquids in containers.
- 120 gallons of Class IB, IC, II, or III liquids in containers.
- 660 gallons of Class IB, IC, II, or III liquids in a single portable tank.

Flammable and Combustible Liquids Commonly Found in Industries

CHEMICAL	FP °F	CLASS	CATEGORY
Acetone	0	IB	Flammable
Ethyl Acetate	24	IB	Flammable
Exx-Print	225+	IIIB	Combustible
Isopropyl alcohol	53	IB	Flammable
MEK (methyl ethyl ketone)	22	IB	Flammable
n-Propyl Acetate	55	IB	Flammable
Stoddard Solvent	110	II	Combustible
Toluene	40	IB	Flammable
Mineral Oil	275+	III	Combustible

Storage cabinets must meet National Fire Protection Association test requirements and must be properly labeled FLAMMABLE - KEEP FIRE AWAY.

Open flames and smoking must not be permitted in flammable or combustible liquid storage areas.



For a copy of the poster "Danger – No Smoking, Matches or Open Flames" (CET #0321), contact the MIOSHA, Consultation Education and Training Division at 517-322-1809 or go to www.michigan.gov/miosha (select Publications, Forms, & Media" then "General Industry Safety Publications").

34.3 Design and Construction of Inside Storage Rooms

Inside storage rooms shall be constructed to meet the required fire-restrictive rating for their use. Such construction shall comply with the test specifications set forth in "Standard Methods of Fire Tests of Building Construction and Materials" (NFPA 251-1969).

- Openings to other rooms or buildings must have noncombustible, liquid-tight, raised sills or ramps at least four inches in height; or the floor in the storage area must be at least four inches below the surrounding floor. A permissible alternate to the sill or ramp is an

SECTION TWO: MIOSHA Regulations

open-grated trench inside the room that drains to a safe location. This method may be preferred if there is an extensive need to transfer flammable liquids into and out of the room by means of hand trucks.

- Any openings must have approved, self-closing fire doors.
- The room must be liquid-tight where the walls join the floor.
- An aisle at least three feet wide must be maintained in every inside storage room.
- Easy movement within the room is necessary in order to reduce the potential for spilling or damaging the containers and to provide both access for fire fighting and a ready escape path for occupants of the room should an emergency occur.
- Containers over 30 gallons in capacity cannot be stacked one upon the other.
- Dispensing of flammables and combustibles must be by approved pump or self-closing faucet only.

34.4 Housekeeping

Maintenance and operating practices at your manufacturing facility must be in accordance with established procedures designed to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills must be cleaned up promptly!

Adequate aisles must be maintained for unobstructed movement of personnel and so fire protection equipment can be brought in to any part of the flammable or combustible liquid storage area.

All combustible waste material and residues in your building(s) must be kept to a minimum, stored in covered metal receptacles, and disposed of daily.

Smoking is not allowed outside of designated areas, and signage should be posted in all flammable and combustible storage areas.



Contact the MIOSHA, Consultation, Education and Training Division, at 517-322-1809 for a copy of the “*On-Site Consultation Abatement Method Advice For: Flammable & Combustible Liquids*” (OSC-113).

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 35: Plastic Molding

The [MIOSHA General Industry Safety Standards - Part 62, Plastic Molding](#) sets forth safe practices for employees and safeguards for all machinery and equipment used in plastic processing.

35.1 Employer/Employee Responsibility

- An employer shall provide training to an employee regarding the operating procedures, hazards, and safeguards of any assigned job.
- An employer shall not allow a machine to be operated which is not guarded as prescribed by this part or where the machine has a known defect which could affect the safety of an employee.
- An employee shall report to a supervisor a machine or safeguard which is defective.

35.2 Housekeeping

All places of employment, aisles and passageways, storerooms, and service rooms shall be kept clean and orderly. If housekeeping hazards are present or likely to be present, the employer must do the following:

- Dust, scrap, and spills of plastic materials shall be cleaned up and disposed of **daily** or more often if it constitutes an employee hazard.

35.3 Machine Installation

A powered gate shall have the leading edge equipped with a return switch and the circuit so designed that the gate will retract and not cause an injury if any employee is struck by it.

35.4 Devices, Guards, and Protective Equipment

An exposed heated surface which could cause injury shall be covered or guarded to prevent contact by an employee. This subrule does not apply to an area that requires accessibility, such as the adapter or grate on an extrusion machine.

In This Chapter...

- 35.1 – Employer/Employee Responsibility
- 35.2 – Housekeeping
- 35.3 – Machine Installation
- 35.4 – Devices, Guards, and Protective Equipment
- 35.5 – Controls
- 35.6 – Lubrication and Maintenance
- 35.7 – Hopper Filling Methods

SECTION TWO: MIOSHA Regulations

A machine that uses a blade or knife to cut plastic materials shall be guarded by a barrier, by position, or by a device to prevent contact between the operator and the machine.

An employee, if exposed to the possibility of burns from a heated surface which cannot be covered or guarded, shall use heat-resistant personal protective equipment that is provided by the employer to the employee at no expense to the employee.

