# HEALTH AND SAFETY GUIDE FOR PREFABRICATED WOODEN BUILDING MANUFACTURERS

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# INTRODUCTION

The Williams-Steiger "Occupational Safety and Health Act of 1970" was passed into law "to assure safe and healthful working conditions for working men and women . . ." This Act established the National Institute for Occupational Safety and Health (NIOSH) in the Department of Health, Education, and Welfare (DHEW) and the Occupational Safety and Health Administration (OSHA) in the Department of Labor (DOL). The Act provides for research, information, education, and training in the field of occupational safety and health and authorizes enforcement of the standards. As part of these activities, surveys have been made by NIOSH to determine the most common health and safety problems in small businesses. This Guide includes a GUIDELINES section and a section on FREQUENTLY VIOLATED REGULATIONS relating to a specific industry and is being distributed throughout that industry.

While the aim of this Guide is to assist in providing a safe and healthful workplace by describing safe practices and helping to correct some of the more frequently encountered violations of the safety and health standards, it is not intended to provide total information in all areas of compliance. Additional information can be found in "General Industry Standards, Title 29, Code of Federal Regulations — Part 1910."

Words such as "must," "shall," "required," "necessary," etc. appearing in the text, indicate requirements under the Federal Regulations. Procedures indicated by "should," "suggested," etc., constitute generally accepted good practices.

In some states, the federal government has delegated enforcement authority for occupational safety and health to the state government. Although state standards sometimes differ, they must be at least as effective as the federal standards.

On the last few pages of the Guide is a list of NIOSH and OSHA regional offices where additional information and materials can be obtained. Consultation resulting from requests for assistance will not precipitate a compliance visit by OSHA.

# HEALTH AND SAFETY GUIDELINES

The purpose of a health and safety program is to recognize, evaluate, and control hazards and potential hazards in the workplace.

**An employee safety committee can provide direct employee involvement in company safety programs.**

Hazards may be identified by investigating accidents, reviewing injury and illness records, soliciting employee input (interviews, suggestions, and complaints), performing self-inspections, and using material in this Guide and information from other sources. Typical hazards are unsafe walking surfaces, unguarded machinery, electrical hazards, improper lifting, and air contaminants.

The CHECKLIST in the back of this book is of particular importance in identifying hazards and can be customized to fit program needs. Situations which occur more frequently or cause the most severe problems should be given priority for corrective action.

This Guide contains many of the requirements and good practices needed to correct hazards. For more complex problems, such as those requiring engineering controls to reduce noise or airborne contamination, outside consultants may be needed.

## THE HEALTH AND SAFETY PROGRAM

Through the use of an actively supported health and safety program including employee training, existing unsafe acts or conditions should become apparent. For many of these there may not be specific standards. Nevertheless, it is important to find a solution to these recognized problems.

During the analysis of the workplace for health and safety problems, it may also become apparent that "the letter of the law" is not being met. This may be particularly noticeable where dimensions are given for ladders, stairs, railings, etc. If it is apparent to all concerned that the "intent" of the law is being met, instead of making changes, a variance may be requested. Considerable care must be exercised in this area and the decision not to make changes should be made only with the concurrence of OSHA.

When new buildings are being constructed, renovations are being made, or new equipment is obtained, the standards must be followed.

Even when a citation is issued, it is desirable that the employer have demonstrated a willingness to comply with the intent of the law by operating an effective, on-going safety and health program, correcting existing hazards in the workplace, and maintaining records of purchases, installations, and other compliance-promoting activities. By documenting intent to provide a safe and healthful workplace, an establishment may be given the benefit of having shown "good faith" when penalties are being determined after an OSHA compliance visit.

Hazardous conditions or practices not covered in the OSHA standards are covered under the general duty clause of the act which states "Each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

Management may want to assign responsibilities in the areas of both program development and implementation. Formal meetings or informal discussions can be held to discuss safety promotions, hazards, and injury and illness records. To ensure program success, management leadership is necessary. The person assigned responsibility, for instance the supervisor, must be delegated the authority

and must have management support to carry out the part of the program assigned. Likewise, everyone in the establishment should be aware of the program activities through a systematic interchange of information. Employees cannot take an interest in the program if they are unaware of what is occurring. Conversely, well informed personnel will likely show interest and a desire to participate.


Safety teams can provide leadership in an emergency.

## THE INDUSTRY AND ITS HAZARDS

Prefabricated wooden building manufacturing involves the process of preparation of major component parts for later field assembly and erection into a finished building. The work presents relatively the same type of potential health and safety problems whether it involves the manufacture of homes, barns, cabins, or chicken houses.

Finished or rough lumber is brought in by truck or rail and is unloaded using forklift trucks or cranes. The lumber is normally stored in open-sided storage buildings having two or more floors. It is then sawed or cut to the proper size and configuration and assembled using nailing and stapling machines. The various small building components may be combined or assembled into a single major component such as a wall or roof structure. The major components are then loaded onto trucks with forklift trucks or cranes for transport to the building site where they are assembled into a finished building.

Prefabrication is for all practical purposes a woodworking shop with the additional potential problems associated with the handling of large component parts.

Deficiencies frequently observed during walk-through surveys are:

1. Lack of engineering or administrative control of noise problems associated with sawing and other operations. In addition, hearing tests and ear protection to assure adequate protection against permanent hearing damage were frequently not provided for employees.

2. Ineffective guarding, or no guarding, of extremely hazardous saws and other equipment. This has resulted in amputations, cuts, and other serious injuries.

3. Nail guns and staplers with inadequate safeguards against accidental operation.

4. Manual lifting of heavy component parts has been used. This practice has produced a number of back injuries.

5. The absence of proper eye protection to prevent injuries associated with flying objects such as nails, staples, and wood chips.

## THE INDUSTRY AND ITS HAZARDS (cont.)

6. Lack of employee safety training in the safe use of machinery, equipment, and personal protective equipment and in proper lifting techniques.

7. Lack of local exhaust ventilation to remove wood dust from the atmosphere and minimize the inhalation exposure and potential fire and explosion hazard.

8. Electrical hazards, such as ground prongs cut from power tools, ungrounded extension cords and electrical equipment, and frayed, damaged, and misused flexible cords.

## GENERAL REQUIREMENTS FOR SAFE OPERATION OF WOODWORKING EQUIPMENT

1. "STOP" SWITCH. Every machine must have a "stop" switch within easy reach of the operator. Any machine requiring more than one operator must have "stop" switches handy to each operator.

2. MASTER SWITCH. Every machine must be provided with a means of keeping the machine inoperative while repairs or adjustments are being made. A disconnect switch that can be locked in the off position is recommended.

3. CUTTING TOOLS. Should be sharp. Dull tools tend to "grab" and create a hazardous condition.

4. GUARDS AND OTHER SAFETY DEVICES. Safe operation requires proper guarding of all points of operation and other machine hazards.

5. SCRAP AND WASTE. The working surface of machinery must be kept clear of scrap material to prevent possible serious injuries should scrap come in contact with saw or cutter blades.

Since various types of saws are used in this industry, it is essential that safe operating practices be established in addition to those requirements covered in the "Machine Guarding" section. Some recommendations for your employees are as follows:

1. When feeding a table saw, hands must be kept out of the line of the cut. Since no guard is entirely foolproof, it is possible for a person's hands to follow the stock into the saw.

## GENERAL REQUIREMENTS FOR SAFE OPERATION OF WOODWORKING EQUIPMENT (cont.)

Therefore, when the worker uses the saw for ripping with a fence gauge, he must always use a push stick to complete the cut.

2. The saw must be placed as low above the table as possible; the lower the blade, the less chance for kickbacks. Hence, it is good practice to stand out of the line of the stock being ripped. A heavy leather apron or other guard for the abdomen is recommended.

3. Never saw freehand. Freehand sawing is always dangerous. The stock must always be held against a gauge.

4. The saw must be appropriate for the job. For instance, it is an unsafe practice to rip with a crosscut saw or to crosscut with a rip saw.

5. The dangerous practice of removing a hood guard because of narrow clearance on the gauge-side can be avoided by clamping a filler board to the table between the gauge and the saw and using it to guide the stock.

6. Crosscutting long boards on a table saw should be avoided because the operator is required to use considerable hand pressure near the saw blade. Also, boards extending beyond the table may be struck by people or trucks. Long stock should be crosscut on a swing pull saw.

7. Work that should be done on special power-feed machines should not be done on general purpose hand-fed machines.

8. To set the gauge of a table saw without taking off the guards, a permanent mark should designate the line of cut on the table top.

9. The saw or fence gauge should never be adjusted while the saw is running. When several adjustments are made daily on a saw, an electrical brake may be installed to reduce the time required to completely stop the blade's rotation.

10. A brush or stick should be used to clean sawdust and scrap from a saw.

## DUST CONTROL

Most dust in a woodworking production shop is removed by local exhaust systems. However, many times there is a considerable

accumulation of very fine dust that has settled on rafters and other structural members — especially in areas where sanding is done. This is a hazardous situation with great potential for fire and explosion. A flash fire over dust-covered surfaces may be followed by explosions of ever increasing force. In order to minimize the probability of this occurring the employer must:

1. Prevent dust from accumulating outside of equipment. Vacuum cleaning or a soft push broom must be used frequently.

2. Eliminate ignition sources.

3. Prevent blow down of accumulated dust with compressed air.

4. Provide continuous local exhaust to remove fine dust in areas where sanding is performed.

5. Have the local exhaust systems piped to a suitable collector.

6. Install explosion relief devices for buildings (e.g., blowout panels).

7. Instruct employees in the hazards of combustible dust.

8. Provide adequate fire protection (e.g., sprinklers, fire exit, etc.).

## OPERATING POWER TOOLS

1. Know the application, limitations, and potential hazards of the tool you are using.

2. Select the proper tool for the job.

3. Remove adjusting keys and wrenches before turning on tools.

4. Do not use tools with frayed cord.

5. Keep guards in place and in working order. Do not remove ground lugs.

6. Working areas must be free of clutter that can be tripping hazards.

7. Keep alert to potential hazards in the working environment such as damp locations or the presence of highly combustible materials.

8. Dress properly to avoid loose clothing catching in moving parts.

9. Use safety glasses or face shield, and other protective clothing and equipment if the operation requires it.

10. Do not surprise or distract anyone using a power tool. It may result in a serious injury.

## EMPLOYEE TRAINING

Even with a well-equipped shop, safe operation depends largely upon employees who are properly informed and aware of potential hazards. Training needs will vary according to the complexity of the operation. Some suggestions are to:

1. Impress upon the worker the need for constant awareness — even during automatically controlled operations.

2. Be sure all employees know when and how to use appropriate personal protective equipment, when needed.

3. Develop and maintain check points to be observed as a part of the standard and emergency procedures during each shift.

4. Post appropriate warning signs and operating procedures.

5. Instruct employees in the use of portable fire extinguishers. (Refer to fold-out chart in this booklet and post in a conspicuous place.)

6. Have at least one person trained in first aid on each shift.

7. Be sure employees authorized to use motorized equipment are thoroughly instructed in its operation and potential hazards.

8. Develop a "good housekeeping" awareness to reduce accidents and to develop the employees' sense of pride in their surroundings. An individual should be assigned responsibility for clean-up.

9. Be sure machines are appropriately guarded and employees are aware of guarding requirements.

10. Be sure employees using, or working in conjunction with, fork lifts, cranes, trucks, and other powered equipment are appropriately trained as to use, safety precautions, signals, etc.

11. Be sure all employees have available a printed list of standard procedures and emergency procedures.

## EMPLOYEE TRAINING (cont.)

12. Organize a health and safety committee or routinely discuss health and safety with employees, noting their suggestions and complaints.

13. Instruct employees in safe-lifting practices. Such instructions may prevent many injuries. An easily understood chart, "HOW TO LIFT SAFELY," is included in the back of this Guide for posting where it may be seen by employees.

## MACHINE GUARDING

It is generally recognized that machine guarding is of the utmost importance in protecting the employee. In fact, it could be said that the degree to which machines are guarded in an establishment is a reflection of management's interest in providing a safe workplace.

Personnel cannot always be relied upon to act safely enough around machinery in motion to avoid accidents. Even the well-coordinated and highly trained individual may at times perform unsafe acts which could lead to injury and death. Thus, it is important that all machines be equipped with the best available, most effective guarding accessories. The regulations covering particular operations will provide minimum standards.

## OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL

In the occupational environment, persons may be exposed to excessive levels of a variety of harmful materials, including gases, dusts, mists, vapors, fumes, certain liquids and solids, noise, heat, cold, and so forth.

Often health hazards are not recognized because materials used are identified only by trade names; a further complication arises from the fact that materials tend to contain mixtures of substances, making identification still more difficut.

To begin identifying occupational health hazards, a materials analysis (product inventory) is made and all hazardous substances listed and evaluated. If the composition of a material cannot be determined, the information should be requested from the manufacturers or suppliers who often will provide Material Safety Data Sheets for their products. These Sheets may contain health and safety information about materials, such as signs and symptoms of over-exposure, physical characteristics, and incompatabilities with substances.

A process analysis is now performed noting all chemicals used and all products and by-products formed. When doing such an analysis, allied activities such as maintenance and service operations should be included. Examples of specifics to watch for are:

1. Welding performed as a maintenance procedure around chlorinated materials may cause the formation of toxic gases in addition to welding fumes.

2. If fork lift trucks with internal combustion engines are used for materials handling, then exhaust gases such as carbon monoxide should be included in the analysis.

3. When certain cleaning agents are mixed, sometimes poisonous gases, as chlorine, are formed.

It should be noted that skin conditions, such as chemical burns, skin rashes, and dermatitis constitute over half of all occupational health problems. The use of protective creams or lotions, proper personal protective clothing and other protective equipment, and the practice of good personal hygiene can often prevent these problems.

Various control methods can be used to prevent or reduce employee exposure. They are as follows:

1. Substitution of less toxic materials.

2. Change of a process — a change from gas-operated fork lift trucks to electric lift trucks.

3. Isolation — placing the hazardous process in a separate room or in a corner of the building to reduce the number of persons exposed.

4. Ventilation — includes either local exhaust ventilation, by which contamination is removed at the point of generation, or general mechanical ventilation (see "Occupational Health and Environmental Control").

5. Administrative controls — limiting the total amount of time an individual is exposed to a health hazard by daily rotating the person to work operations where the hazard is not present.

6. Training and education of employees — employees should be told what hazards they are exposed to and the ways to reduce or limit exposures (see "Employee Training").

7. Personal hygiene — cannot be over-emphasized. Persons should wash their hands before eating and if chemicals or solvents get on the skin, they should be washed off immediately. Employees should not be permitted to eat around toxic chemicals or in contaminated areas. Clothing should be changed and washed daily if it becomes contaminated with toxic chemicals, dusts, fumes, or liquids.

8. Personal protective equipment — such items as respirators, hearing protection devices, protective clothing, and protective equipment should be used (see "Personal Protective Equipment").

## AUTOMATIC SPRINKLER SYSTEMS

When automatic sprinkler systems are provided, they must meet design requirements of the National Fire Protection Association's Standard for the Installation of Sprinkler Systems NFPA No. 13-1969 as well as OSHA requirements.

1. Every automatic sprinkler system must have at least one automatic water supply of adequate pressure, capacity, and reliability.

2. One or more fire department connections through which the fire department can pump water is required. No shut-off valve is allowed in this connection.

3. The employer is responsible for the condition of the sprinkler system and must keep it in good operating order. At least annual functional tests are required.

4. The clearance between sprinkler deflectors and the top of combustible storage must be at least 36 inches unless the material is in solid piles less than 15 feet high or in piles less than 12 feet high with horizontal channels, in which case a minimum clearance of 18 inches is allowed. Commodities containing only small amounts of combustible material may be stored up to 18 inches from the sprinkler deflector.

5. Alarm systems, audible to all employees, must be provided on all automatic sprinkler installations.

## GOOD HOUSEKEEPING HELPS PREVENT FIRES

Maintaining a clean and orderly workplace reduces the danger of fires. Combustible material should be kept only in places which are isolated by fire-resistant construction.

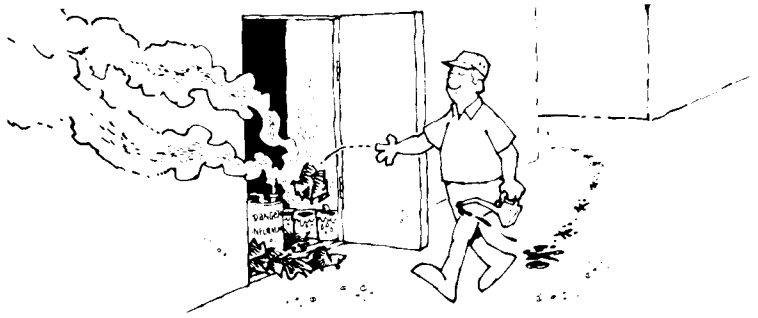
Rubbish should be disposed of regularly. If it is necessary to store combustible waste materials, a covered metal receptacle is suggested.

Materials used for cleaning can create hazards. Combustible sweeping compounds, such as oil-treated sawdust, can be a fire hazard. Floor coatings containing low-flash-point solvents can be dangerous, especially near sources of ignition. All oily mops and rags must be stored in closed metal containers.

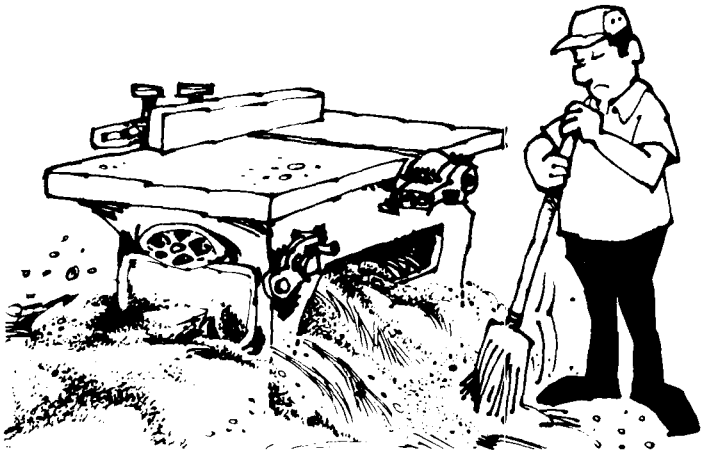
Some common causes of fires in all businesses are:

1. Electrical malfunctions
2. Friction
3. Open flames
4. Sparks
5. Hot surfaces
6. Smoking

Proper maintenance and awareness of these conditions through a safety program can reduce these hazards.



# WALKING AND WORKING SURFACES



## GENERAL REQUIREMENTS

1. The workplace must be maintained in a clean, orderly, sanitary, and, as far as possible, in a dry condition. Spills should be cleaned up promptly.

2. Areas which are constantly wet should have nonslip surfaces where personnel normally walk or work.

3. Every floor, working place, and passageway must be maintained free from protruding nails, splinters, holes, and loose boards.

4. Where mechanical handling equipment such as lift trucks is used, sufficient safe clearances must be provided for aisles at loading docks, through doorways, and wherever turns or passage must be made. Aisles must not be obstructed.

5. All permanent aisles must be easily recognizable. Usually aisles are identified by painting or taping lines on the floor.

6. The floorload capacity is the maximum weight which can be safely supported by the floor, expressed in pounds per square foot. When this information is not available, and when floorload capacity is in doubt, it is suggested that a competent engineer be consulted.

## WALKING AND WORKING SURFACES (cont.)

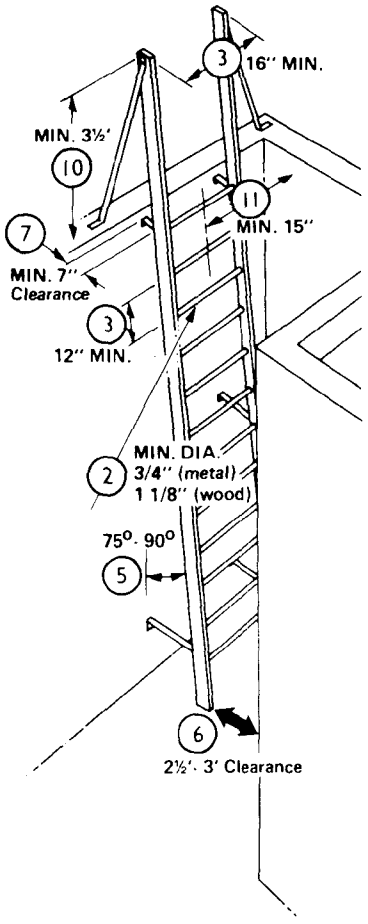
These floorload capacities must be posted in a readily visible location (except for slab floors with no basements).

### FIXED LADDERS MUST:

1. Be designed to withstand a single concentrated load of at least 200 pounds.

2. Have rungs with a minimum diameter of ¾-inch for metal ladders, or 1⅛ inches for wood ladders.

3. Have rungs at least 16 inches wide and spaced not more than 12 inches apart.




4. Be painted (if metal), or otherwise treated to resist deterioration when location demands.

5. Have a preferred pitch of 75°-90° for safe descent.

6. Have 2½ foot clearance for ladders with 90° pitch and three feet for 75° pitch on the climbing side of ladder (unless caged).

7. Have at least 7 inch clearance in back of the ladder to provide for adequate toe space.

8. Be equipped with cages if they are longer than 20 feet.

9. Have landing platforms if they are longer than 30 feet. A platform every 30 feet for caged ladders and every 20 feet for unprotected ladders is required.

10. Have side rails extend 3½ feet above landings.

11. Have a clear width of 15 inches on each side of the center line of the ladder (unless with cages or wells).

# WALKING AND WORKING SURFACES (cont.)

## PORTABLE LADDERS

1. Must be maintained in good condition at all times.

2. Should be kept coated with a suitable protective material.

3. Must be inspected frequently. Those which have developed defects must be tagged, "DANGEROUS — DO NOT USE" and removed from service for repair or destruction.

4. If wooden, should be stored where they will not be exposed to the elements, and where there is good ventilation.

5. If metal, must not be used near energized electrical equipment.

6. Must be placed so that the side rails have a secure footing. They must not be placed on boxes, barrels, or other unstable bases to obtain additional height. Nonslip bases should be used.

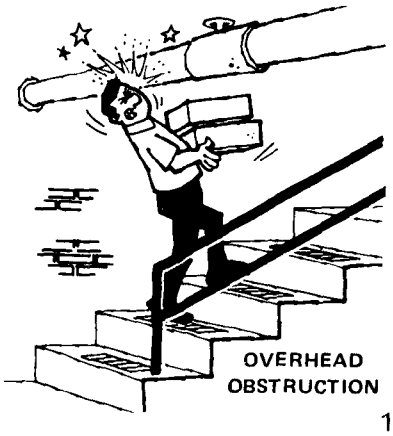
## FIXED INDUSTRIAL STAIRS

Where there are fixed industrial stairs, the following conditions apply:

1. Riser height and tread width must be uniform throughout any flight of stairs.

2. All treads must be reasonably slip resistant.

3. Vertical clearance above any stair tread to any overhead obstruction must be at least seven feet, measured from the leading edge of the tread.


OVERHEAD OBSTRUCTION


SLIPPERY STAIRS

## WALKING AND WORKING SURFACES (cont.)

4. The minimum permissible width is 22 inches (except stairs that are a means of exit access must be at least 28 inches wide).

5. The angle to the horizontal made by the stairs must be between 30° and 50°.

6. All stairs should be adequately lighted.

7. If the tread is less than nine inches wide, the risers should be open.

8. If the flight of stairs has four or more risers:

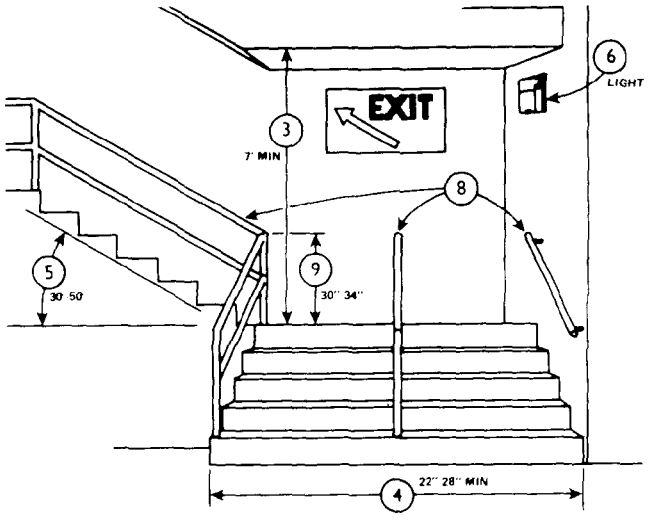
a. a stair railing on each open side is required.

b. a handrail on each enclosed side is required if greater than 44 inches wide.

c. and both sides are enclosed on a stairway less than 44 inches wide, at least one handrail is required, preferably on the right side descending.

d. and if the stairway is 88 or more inches wide, an intermediate stair railing located midway is required.

9. The vertical height of the railing must be 30 to 34 inches with construction of railing similar to the standard railing described later in this section.



# WALKING AND WORKING SURFACES (cont.)

## THE STANDARD RAILING AND TOEBOARD:

A standard railing consists of a top rail, intermediate rail, and posts. The distance from the upper surface of the top rail to the floor, platform, runway, or ramp must be 42 inches. The intermediate rail must be approximately halfway between the top rail and the floor.

A standard railing can be of any configuration and construction that meets the basic dimension requirements (42 inches high with midrail) and can withstand 200 pounds applied in any direction at any point on the top rail. For wood railings, the rails and posts must be of at least 2 by 4-inch stock with posts spaced not more than 6 feet.