35.5 Controls

- An operating control shall be guarded against accidental contact.
- A control button or lever shall be identified as to its function.
- If a machine requires more than one operator, and if each operator is exposed to a point of operation, the controls shall be activated concurrently before the machine will operate.
- A machine shall be provided with an emergency stop control at each operator station. The stop control shall be red in color and readily accessible. A button, if used, shall have a mushroom shape.

35.6 Lubrication and Maintenance

Lubrication of a machine shall be accomplished by one of the following:

- Manually when the machine can be shut off and locked out.
- An automatic pressure or gravity feed system.
- An extension pipe leading to an area outside of the guard or away from any hazard.

Except as permitted in R 408.16234(10), each employee doing the work shall lock out the power source of the machine or equipment to be repaired or serviced if unexpected motion would cause injury. Any residual pressure which would be hazardous shall be relieved before and remain relieved during work by an employee doing the work.

35.7 Hopper Filling Methods

The method used to fill a hopper where the top of the hopper is more than five feet above the floor or platform of a plasticizer shall be one of the following:

- A barrel that is used with a hoist.
- A barrel dumper or an enclosed platform on a powered industrial truck.
- A portable stair that has handrails and wheel locks.
- A platform that is located not more than five feet below the hopper opening.
- Another method that does not expose the employee to a hazard.

Note: A minimum of 42 inches shall be maintained from the top of the hopper to the working surface or standard barriers shall be provided.

SECTION TWO – MIOSHA REGULATIONS

PART 3: MIOSHA SAFETY REGULATIONS

CHAPTER 36: Other MIOSHA Safety Standards

There are several MIOSHA standards with rules generally applicable to the manufacturing industry. Depending on the North American Industry Classification System (NAICS) Code, each manufacturing industry may be subject to selected rules developed to ensure the health and safety of its employees. These standards may include:

36.1 Welding and Cutting

The [MIOSHA General Industry Safety Standards - Part 12, Welding and Cutting](#) this standard is intended to provide, in, about or around places of employment, reasonable safety to persons involved in welding, cutting, brazing, soldering and acetylene generating and to those exposed to these processes and the equipment and compressed gases used. It also includes those exposed to these processes, as well as the equipment and compressed gases used.



Part 12 covers employer and employee responsibility including training, inspection, testing, and the use of personal protective equipment. The standard specifies who is qualified to use and how to use welding and cutting equipment in confined spaces. The rules discuss the construction, storage, and handling of cylinders. Other topics reviewed are manifolding, service piping, protective devices, hoses, and regulators. Arc welding, cutting, and acetylene generators are also discussed.

36.2 Fixed Ladders

The [MIOSHA General Industry Safety Standards - Part 3, Fixed Ladders](#) establishes the minimum standards for the design and installation of fixed ladders and their safe use by employees. Utility poles; radio and television transmission towers are excluded from this part.

This standard covers rules on surface conditions and clearances, employee training, ladder design, use restrictions, maintenance, design of manhole steps, and periodic testing for fall arrest systems.

In This Chapter...

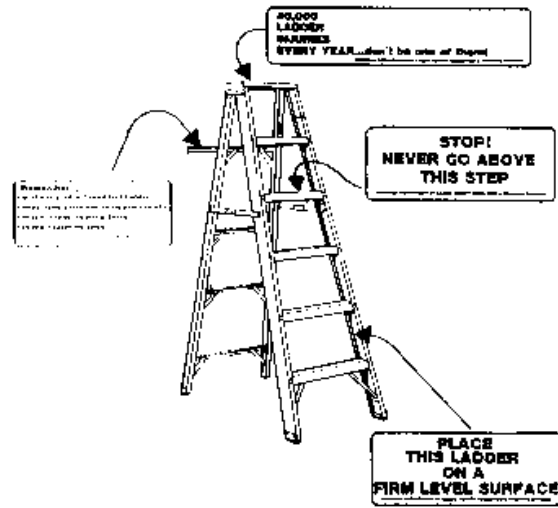
- 36.1 – Welding and Cutting
- 36.2 – Fixed Ladders
- 36.3 – Portable Ladders
- 36.4 – Abrasive Wheels
- 36.5 – Hand and Portable Powered Tools
- 36.6 – Air Receivers
- 36.7 – Polishing, Buffing, and Abrading
- 36.8 – Refuse Packer Units
- 36.9 – Conveyors
- 36.10 – Overhead and Gantry Trains
- 36.11 – Crawler, Locomotive, and Truck Cranes
- 36.12 – Underhung Cranes and Monorail Systems
- 36.13 - Slings

36.3 Portable Ladders

The [MIOSHA General Industry Safety Standards - Part 4, Portable Ladders](#) establishes minimum requirements for the construction, care, and use of portable ladders used in and about places of employment. It specifies types and use of wood, non-wood, and special-purpose ladders. It also specifies the handling, transportation, maintenance, inspection, and repair of all ladders.