For pipe railings, rails and posts must be at least 1½-inch outside diameter pipe with posts spaced not more than 8 feet.

For structural steel railings, posts and rails must be of 2 by 2 by ⅜-inch angles or other metal shapes of equivalent strength with posts spaced not more than 8 feet.

The standard toeboard must be approximately 4 inches in height from the floor to its top edge, with no more than a ¼-inch gap between the toeboard and the floor. It may be constructed of any substantial material either solid or perforated, as long as the openings are smaller than 1 inch.

## WHERE A STANDARD RAILING IS REQUIRED

1. Every open-sided floor or platform 4 feet or more above the adjacent floor or ground level must be railed on all open sides except where there is entrance to a ramp, stairway, or fixed ladder.

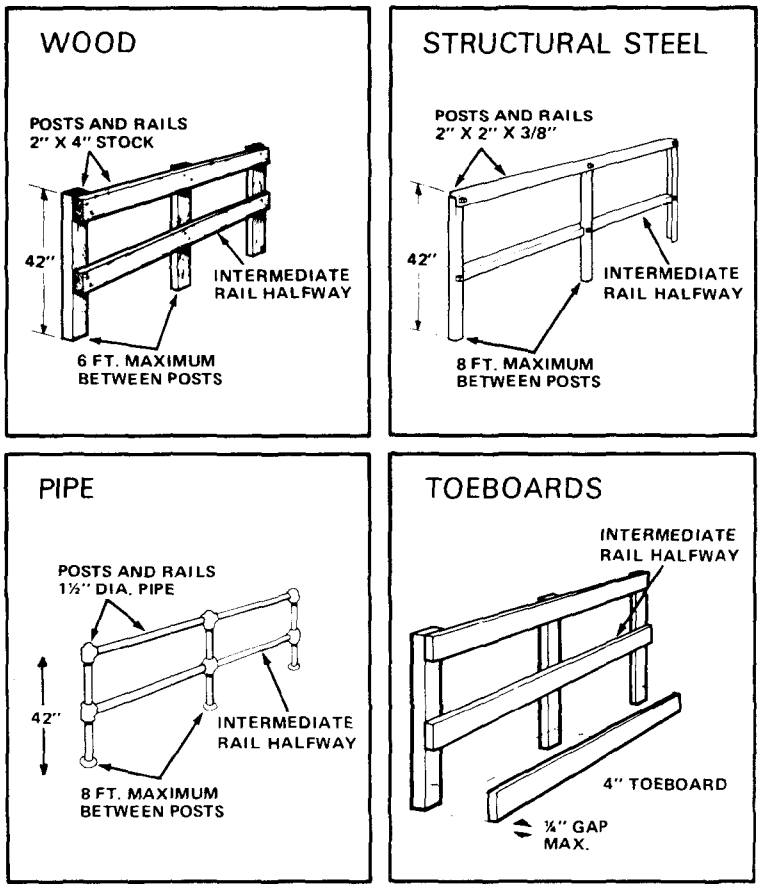
2. Every stairway floor opening must be guarded on all exposed sides except the entrance to the stairway.

3. Every ladderway floor opening must be guarded by a standard railing and toeboard on all sides, with passage through the railing constructed so as to prevent a person from walking directly into the opening.

4. Every runway or catwalk must have railings on all open sides 4 feet or more above ground or floor level.

## WALKING AND WORKING SURFACES (cont.)

As a general condition: a standard toeboard and railing are required wherever people walk beneath the open sides of a platform or under similar structures or where things could fall from the structure (for example, into machinery below).



# EXITS AND EXIT MARKINGS

1. Every exit must have the word "EXIT" in plain legible letters not less than 6 inches high with strokes of the letters not less than ¾-inch wide.

2. Doors, passageways, or stairways which are neither exits nor ways to an exit, but may be mistaken for an exit, must be clearly marked "NOT AN EXIT" or must be marked by a sign indicating their actual use, e.g., "STORAGE ROOM" or "TO BASEMENT."


3. When the direction to the nearest exit may not be apparent to an occupant, an exit sign with an arrow indicating direction should be used.

4. Exit access must be arranged so that it is unnecessary to travel toward any area of high hazard potential in order to reach the nearest exit (unless the path of travel is effectively shielded by suitable partitions or other physical barriers).

5. Nothing may impair the visibility of the exit sign, such as decorations, furnishings, or other signs.

6. A door from a room to an exit or to a way of exit access must be of the side-hinged swinging type. It must swing out in the direction of travel if:

## EXITS AND EXIT MARKINGS (cont.)

a. 50 or more persons occupy the room or

b. the exit is for an area of high hazard potential.


7. Areas around exit doors and passageways leading to and from the exit must be free of obstructions. The exit route must lead to a public way.

8. If occupancy is permitted at night, or if normal lighting levels are reduced during working hours, exit signs must be suitably illuminated by a reliable light source.

9. No lock or fastening may be used to prevent escape from inside the building.

10. Where occupants may be endangered by the blocking of any single exit due to fire or smoke, there must be at least two means of exit remote from each other.

# ENVIRONMENTAL CONTROL

Persons involved in woodworking are exposed to numerous vapors, gases, dusts, and noise that may produce an occupational illness or injury.

Woodworking shops vary greatly. The following items were found in some shops:

## DUST

Wood dust, if not removed at the source of generation, can present a health hazard. Some dusts are toxic or cause allergic responses in workers. Excessive dust makes good housekeeping difficult and also increases the fire potential.

The best control for wood dust is local exhaust ventilation with subsequent collection by cyclones or bag houses.

If local exhaust ventilation is installed, the following practices should be observed:

1. The duct velocity should be maintained at a minimum of 3500 feet per minute to prevent dust from accumulating and plugging the system.
2. The ducts should be checked and cleaned at regular intervals.
3. If a bag house is used, it should be shaken regularly.
4. Check belts on the drive units of the exhaust fan for slippage or breakage.
5. Check for loose, damaged, or broken ducts.

Respirators may be worn by individuals to prevent inhalation of the wood dust. For more information regarding respirators, see the section on "Personal Protective Equipment."

## CARBON MONOXIDE

Gasoline or propane-powered fork lifts emit carbon monoxide. The carbon monoxide levels should be checked to ensure that hazardous levels are not present and that the area is well ventilated.

# ENVIRONMENTAL CONTROL (cont.)

## PAINTS, LACQUERS, STAINS, AND SOLVENTS

Thinners used in most paints will have a narcotic effect on workers and may, on a long-term basis, cause irreparable illness such as liver and lung damage. In addition to ventilation in the spray area or paint booth, respirators may be worn (see Respirators under "Personal Protective Equipment").

Some of the newer paints contain hardeners and other additives that can cause skin rashes and dermatitis.

Do not permit painters to wash their hands in thinners because this takes the fats out of the skin and increases the chance for skin rashes and can, in some cases, be absorbed through the skin. Solvent resistant gloves worn while handling the paint and thinners will prevent this.

## INSULATING FOAM

Some prefabricated buildings have foam insulation installed in the shop which can involve the use of isocyanates. Generally, isocyanates are irritating to the eyes, skin, and respiratory tract and can produce sensitivity reactions with asthma-like symptoms at very low levels. They should be used only in areas with adequate general and local exhaust ventilation. Since skin contact should be avoided, protective clothing is recommended.

# OCCUPATIONAL NOISE EXPOSURE

Excessive noise is one of the most commonly violated standards and can cause permanent hearing damage. To protect employees it is management's responsibility to make sure they are not exposed to noise levels in excess of the standards. The current standard is 90 decibels A-weighted (dBA) for an eight-hour exposure. Even at this noise level, hearing damage can be expected in some individuals. It may soon be a requirement, and it is considered good practice, to have hearing checked (audiometric testing) on an annual basis, for all employees exposed to 85-90 dBA noise levels for eight hours daily. If no hearing loss is observed, ear protection is not required.

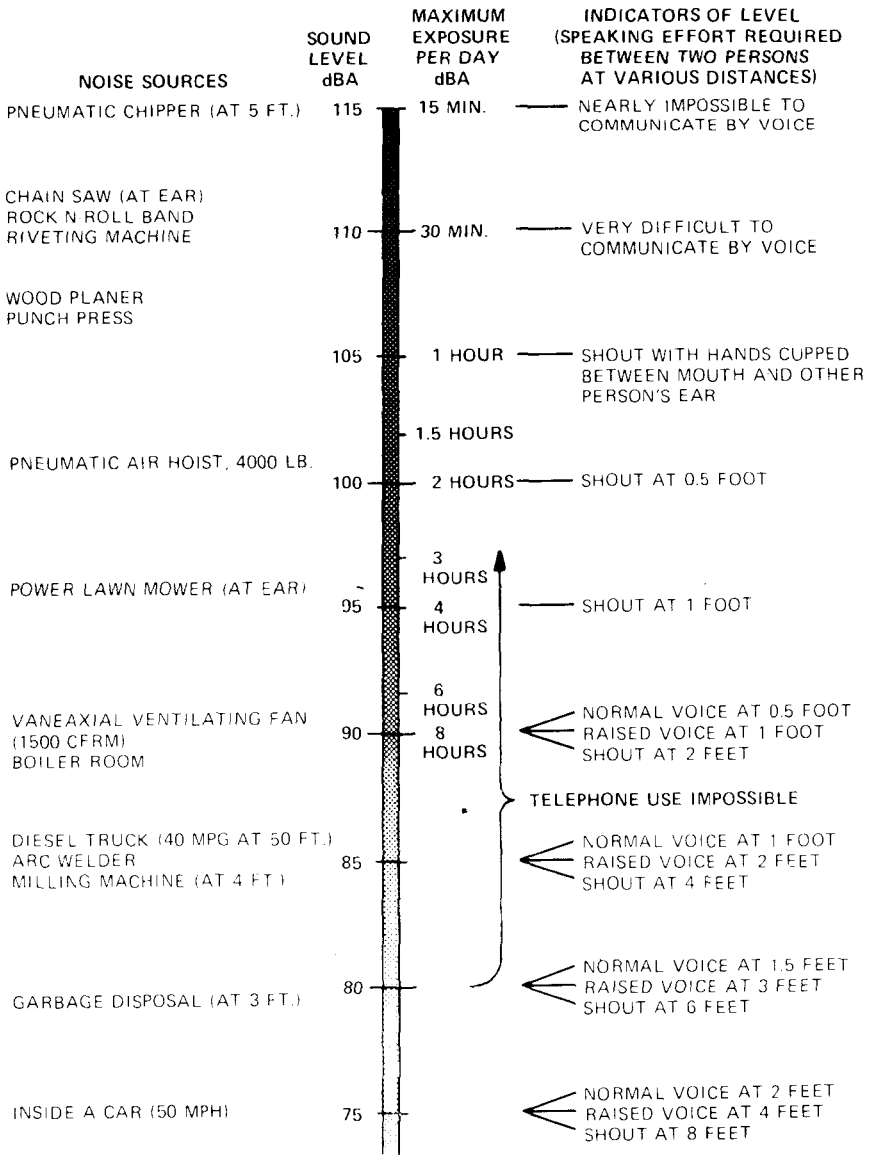
At greater than 90 dBA exposures (eight hours per day) or for higher noise levels in excess of the allowable time (e.g., 100 dBA for more than two hours), a continuing, effective hearing conservation program must be administered. Reference to the following table gives estimates of noise levels and the maximum allowable exposure times. It is required that either engineering controls such as enclosing noisy equipment, or administrative controls, such as limiting time of exposure, be utilized to reduce noise level or the exposure time to comply with the standard. If these control measures are not feasible, then effective personal protective equipment is required. There are many forms and types of ear protection that can be considered from ear muffs to ear plugs. Some are more useful than others, depending on the noise level, the frequency of the noise, and how well they fit the individual. It is necessary to provide protection that is effective and reasonably comfortable to the wearer.

The following table is provided to assist in the evaluation of the noise levels in the workplace. If referral to the table indicates that levels and time of exposure are such that corrective action is needed, it is recommended that professional help be sought to correct the problem. A noise survey by adequately equipped and trained personnel should be made before implementing engineering and administrative controls, and/or setting up a hearing conservation program.

## FREQUENTLY VIOLATED REGULATIONS

# OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

## PERMISSIBLE NOISE EXPOSURES



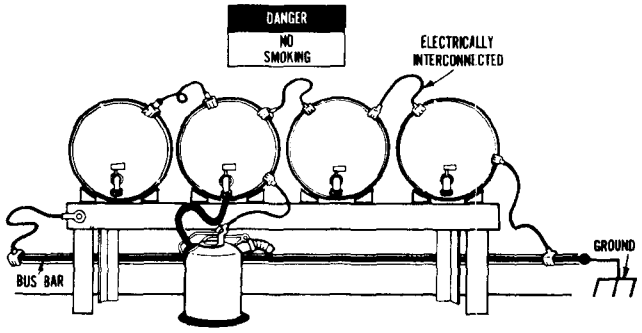
# HAZARDOUS MATERIALS

## FLAMMABLE AND COMBUSTIBLE LIQUIDS

Flammable and combustible liquids are categorized by their ease of ignition. Flammable liquids are more easily ignited than combustible ones. Examples of flammables are gasoline, acetone, lacquer, and thinner. Examples of combustibles are kerosene, fuel oil, and Stoddard solvent.

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

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




3. All spills of flammable or combustible liquids must be cleaned up promptly.

4. Supplies of flammable and combustible liquids must be stored in approved fire-resistant safety containers. These containers can be purchased from an industrial supply house.

5. All flammable liquids must be kept in closed containers when not in use.

6. Combustible waste materials, such as oily shop rags or paint rags, must be stored in covered metal containers and be disposed of daily.

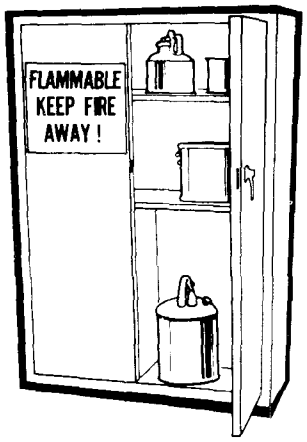
# HAZARDOUS MATERIALS (cont.)

## STORAGE CABINETS

Storage cabinets must be distinctly designated "FLAMMABLE — KEEP FIRE AWAY." Storage cabinets must meet National Fire Protection Association test requirements. Cabinets constructed in the following manner will meet these requirements:

Metal cabinets — must be constructed of at least No. 18 gauge sheet iron, double-walled with tight joints and a 1½-inch air space between. Doors must have three-point locks with the sill raised at least 2 inches above the cabinet floor.

Wooden cabinets — must be constructed of at least 1-inch plywood with rabbetted joints fastened two-directionally with flathead screws.





## INSIDE STORAGE

Open flames and smoking must not be permitted in flammable or combustible liquid storage areas. Openings to other rooms or buildings must be provided with noncombustible, liquid-tight, raised sills or ramps at least 4 inches in height and self-closing fire doors.

A permissible alternative to a sill or ramp is an open-grated trench which drains to a safe location.

General exhaust ventilation (either gravity or mechanical) which provides for a complete change of air within a room at least six

times each hour is required for inside storage rooms. Explosion proof lights are required in flammable liquid storage areas.

## OUTSIDE STORAGE

If flammable and combustible liquids are stored outside, the area should be graded so that spills are diverted away from any building. The storage area should be kept free of combustible material not necessary for storage such as weeds and other debris. SMOKING MUST BE PROHIBITED.

# SPRAY PAINTING

## GENERAL

1. Portable lamps must be removed during spraying.

2. Low flash-point thinners (less than 100°F) may be used for cleaning purposes only if used in a well-ventilated area such as a spray booth.

3. The fire control sprinkler heads must be kept clean and free of paint build-up.

4. "NO SMOKING" signs must be posted wherever flammable liquids are sprayed or stored.

5. Parts to be painted should be arranged so that overspray and fumes are not drawn through the breathing zone.

6. Protective clothing such as gloves, apron, and a cloth cap should be worn.

7. Respirators must be cleaned and maintained regularly.

8. There should never be more than one day's supply of paint outside of storage rooms or cabinets.

## SPRAY AREAS

1. The spray area must be at least 20 feet from flames, sparks, non-explosion-proof electric motors, or other ignition sources.

2. The spray area must be free from hot surfaces such as heat lamps.

3. Electric lights in the spray area must be covered and guarded from accidental breakage.

4. The spray area must be kept clean of combustible residue.

5. Mechanical ventilation must be provided and kept operating to remove vapors during the painting.

## SPRAY BOOTHS

1. Spray booths must be made of metal, masonry, or other suitable noncombustible material and be smooth on the inside to aid in cleaning.

## SPRAY PAINTING (cont.)

2. Floors and baffles must be noncombustible and easily cleaned.

3. Spray booth lights must be explosion-proof or enclosed in sealed panels.

4. Mechanical ventilation must be installed and operating during spraying.

a. The ventilation rate must be at least 100 linear feet per minute over the open face of the booth.

b. Electric motors for the exhaust fans must be outside the booth or ducts and the belts and pulleys fully enclosed.

c. Air exhausted from the paint booth must be discharged outside where it cannot reenter the building.

d. Ducts connected to the booth must have access doors to allow for cleaning.

5. Air supply must be maintained for paint booths.

a. Plugged overspray filters must be replaced.

b. When temperatures are below 55°, the make-up air must be heated to at least 65° except where adequate and safe means of radiant or general building heating maintains a minimum temperature of 65° with the exhaust system in operation.

c. The heater of the make-up air must be located outside the spray booth.

## PAINT DRYING APPARATUS

1. Mechanical ventilation must be left on while the paint is drying. A warning sign to this effect must be attached to the drying apparatus.

2. The area used for drying with portable heaters or lights must be kept clean of overspray products.

3. Heat sources must be kept out of the spray area during spray operations.

4. All electrical drying apparatus must be properly grounded.

# PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

Personal protective equipment is required whenever toxic substances can do bodily harm through absorption, inhalation, or physical contact. Various processes, environments, chemicals, or mechanical irritants constitute hazards for which personal protective devices for the eyes, face, head, and extremities, as well as protective clothing and respiratory devices, are required.

All personal protective equipment must be safely designed and sufficiently well-constructed to provide the protection for which it is intended. It must be maintained in a sanitary and reliable condition.

## EYE PROTECTION

Eye protection is required where there is a possibility of an eye injury from flying particles, chips, and corrosive materials. Employees must wear eye protection when using grinders, power drills, and other similar equipment.

## GLOVES

When handling hazardous liquids, employees must wear gloves which are impervious to such liquids. The gloves must be long enough to protect the forearms.

## FOOT PROTECTION

Foot protection is required to prevent injury from falling objects. Particularly in receiving and transferring inventory, experience has shown that precautions are needed against falling items.

## HEAD PROTECTION

Hard hats are required in a situation where workers may be subjected to impact or penetration from falling or flying objects.

## HEARING PROTECTION

Appropriate hearing protection must be available to personnel, and used, where noise levels are in excess of the maximum exposure per day. Such sound intensity is likely to occur around powerful motors or high speed tools. (See "Occupational Health and Environmental Control.")

# RESPIRATORY PROTECTION

NIOSH-approved respirators must be provided by the employer when air is contaminated with excessive concentrations of harmful dusts, fumes, mists, gases, or vapors. Respirators are acceptable only when engineering or administrative controls are not feasible or while they are being instituted. When respirators are used, a respirator program must be established and include the following requirements:

1. Respirators designed to protect against the specific hazards to which the worker is exposed must be selected.

2. Written instructions covering selection, cleaning, and use of respirators must be available.

3. Employees must be trained in the use of respirators, their limitation, proper fitting, and maintenance.

4. Respirators should be cleaned at the end of each day's use. They are taken apart, washed, dried, and defective parts replaced.

5. Two people must never wear the same respirator unless it has been cleaned and disinfected between uses.

6. All straps must be tied and adjusted.

7. A good face seal is required — beards, sideburns, glasses may interfere.

8. Filters must be replaced when the respirator has been used for the specified lifetime of the cartridge, when an employee can smell vapors in the mask, or when breathing becomes difficult.

# GENERAL ENVIRONMENTAL CONTROLS

Federal standards for occupational safety and health which apply to your place of business require that:

1. Safe drinking water must be provided in all places of employment. The use of a common drinking cup is forbidden.

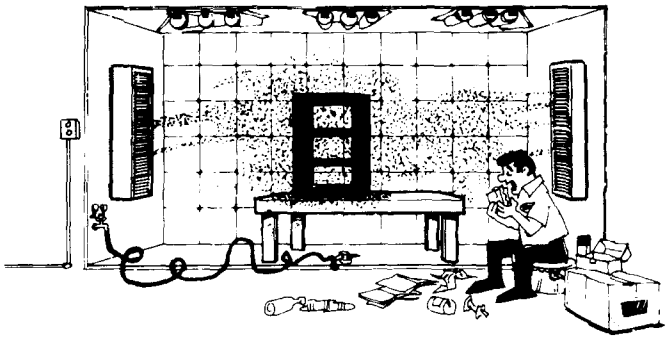
2. Receptacles for waste food are to be covered and kept in a clean and sanitary condition.

3. Restrooms are to be kept in a clean and sanitary condition.

4. Separate toilet facilities must be provided for each sex. The exception to this is if only one person at a time uses a toilet room and the door can be locked.

5. One toilet and one lavatory must be provided for approximately every 15 employees.

6. Each lavatory must have hot and cold or tepid running water, hand soap, individual hand towels, or warm air blowers.



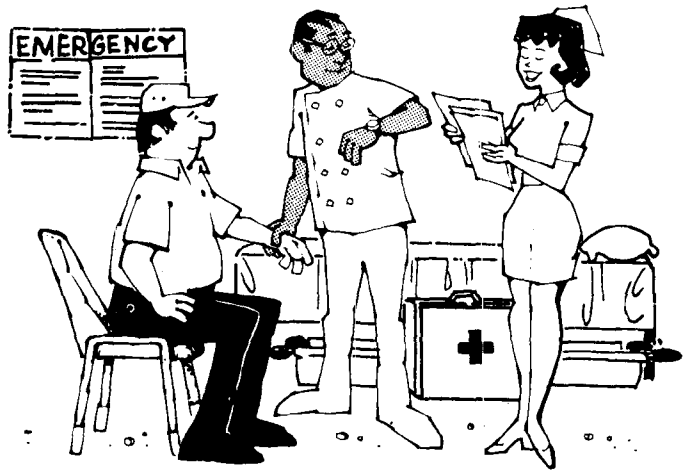
7. Beverages or food must not be stored or consumed in a toilet room or in an area exposed to materials which could be hazardous if ingested.

8. Employees working with hazardous substances should wash and remove contaminated clothing before eating, drinking, or smoking.

# MEDICAL AND FIRST AID

The employer interested in maintaining production, preventing loss of work time, receiving efficient employee performance, and achieving good morale should adopt ways of preserving employees' health. A good practice is to require preplacement medical examinations to insure that prospective employees are physically able to do the specific work. Periodic health evaluations for hazardous jobs and early treatment of any illness or injury should also be encouraged. On matters of health, medical personnel must be readily available by phone or on-site for advice and consultation.

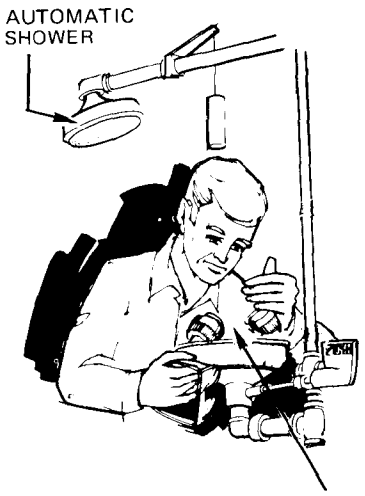
Emergency phone numbers should be posted near telephones. (See "Emergency Information Chart" on the back cover.) Stretchers and blankets should be available for prompt transportation of injured or ill employees to a hospital.




In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for treatment of injured or ill employees the following are required:

1. At least one and preferably more employees on each shift must be adequately trained to render first aid. The American Red Cross, the U. S. Bureau of Mines, some insurance carriers, local safety councils, and others with OSHA approved programs provide acceptable training.

## MEDICAL AND FIRST AID (cont.)



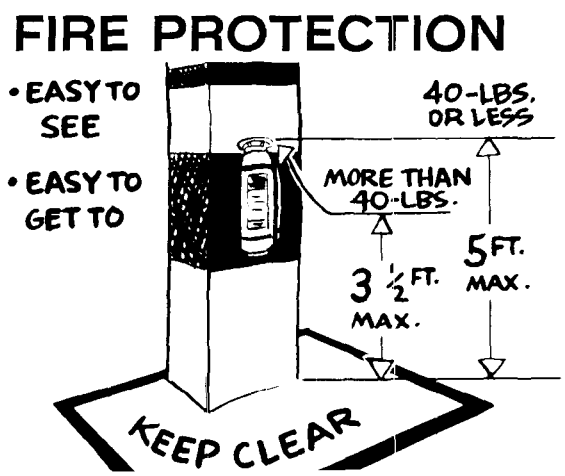

2. First aid supplies must be readily available and approved by a consulting physician. These supplies should be in sanitary containers with individually sealed packages for material such as gauze, bandages, and dressings that must be sterile. Other items often needed are adhesive tape, triangular bandages (to be used as slings), inflatable plastic splints, scissors, and mild soap for cleansing of wounds or cuts.

3. Suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area when a person may be exposed to injurious corrosive materials.

Some states have laws concerning first aid requirements including supplies (kits), training, and instructions on first aid given by the lay person. Trained employees should understand where first aid ends and treatment by a physician begins.

NOTE: First aid is immediate, temporary treatment given in the event of accident or illness — before the doctor arrives. Immediate first aid (within four minutes) may be the difference between complete recovery, permanent impairment, or death.