Placement of Ladder Safety Stickers



36.4 Abrasive Wheels

The [MIOSHA General Industry Safety Standards - Part 1A, Abrasive Wheels](#) sets forth rules and specifications for the safe use of abrasive wheels in, around, and about places of employment. Part 1A identifies several types of grinding wheels, classified according to their appearance. The provisions provided include specifications for safety guards, flange construction and maintenance, as well as rules for storage, handling, mounting, and use of grinding wheels.

36.5 Hand and Portable Powered Tools

The [MIOSHA General Industry Safety Standards - Part 38, Hand and Portable Powered Tools](#) provides for the safe maintenance; operation; and use of hand tools and portable powered tools, regardless of ownership in, around, or about a place of employment.

Part 38 outlines employee/employer responsibility and establishes requirements for proper storage and handling, equipment inspection, and control devices. A number of provisions are provided for specific hand tools (knives, pliers, hot sticks, etc.) and powered tools (circular saws, staplers, nailers, pneumatic grinders, etc.). These provisions identify how to properly inspect, operate, and maintain the tools in accordance with the standard. In addition, there are also several provisions that address the proper design, training, and operation of power-actuated tools (devices used for making forced entry into materials by use of a tool, a fastener, and an explosive load).



36.6 Air Receivers

The [MIOSHA General Industry Safety Standards - Part 93, Air Receivers](#) applies to compressed air receivers and other equipment used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting, and chipping. Essentially, *Part 93* establishes requirements for the proper installation of air receivers as well as any equipment used in conjunction with them (drains, gauges, valves, handholes, etc.).

36.7 Polishing, Buffing, and Abrading

The [MIOSHA General Industry Safety Standards - Part 11, Polishing, Buffing, and Abrading](#) sets forth rules for safety in the use of buffing and polishing wheels and coated abrasives. This standard provides specifications for flanges, guards, fixtures, proper illumination, and operation. Part 11 also includes operator personal protection requirements and provides that precautions be taken to protect against fire and explosion.

36.8 Refuse Packer Units

The [MIOSHA General Industry Safety Standards - Part 17 Refuse Packer Units](#) applies to the safe design, use, and maintenance of mobile and stationary equipment used in the collection and compaction of solid waste in, around, or about places of employment. Part 17 includes general provisions that cover employer/employee responsibility, refuse packer operation, hoisting cables and chains, hydraulic piping, and lights. In addition, the standard also provides special provisions for both mobile and stationary units. These provisions identify special requirements for warning devices, controls, guards, as well as loading and unloading.

36.9 Conveyors

The [MIOSHA General Industry Safety Standards - Part 14, Conveyors](#) applies to the construction, maintenance, and operation of conveyors and conveying machinery. Conveyor is defined in the Rule as "a horizontal, inclined, or vertical device for moving or transporting bulk materials, packages, or objects in a predetermined path by design and having points of loading or discharge fixed or selective. Part 14 provides several design provisions for conveyors, such as guarding, as well as electrical provisions that cover items like starting buttons and stop devices. Also included are specific provisions that regulate individual types of conveyors.

36.10 Overhead and Gantry Cranes

The [MIOSHA General Industry Safety Standards - Part 18, Overhead and Gantry Cranes](#) covers the equipment, installation, maintenance, and operation of top running overhead and gantry single and multiple girder cranes. This part does not apply to top running overhead cranes with push-type bridge and trolley, monorails, railway or truck cranes, mine hoists, conveyors, shovels, drag-line excavators, equipment used on construction jobs or systems used to transport people. Part 18 provides several provisions for construction, installation, and equipment, as well as regulations for operator training and testing. Also included are a number of provisions that pertain to inspection protocol and proper maintenance.

36.11 Crawler, Locomotive, and Truck Cranes

The [MIOSHA General Industry Safety Standards - Part 19, Crawler, Locomotive, and Truck Cranes](#) pertains to the safe construction and maintenance by the employer and safe use by the employee of crawler, locomotive, and truck cranes including mobile hydraulic cranes used only as lifting cranes. Part 19 provides several sections that address operating practices and required training as well as inspection procedures and maintenance programs.

36.12 Underhung Cranes and Monorail Systems

The [MIOSHA General Industry Safety Standards - Part 20, Underhung Cranes and Monorail Systems](#) applies to power-driven cranes, classified as underhung, single-leg gantry, and jib, operating on the bottom flange of a track section and to single-track monorail systems. This part does not apply to monorail systems used only to transport personnel or to monorail-type conveyor systems, commonly referred to as overhead trolley conveyors or power and free trolley conveyors. Part 20 provides regulations for the construction, installation, and testing of these types of systems. Also included are provisions for operator training and proper operation, as well as several rules regarding inspection and maintenance procedures.

36.13 Slings

The [MIOSHA General Industry Safety Standards - Part 49, Slings](#) sets forth the requirements for slings, their construction, care, and use. This part pertains to several types of slings including: chain, wire rope, metal mesh, 3-strand natural or synthetic rope, and synthetic web made from nylon, polyester, and polypropylene. Part 49 provides rules for each type of sling mentioned previously and addresses, among other things, inspection, repairs, rated capacities, and attachments.