"Recordkeeping Requirements" toward the back of this Guide gives a discussion of records which must be maintained for occupational injuries and illnesses.




## PORTABLE FIRE EXTINGUISHERS MUST

1. Be kept fully charged and in their designated places.
2. Be located along normal paths of travel.
3. Not be obstructed or obscured from view.
4. Not be mounted higher than 5 feet (to the top of the extinguisher) if 40 pounds or less, or 3½ feet if heavier.
5. Be inspected by management or a designated employee at least monthly to insure that they
   a. Are in their designated places.
   b. Have not been tampered with or actuated.
   c. Are free of corrosion or other impairment.
6. Be inspected at least yearly and recharged or repaired to insure operability and safety. A tag must be attached to show the maintenance or recharge date and signature or initials of the person performing the service.
7. Be hydrostatically tested. The extinguisher sales representative usually will perform this service at appropriate intervals.
8. Be selected on the basis of type of hazard, degree of hazard, and area to be protected.
9. Be placed so that the maximum travel distances, unless there are extremely hazardous conditions, do not exceed 75 feet for Class A or 50 feet for Class B.

A chart showing fire extinguishers by class and how to use them is located in the back of this guide.

# FIRE PROTECTION (cont.)

## TYPES OF SPRINKLER SYSTEMS

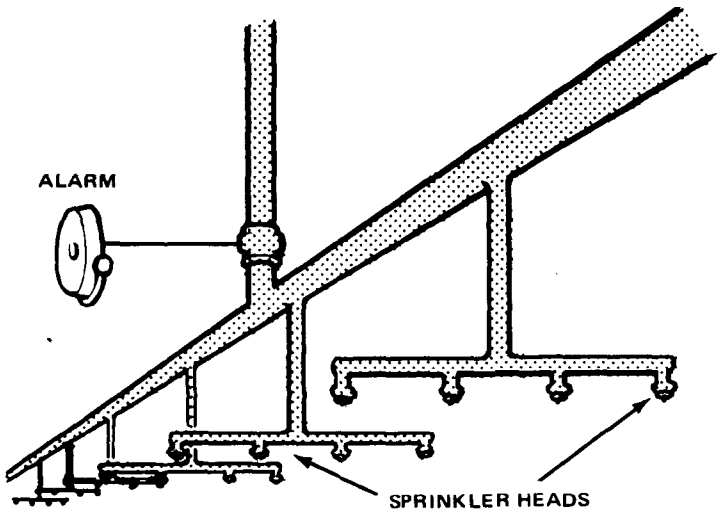
### WET-PIPE SPRINKLER SYSTEMS

The wet-pipe system is filled up to the sprinklers with water under pressure. This system discharges water immediately when heat activates the sprinklers. If parts of the system are subjected to below freezing temperatures, it is necessary to protect those portions with anti-freeze solution. The anti-freeze must be water soluble and noncombustible.

When the sprinkler system is connected to public water mains, care must be taken to use only anti-freeze solutions that are acceptable to local health authorities.

This method of maintaining a wet-pipe system in unheated areas is suitable only for small installations because of the difficulty and expense involved.

NOTE: Piping must never be closed off and drained to avoid freezing unless such action is judged safe by the fire authorities having jurisdiction in the area.



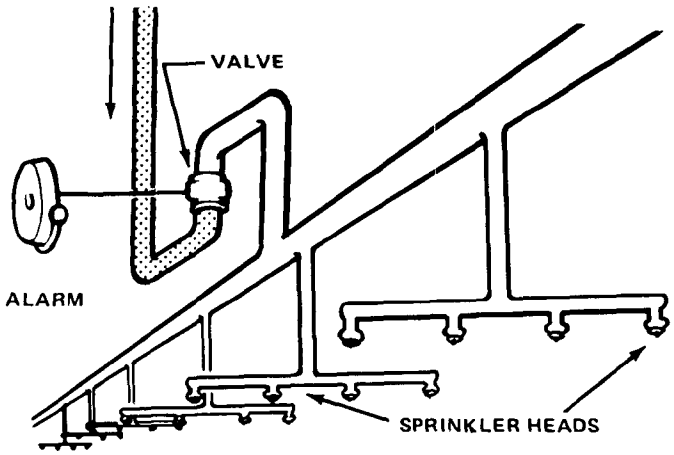
# FIRE PROTECTION (cont.)

## DRY-PIPE SYSTEMS

In areas exposed to freezing temperatures, a dry-pipe system is generally used rather than the wet-pipe and anti-freeze method. However, it is necessary that the water supply line and the dry-pipe valve be protected from freezing. Such protection is usually accomplished with a heated enclosure.

The dry-pipe system depends on compressed air in the pipes that holds back the water by exerting pressure on the dry-pipe valve. When a sprinkler opens, the air pressure drops allowing the dry-pipe valve to open and the water to flow into the system.

Though satisfactory in many cases, dry-pipe installations are unsuitable for extremely hazardous areas because the mechanics of the system allow too much time to elapse before water is discharged. This delay may be shortened by the use of quick-opening devices; however, such a system is still not adequate for protecting extremely hazardous occupancies.



# FIRE PROTECTION (cont.)

## PRE-ACTION SPRINKLER SYSTEMS

The main difference between a pre-action system and a standard dry-pipe system is that the water supply valve is opened by an independent, automatic, fire-detection system rather than by the fusing of a sprinkler. The water supply valve can be controlled manually.

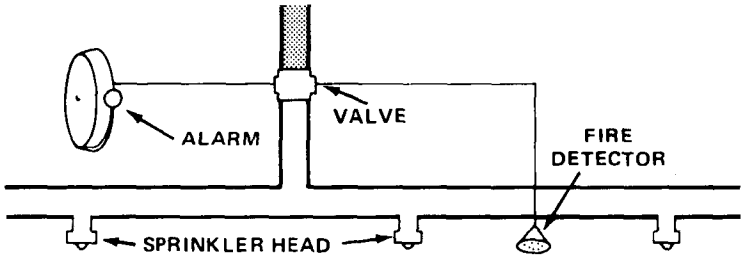
The major advantages of a pre-action system over a standard dry-pipe system are:

1. The water supply valve is opened more quickly because the independent fire detectors are usually more heat sensitive than the sprinklers.

2. The detection system also rings an alarm.

3. The water gets to the fire more quickly.

4. Since the sprinkler piping is normally dry, the pre-action system is suitable for areas subject to below-freezing temperatures.




## THE DELUGE SYSTEM

This system is designed for protection of extremely hazardous areas. The deluge system drenches an entire area by admitting water to pipes which have sprinklers that are open at all times. Deluge valves are triggered by automatic fire-detection devices located near the sprinklers. The water supply valves can also be controlled manually. Large amounts of water can be poured on a fire very rapidly with the deluge system.

## SPRINKLER ALARMS

A sprinkler alarm is designed to sound an alarm whenever there is any flow of water from a sprinkler system equal to or more than

the amount of flow from a single sprinkler.

1. Such waterflow alarms must be provided on all sprinkler installations.

2. All alarms must be located where they are accessible for inspection, removal, and repair.

3. Under conditions of variable water pressure, a retarding device must be installed. The installation must have valves that allow repair or removal without shutting off the sprinklers. The valves must be arranged so that they may be locked or sealed in the open position.

## DRY CHEMICAL SYSTEMS

Dry chemical fire protection systems must meet the design requirements of the National Fire Protection Association (NFPA No. 17-1969). Alarms or indicators of systems operations are required with thorough inspections made of the system at least annually. A report of the inspection by a competent inspector should be kept on file. Informal, visual inspections should also be made on a regular basis. These systems must be maintained in adequate operating condition at all times.

## CARBON DIOXIDE SYSTEMS

When a carbon dioxide system is discharged, an oxygen deficient atmosphere may exist. Suitable safeguards must be provided to insure prompt evacuation of and to prevent entry into such atmospheres.

At least annually, all carbon dioxide systems must be thoroughly inspected and tested for proper operation. All high pressure cylinders must be inspected twice a year. If a cylinder shows a loss of more than 10% of its net contents, it must be refilled or replaced. If a low pressure container shows a loss of 10% or more, it must be refilled unless minimum gas requirements are provided.

# COMPRESSED AIR EQUIPMENT

Employees should be familiar with the air compressor's operating and maintenance instructions.

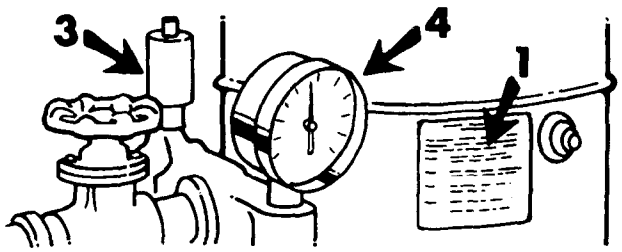
1. New air tanks must be constructed in accordance with the American Society of Mechanical Engineers (A.S.M.E.) Boiler and Pressure Vessel Code, Section VIII. The A.S.M.E. Code requires this information to be permanently stamped on the air tank.

2. The drain valve on the air tank should be opened frequently to prevent excessive accumulation of liquid.

3. Air tanks must be protected by adequate safety-relief valve(s). These valves must be tested at regular intervals to be sure they are in good operating condition.

4. The pressure controller and gauge must be maintained in good operating condition.

5. There must be no valves between the air tank and safety valve.



# MATERIALS HANDLING AND STORAGE

## POWERED INDUSTRIAL TRUCKS

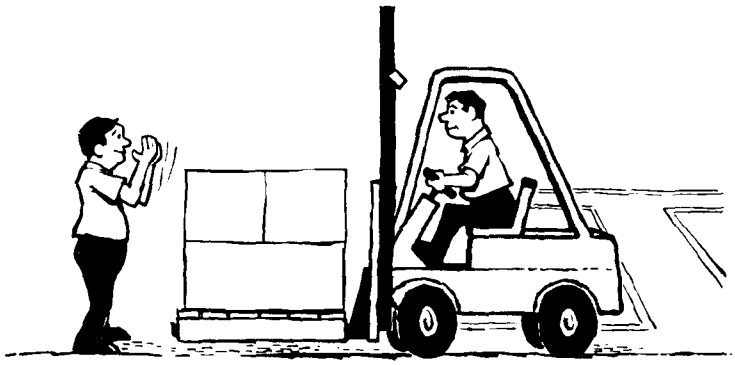
Powered industrial trucks are classified into categories for the purpose of determining what type of truck may be used in a certain location. The type of hazard in a location determines whether diesel, electric, gasoline, or LP-gas powered trucks may be used and what additional safeguards must be present.

Only approved power-operated (electric) industrial trucks designated as EX may be used in atmospheres in which combustible dust is in suspension in quantities sufficient to produce explosive or ignitable mixtures.

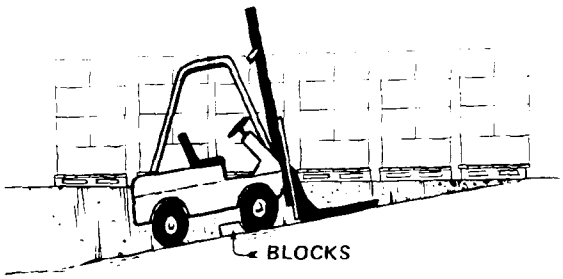
If battery-operated equipment is used, the battery charging area is to be designated with a "NO SMOKING" sign because of the hydrogen gas emitted during the charging process.

High-lift-rider trucks must be fitted with an overhead guard.

Methods must be developed and used to effectively train operators in the safe operation of powered industrial trucks, and only trained and authorized operators may operate the truck.

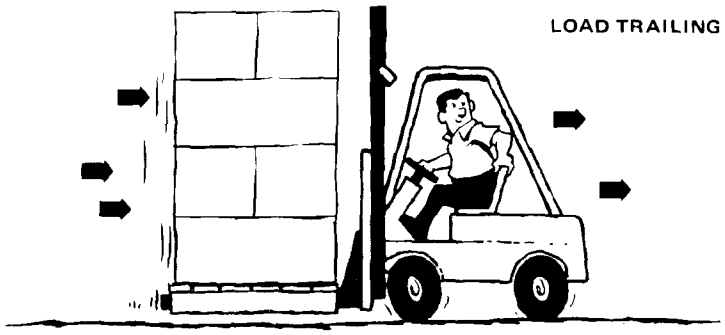


## MATERIALS HANDLING AND STORAGE (cont.)




When a powered industrial truck is left unattended (operator 25 feet or more away or truck not in view), the forks must be lowered, the control lever positioned in neutral, the power shut off, and the brakes set. The wheels must be blocked if parked on an incline.

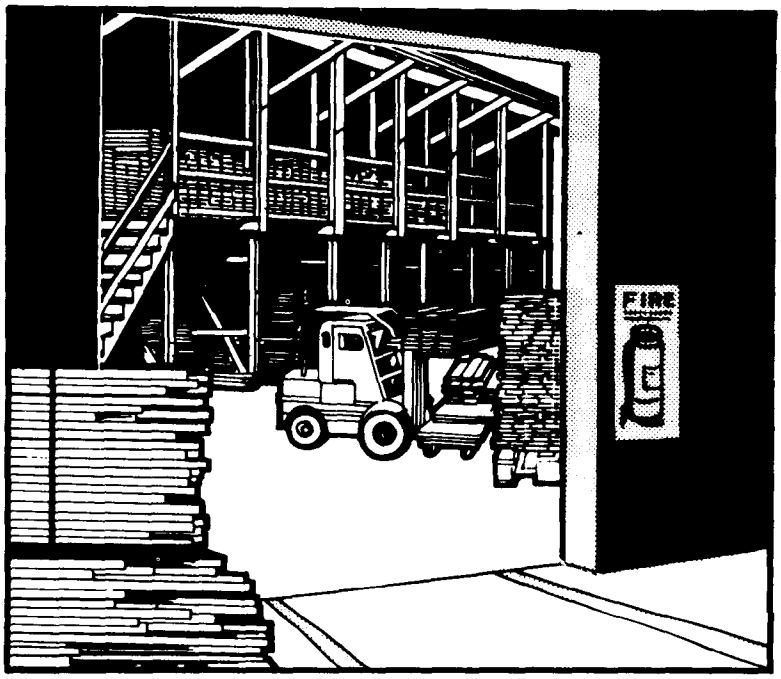
Industrial trucks must be examined daily for any conditions adversely affecting the safety of the vehicle before being placed into service. If the truck is used around the clock, it must be inspected after each shift.




If the load being carried obstructs forward view, the operator is required to travel with the load trailing.

When unloading or loading from trucks, trailers, or railroad cars with forklift trucks, provision must be made for securing the truck, trailer, or railroad car by setting the brakes and placing wheel chocks under the rear wheels. Portable dock boards must be secured in position with devices which will prevent their slipping during loading and unloading.

# MATERIALS HANDLING AND STORAGE (cont.)




## SAFE WAREHOUSING

The primary problem confronting the warehouse supervisor (or person responsible for the storage area) is maintaining a neat and orderly area for both temporary and permanent storage. Proper planning of material storage areas demands that the material not obstruct fire extinguishers, fire alarm boxes, sprinkler system controls, electric switches, lights, first aid equipment, or exits. Safe clearances must be allowed for aisles, at loading docks, through doorways, and whenever turns or passage must be made. All permanent aisles and passageways must be appropriately marked, preferably with lines on the floor. Proper drainage must be provided and clearance limits must be marked.

## HOISTS

Although the information provided in this section on hoists pertains specifically to cranes, these requirements should be applied to all hoisting equipment.

# MATERIALS HANDLING AND STORAGE (cont.)

1. The rated load must be legibly marked on each side of the hoist. Employees should be made aware of the weight of the load.

2. The hoist must be equipped with a self-setting brake, applied to the motor shaft or some part of the gear train.

3. For powered hoists, holding brakes must be applied automatically when the power is off.

4. Hooks, chains, and all functional operating mechanisms must be inspected daily for indication of damage and wear, and monthly records maintained.

5. Loads must not be carried over the heads of people.

6. The operator must test the brakes each time a near-capacity load is handled. This test is done by raising the load a few inches and applying the brakes.

7. The hoist rope or chain must be free from kinks or twists and not be wrapped around the load.

## HYDRAULIC LIFT SKID TRUCKS

A hydraulic lift truck that shows signs of leaking should be taken out of service until it can be repaired. The leaking can cause the truck to settle after the load is raised, thereby creating a hazard.

## HAND TRUCKS

Operators of hand trucks should wear gloves and safety shoes. The most frequent injuries of hands and feet may then be easily avoided. Also, hand trucks should be fitted with knuckle guards to prevent jamming the hands into obstructions.

## HANDLING HAZARDS

1. Remove all protruding nails from boxes before unpacking or carrying.

2. Keep scrap lumber clear of operating area.

3. Nest and block cylindrical objects that are stored in a horizontal position to prevent rolling.

4. Place flammable packing materials in closed metal containers to prevent fire hazards.

5. Enforce "NO SMOKING" regulations in hazardous areas.

# MACHINERY AND MACHINE GUARDING

Machines designed for fixed locations must be securely anchored to prevent "walking" or tipping. One or more methods of machine guarding must be provided to 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.

Guarding devices MUST prevent the operator from having any part of the body in the danger zone during the operating cycle. A booklet entitled **"The Principles and Techniques of Mechanical Guarding,"** OSHA 2057, can be obtained by writing to OSHA Regional Offices listed in the back of this book. Many equipment representatives can assist in obtaining the necessary protective devices.

The most common methods of guarding a hazard or hazardous machine operation are:

1. Enclosing the operation (preferred).
2. Interlocking devices.
3. Moving barriers.
4. Removal devices.
5. Remote control.
6. Two-hand tripping devices.
7. Electronic safety devices.

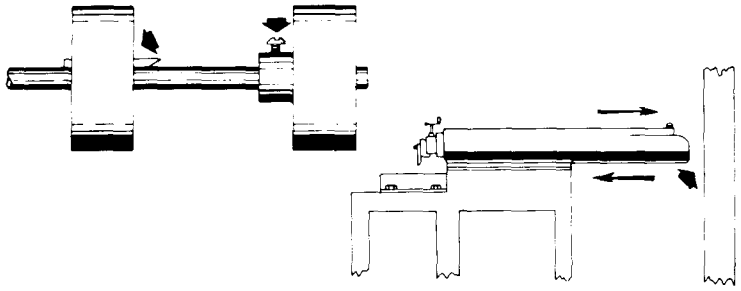
The following are examples of specific equipment that must be guarded. This listing is not intended to include all equipment that may require guarding.

# MACHINERY AND MACHINE GUARDING (cont.)

## ROTATING AND RECIPROCATING MOTION

Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, rotating bar stock, lead screws, and horizontal or vertical shafting are typical examples of common rotating mechanisms which are hazardous. The danger increases when bolts, oil cups, nicks, abrasions, and projecting keys or screw threads are exposed when rotating.

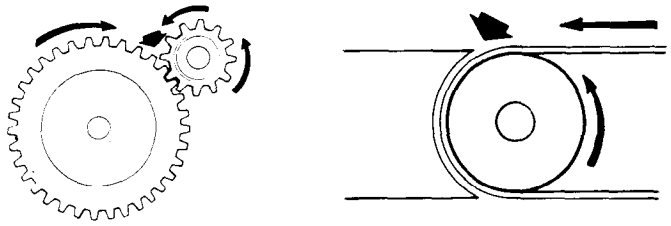
EXAMPLES OF TYPICAL ROTATING AND RECIPROCATING MECHANISMS



## IN-RUNNING NIP POINTS

In-running nip points are a special danger, existing only through action of rotating objects. Whenever machine parts rotate toward each other, or where one rotates toward a stationary object, an in-running nip point is formed. Objects or parts of the body may be drawn into this nip point and be bruised or crushed.

EXAMPLES OF IN-RUNNING NIP POINTS



# MACHINERY AND MACHINE GUARDING (cont.)

## CUTTING ACTIONS

Cutting action results when rotating, reciprocating, or transverse motion is imparted to a tool so that material being removed is in the form of chips. The danger of cutting action exists at the movable cutting edge of the machine as it approaches or comes in contact with the material being cut. Such action takes place at the point-of-operation in cutting wood, metal, or other materials as differentiated from punching, shearing, or bending by press action.

Typical examples of mechanisms involving cutting action include band and circular saws, planing or shaping machines, turning machines, boring or drilling machines, and grinding machines.

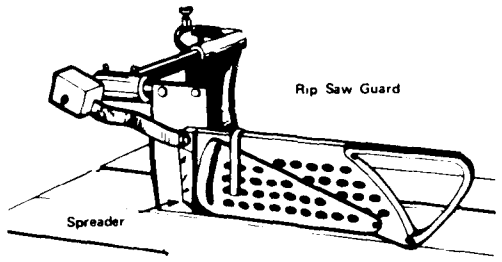
## RIP SAWS

1. Hand-fed rip saws must be provided with a hood that covers the saw at all times, to the depth of the teeth.

2. The hood must adjust itself automatically to the thickness of, and remain in contact with, the material being cut.

3. A spreader and non-kickback device must be provided.

4. The exposed part of the saw underneath the table must be guarded.




## TABLE SAWS

1. Table saws must be provided with a hood that covers the saw blade at all times.

# MACHINERY AND MACHINE GUARDING (cont.)

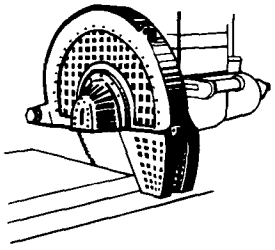
2. Many times for rabbeting and dadoing, the standard hood guard may be impractical. In this case, an effective guarding procedure can be utilized by the use of a jig to hold the work, thereby keeping the hands away from the blade.

3. Table saws do not have to be equipped with a non-kickback device unless used as a rip saw. A spreader is recommended.

4. The exposed part of the saw underneath the table must be guarded.

## SWING CUTOFF SAWS AND SLIDING CUTOFF SAWS MOUNTED ABOVE THE TABLE

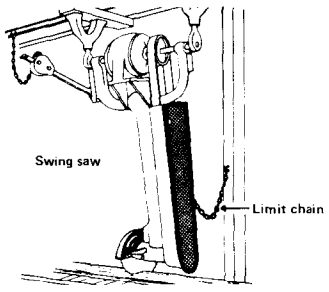
1. There must be a hood completely enclosing the upper half of the saw blade, the arbor end, and the point of operation at all positions of the saw. The hood must be designed to automatically cover the lower part of the blade. When the saw is returned to the back of the table, the hood must rise on top of the fence. When moved forward, hood must drop and remain in contact with top of table or material being cut.



Swing sawhood

2. An effective device to return the saw automatically to the back of the table when released is necessary.

3. Limit chains or other equally effective devices are necessary to prevent the saw from swinging beyond the front or back edges of table or beyond a forward position where the gullets of the lowest saw teeth will rise above the table top.




(Inverted swing cutoff saws require a hood that covers the portion of the saw protruding above the table or above the material being cut. It must automatically adjust to the thickness of, and remain in contact with, the material being cut.)

# MACHINERY AND MACHINE GUARDING (cont.)

## RADIAL SAWS

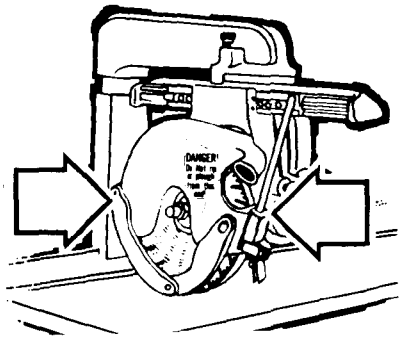
1. A hood must enclose top portion of blade down to include end of the saw arbor. The sides of the lower exposed portion of the blade must be guarded to the full diameter of the blade by a device that automatically adjusts to the thickness of the stock being cut, maintaining maximum protection betwen blade and operator.

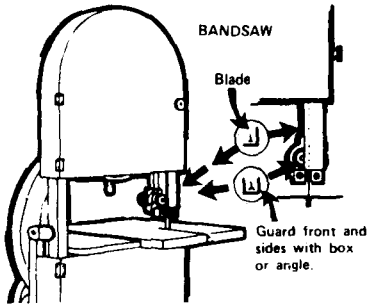
2. (If used for ripping) Non-kickback dogs on both sides of saw designed to provide adequate holding power for all thickness of material being cut are required.

3. There must be an adjustable stop, limiting forward travel of the blade beyond distance necessary to complete cut in repetitive operations.

4. The head must automatically return to starting position.

5. Marking on hood must show the direction of saw rotation and a label reading "DANGER. DO NOT RIP OR PLOUGH FROM THIS END." Label should be colored standard danger red.






## BANDSAWS AND BAND RESAWS

1. All parts of saw blade must be enclosed except for the working portion of blade.

2. Wheels must be enclosed.

3. A tension control device must be used.

4. There must be suitable guard on in-running feed rolls of band resaws.

# MACHINERY AND MACHINE GUARDING (cont.)

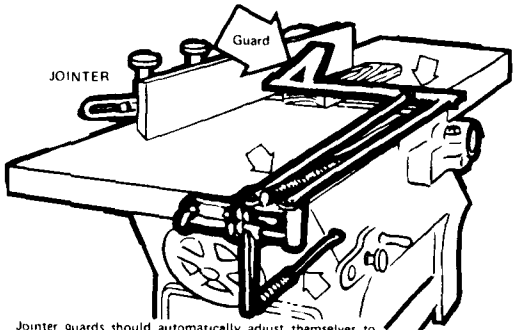
## JOINTERS

1. Where process is hand-fed with horizontal head, there must be a cylindrical cutting head with knife projecting no more than 1/8 inch beyond cylinder.

2. Clearance between rear table and cutter head must be 1/8 inch maximum. Table throat opening (when tables are set with each other for zero cut) must be 2½ inches maximum.

3. For a horizontal head, there must be an automatic guard covering the head on the working side of the fence or gauge, and a guard covering the head in back of the fence or gauge.

4. For a vertical head, there must be an exhaust hood or other guard completely enclosing the revolving head except for a slot of width necessary to perform the work.




Jointer guards should automatically adjust themselves to cover all sections of the head on the working side of the fence or gage and should remain in contact with the material at all times. The section of the cutting head back of the fence or gage should also be guarded.

## TENONING MACHINES

1. Feed chains and sprockets of all double end tenoning machines must be enclosed except for the portion necessary to convey stock.

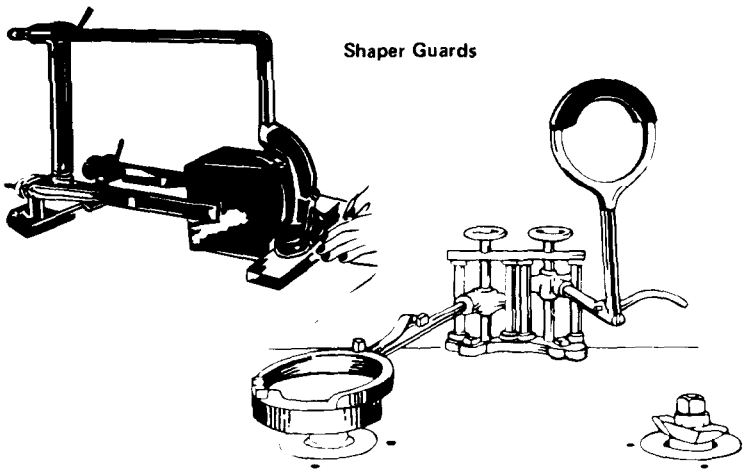
2. Unused part of all cutting heads and saws must be covered by metal guards (1/16-inch minimum sheet metal or 3/16-inch minimum cast iron). If an exhaust system is used, the guard must form all or part of the hood and it must be constructed with metal as thick as specified above.

# MACHINERY AND MACHINE GUARDING (cont.)

## BORING AND MORTISING MACHINES

1. There must be safety bit chucks with no projecting setscrews.

2. Boring bits and chuck should be completely enclosed above material being worked.



Shaper Guards

3. Top of cutting chain and riving mechanism must be enclosed.

4. Acceptable means to prevent dropping of counterweight are:

a. Bolt through both bar and counterweight.

b. Bolt through extreme end of bar.

c. Safety chain attached if counterweight does not encircle bar.

d. Counterweight suspended by chain or wire rope, must travel in pipe or other enclosure.

5. Universal joints on spindles of boring machines must be completely enclosed.

6. Foot treadle must be protected from accidental tripping by inverted U-shaped metal guard.

## WOOD SHAPERS AND SIMILAR EQUIPMENT

1. Cutting heads enclosed with cage or adjustable guard must be of a diameter at least as great as the diameter of the cutter.

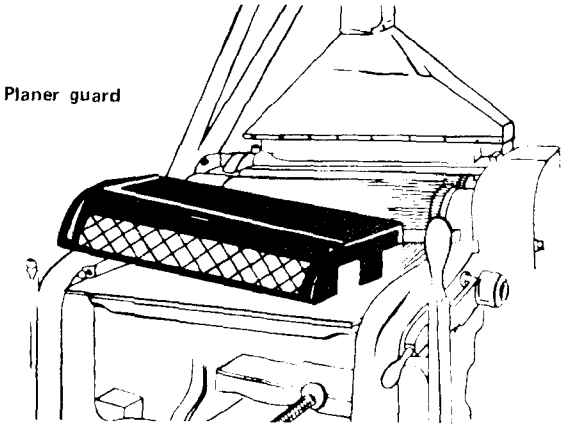
## MACHINERY AND MACHINE GUARDING (cont.)

Warning devices of leather or other material attached to the spindle are not acceptable.

2. Single cutter knives in shaper heads must be properly balanced.

3. Double-spindle shapers require a starting and stopping device for each spindle.

4. The tops and sides of fixed routers must be covered.



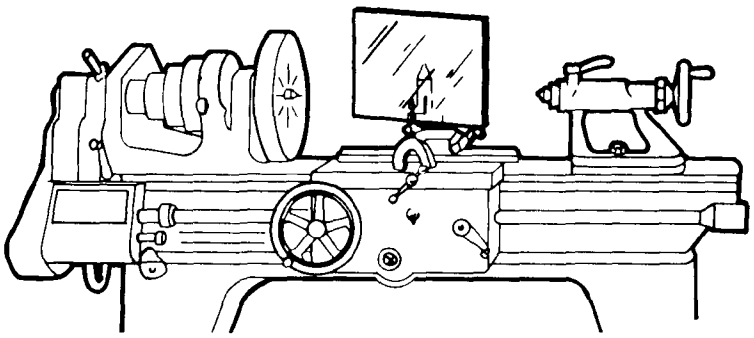

## PLANING, MOLDING, STICKING, AND MATCHING MACHINES

1. Cutting heads and saws must be guarded with metal. Minimum 1/16-inch thick if sheet metal or minimum 3/16-inch thick if cast iron.

2. Feed rolls must be guarded by a hood or suitable guard to prevent the hands of the operator from coming in contact with the in-running rolls.

3. Surfacers or planers which can accept multiple pieces of wood simultaneously must be provided with sectional infeed rolls or kickback finger devices at the infeed end.

# MACHINERY AND MACHINE GUARDING (cont.)



## LATHES

1. Wood-turning lathes: cutting heads must be covered as completely as possible by hoods or shields hinged to the machines so they can be thrown back for adjusting.

2. Shoe last and spoke lathes, doweling machines, wood heel turning machines, and other automatic wood-turning lathes of the rotating knife type, require hoods covering cutter blades excepting contact points.

3. Lathes used for turning long pieces of stock held only between the two centers must have long curved guards extending over the top of the lathe to prevent work pieces from being thrown from the lathe if they become loose.

## SANDING MACHINES

1. Self-feed sanding machines require a semicylindrical guard to protect operator's hands from the in-running rolls. The guard must be of heavy material well secured to the frame carrying the rolls so as to stay in adjustment for any thickness of stock. The bottom of the guard should come down to within 3/8-inch of contact face of the feed roll where it touches the stock.

2. Drum sanders require an exhaust hood (or other guard if no exhaust system is necessary). The guard must enclose the revolving drum, except portion of drum above the table.

## MACHINERY AND MACHINE GUARDING (cont.)

3. Disc sanders require enclosed disc, except for the portion of the disc above the table.

4. Belt sanders require guards at each nip point where the sanding belt runs onto a pulley. The unused part of the sanding belt must be guarded against accidental contact.

Drum Sander

## GRINDERS

1. Safety guards must cover the spindle end, nut, and flange projections of all wheels.

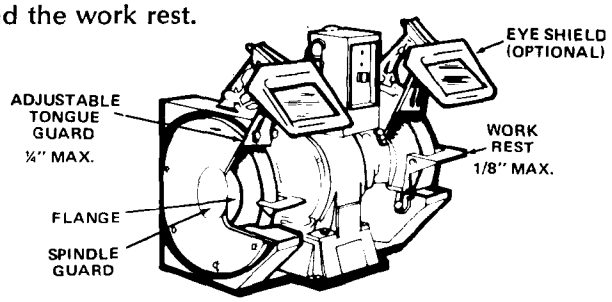
The exposed area of the grinding wheel and sides for the safety guards should not exceed more than one-fourth of the entire wheel.

When the guard opening is measured, the visors or other accessory equipment are not included as a part of the guard unless this accessory equipment is as strong as the guard.

2. Work or tool rests must be of strong construction and designed to be adjustable to compensate for wheel wear. Work rests must be closely adjusted to the wheel, with a maximum clearance

## MACHINERY AND MACHINE GUARDING (cont.)

of 1/8-inch, to prevent the work from becoming jammed between the wheel and the work rest.




3. Exposure adjustment or tongue guards must be constructed so that the tongue guard can be adjusted to the constantly decreasing diameter of the wheel. The distance between the tongue guard and the wheel must never be more than ¼-inch.

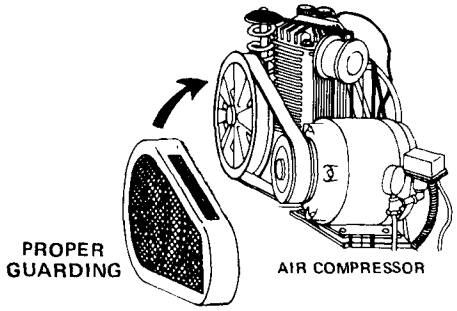
4. Goggles or a face shield must be worn by the operator.

### FANS

If fans are located within seven feet of the floor, they must be guarded with grille or mesh, limiting openings to not more than ½-inch.

### AIR COMPRESSORS

Air compressors must have their flywheel and drive pulley fully enclosed.



# HAND AND PORTABLE POWERED TOOLS

The following is a partial list of regulations governing use of hand tools.

1. Each employer is responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

2. Hammers with broken or cracked handles, chisels and punches with mushroomed heads, or bent or broken wrenches should not be used.

3. Most hand-held powered tools must be equipped with a dead-man control so that the power is automatically shut off whenever the operator releases the control.

4. Portable circular saws and portable grinders must be equipped with guards above and below the base plate or shoe. The lower guard must retract when the blade is in use and automatically return when the tool is withdrawn from the work.

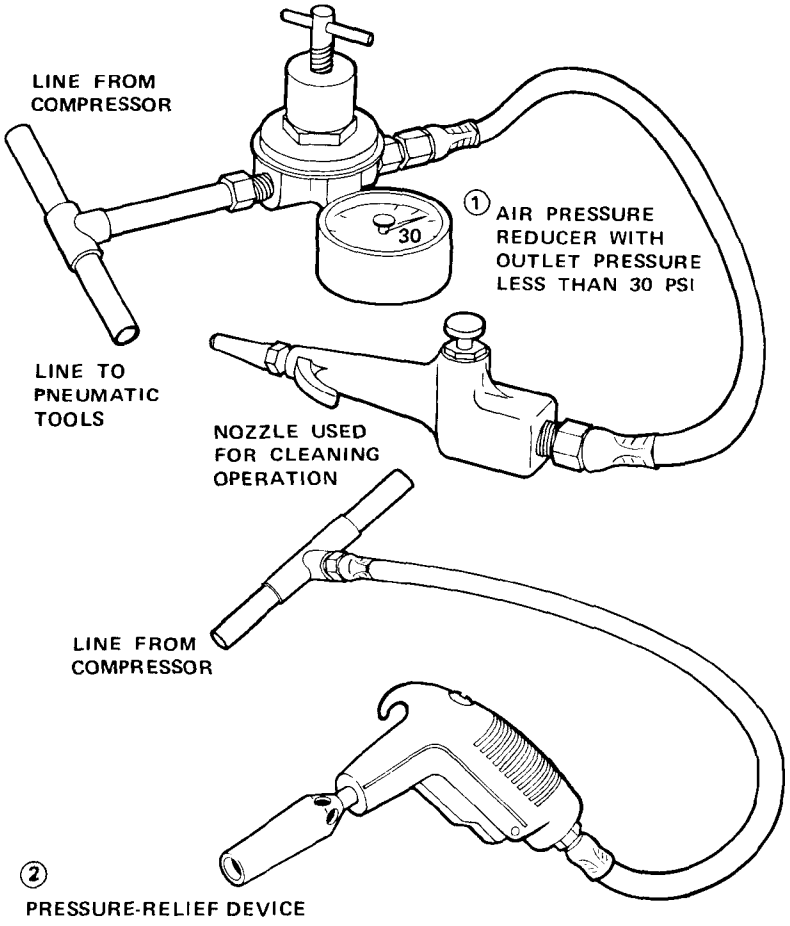
5. All hand-held portable electrical equipment must have its frame grounded or be double insulated and identified as such.

Beware of compressed air, it can be dangerous. Alternate methods of cleaning surfaces should be sought. Compressed air

# HAND AND PORTABLE POWERED TOOLS (cont.)

should never be used to blow debris from a person. Compressed air may be used if no alternate method of cleaning surfaces is acceptable. The downstream pressure of compressed air must remain at a pressure level below 30 psi whenever the nozzle is dead ended and then only when effective chip guarding and personal protective equipment are used.

Two acceptable methods of meeting the "below 30 psi" requirement are illustrated below.



# THE NATIONAL ELECTRICAL CODE (NEC)

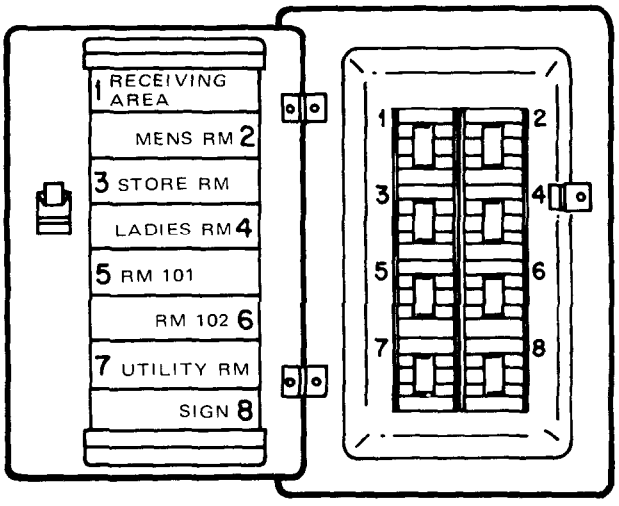
## ELECTRICAL REQUIREMENTS

More fires are caused by electrical malfunction than any other cause, and standards pertaining to electrical equipment and use in all industries have been cited as violations more frequently than any others.

The National Electrical Code, NFPA 70-1971; ANSI C1-1971 has been adopted as a national consensus standard by OSHA. (Refer to "Information Sources.") The purpose of the NEC is the practical safeguarding of any persons and of buildings and their contents from hazards arising from the use of electricity. The code contains basic minimum provisions considered necessary for safety. The electrician should be familiar with these requirements.

## IT IS REQUIRED THAT:

1. Each disconnecting means for motors and appliances must be legibly marked to indicate its purpose unless its purpose is evident.




**Proper labeling of circuit breakers.**

## THE NATIONAL ELECTRICAL CODE (NEC) (cont.)

2. Frames of electrical motors, regardless of voltage, must be grounded.

3. Exposed noncurrent-carrying metal parts of fixed equipment that may become energized under abnormal conditions must be grounded under any of the following circumstances:

a. In wet or damp locations.

b. If in electrical contact with metal.

c. If operated in excess of 150 volts to ground.

d. When in a hazardous location.

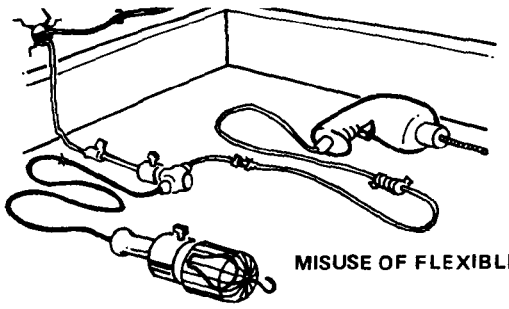
4. Exposed noncurrent-carrying metal parts of the following plug-connected equipment which are liable to become energized, must be grounded or double insulated and distinctly marked.

a. Portable hand-held motor-operated tools.

b. Appliances.

c. Any equipment operated in excess of 150 volts to ground.

5. Outlets, switches, junction boxes, etc., must be covered.



MISUSE OF FLEXIBLE CORDS

6. Flexible cords may not be:

a. Used as a substitute for fixed wiring.

b. Run through holes in walls, ceilings, or floors.

## THE NATIONAL ELECTRICAL CODE (NEC) (cont.)

c. Run through doors, windows, etc.

d. Attached to building surfaces.

7. Flexible cord must be fastened so that there is no pull on joints or terminal screws. It must be replaced when frayed or when the insulation has deteriorated.

8. All splices in flexible cord must be executed by brazing, welding, or soldering, or by joining the conductors with suitable splicing devices. Any splices, joints, and the free ends of conductors must be properly insulated.

# RECORDKEEPING REQUIREMENTS

Recordkeeping requirements under OSHA compile factual information about accidents that have happened. These records provide employers with a measure for evaluating the success of their safety and health activities and of identifying high risk areas of their businesses to which attention should be directed. Employers must report within 48 hours to OSHA (or a state agency in states which have operational safety and health plans) any incident or accident which results in hospitalization of five or more employees or a fatality.

Federal regulations require that employers with 11 or more employees at any time during the preceding calendar year are required to complete OSHA Forms 100, 101 (or equivalent), and 102. The following cases must be recorded on the OSHA Form 100 (Log of Occupational Injuries and Illnesses): every death, every illness, and any injury which results in loss of consciousness, loss of time, restriction of work or motion, temporary or permanent transfer to another job, or medical treatment other than first aid. Illnesses and injuries are classified as to lost workdays, restriction of duties or "light duty," and no lost time.

A supplementary record must be completed for each recordable case. OSHA Form 101 may be used; a state workers' compensation report or other form is acceptable if it contains the equivalent information as the OSHA 101. Forms 100 and 101 must be kept current to within six days.

An annual summary, OSHA Form 102 must be posted for the entire month of February in a place where all employees are likely to see it. All of these forms (100, 101, and 102) must be retained for five years, excluding the current calendar year.

A booklet "Recordkeeping Requirements Under the Williams-Steiger Occupational Safety and Health Act of 1970" which provides a supply of forms and more detailed information is available from OSHA regional or area offices or from the regional offices of the Bureau of Labor Statistics.

Employers are also required to maintain accurate records of certain potentially toxic or harmful physical agents which must be

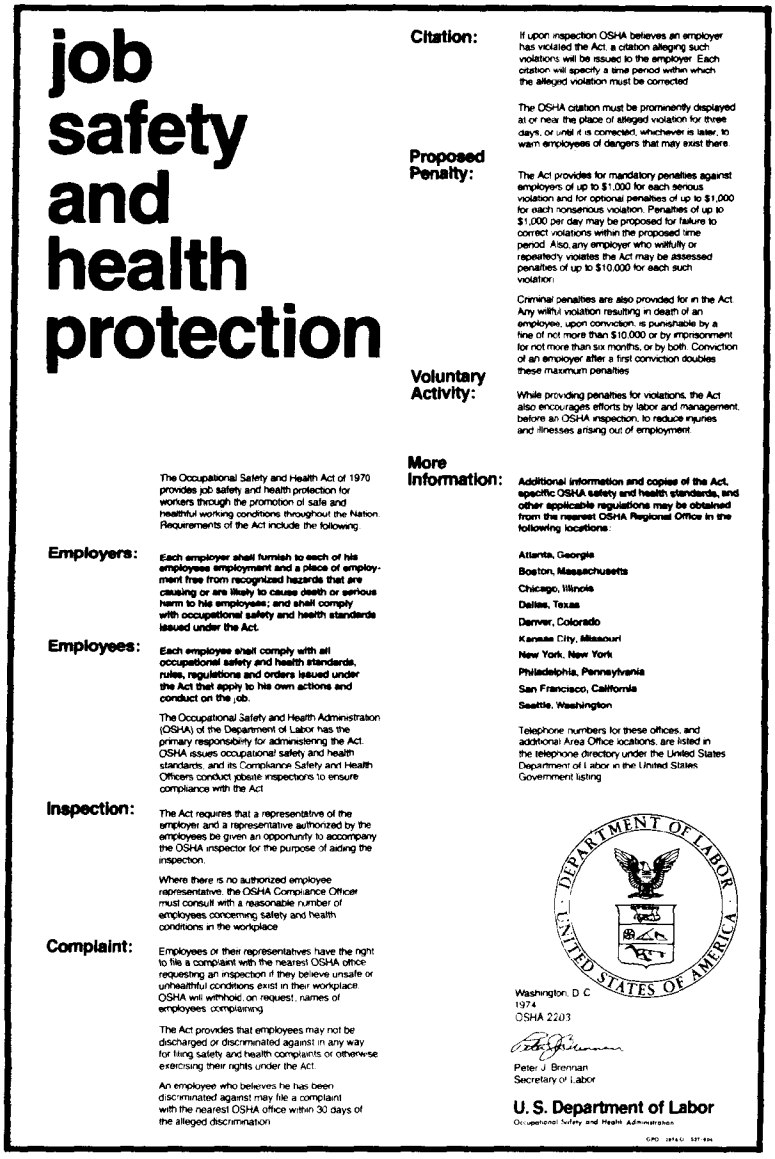
## RECORDKEEPING REQUIREMENTS (cont.)

monitored or measured and to promptly advise employees of any excessive exposure and the corrective action taken. In certain cases, physical examinations and testing are required. Examples of these agents are asbestos, ionizing radiation, etc. Any OSHA office can supply a list of these hazardous substances and explain what records may be required.

# FREQUENTLY VIOLATED REGULATIONS

## RECORDKEEPING REQUIREMENTS (cont.)

Employers MUST post one of the full size versions (10x16) of this type of OSHA poster or a state-approved poster where required.



# job safety and health protection

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers through the promotion of safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

**Employers:** **Each employer shall furnish to each of his employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to his employees; and shall comply with occupational safety and health standards issued under the Act.**

**Employees:** **Each employee shall comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to his own actions and conduct on the job.**

The Occupational Safety and Health Administration (OSHA) of the Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to ensure compliance with the Act.

**Inspection:** The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

**Complaint:** Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or otherwise exercising their rights under the Act.

An employee who believes he has been discriminated against may file a complaint with the nearest OSHA office within 30 days of the alleged discrimination.

**Citation:** If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

**Proposed Penalty:** The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000 or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

**Voluntary Activity:** While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce injuries and illnesses arising out of employment.

**More Information:** **Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from the nearest OSHA Regional Office in the following locations:**

**Atlanta, Georgia**
**Boston, Massachusetts**
**Chicago, Illinois**
**Dallas, Texas**
**Denver, Colorado**
**Kansas City, Missouri**
**New York, New York**
**Philadelphia, Pennsylvania**
**San Francisco, California**
**Seattle, Washington**

Telephone numbers for these offices, and additional Area Office locations, are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

DEPARTMENT OF LABOR · UNITED STATES OF AMERICA

Washington, D.C.
1974
OSHA 2203

Peter J. Brennan
Secretary of Labor

**U.S. Department of Labor**
Occupational Safety and Health Administration

# CHECKLISTS

Since safe conditions depend on vigilance for possible hazards and immediate remedial action, periodic inspection is one of the most important aspects of a successful safety and health program.

Management will find a checklist, such as the one presented on the following pages, helpful in performing a self-inspection of its facility. Because businesses vary, it is best that each business develop a customized list from the information in this booklet and a walk-through inspection.

Using this checklist, the manager, supervsior, or employee representative should make periodic inspections (preferably at least once each month) to identify problem areas so that corrective action may be taken.

Reference made in the CHECKLIST subtitles refers to appropriate sections of "General Industry Standards, Title 29 — Code of Federal Regulations — Part 1910."

# WALKING AND WORKING SURFACES

## AISLES AND FLOOR (29 CFR 1910.22)

| | Yes | No |
|---|---|---|
| Are all places of employment kept clean and orderly? | ☐ | ☐ |
| Are floors, aisles, and passageways kept clean and dry and all spills cleaned up immediately? | ☐ | ☐ |
| Are floor holes, such as drains, covered? | ☐ | ☐ |
| Are permanent aisles appropriately marked? | ☐ | ☐ |
| Are wet surface areas covered with non-slip materials? | ☐ | ☐ |

## STORAGE LOFTS, SECOND FLOORS, ETC. (29 CFR 1910.22, .23)

| | | |
|---|---|---|
| Are signs showing floor load capacity present? | ☐ | ☐ |
| Are platforms, storage lofts, balconies, etc. that are more than four feet above the floor protected with standard guardrails? | ☐ | ☐ |
| Are all platforms, lofts, and balconies (where people or machinery could be exposed to falling objects) guarded with standard four-inch toe-boards? | ☐ | ☐ |

## STAIRS (29 CFR 1910.24)

| | | |
|---|---|---|
| Are there standard stair rails or handrails on all stairways having four or more risers? | ☐ | ☐ |
| Are all stairways at least 22 inches wide? | ☐ | ☐ |
| Do stairs have at least a 7 foot overhead clearance? | ☐ | ☐ |
| Do stairs angle no more than 50° and no less than 30°? | ☐ | ☐ |

## LADDERS (29 CFR 1910.25, .26, .27)

| | Yes | No |
|---|---|---|
| Have defective ladders (e.g., broken rungs, side rails, etc.) been tagged as "DANGEROUS, DO NOT USE" and removed from service for repair or destruction? | ☐ | ☐ |
| Is it prohibited to use the top of an ordinary step ladder as a step? | ☐ | ☐ |
| Do fixed ladders have at least 3½ feet of extension at the top of the landing? | ☐ | ☐ |
| Is the distance between the centerline of rungs on a fixed ladder and the nearest permanent object in back of the ladder at least 7 inches or more? | ☐ | ☐ |
| Do all fixed ladders have a preferred pitch of 75°-90°? | ☐ | ☐ |

## EGRESS (29 CFR 1910.36-.38)

| | | |
|---|---|---|
| Are all exits marked with an exit sign and illuminated by a reliable light source? | ☐ | ☐ |
| Is the lettering at least 6 inches high with the principal letter strokes at least ¾ of an inch wide? | ☐ | ☐ |
| Is the direction to exits, when not immediately apparent, marked with visible signs? | ☐ | ☐ |
| Are doors or other passageways, that are neither exits nor access to an exit, and located where they may be mistaken for exits, appropriately marked "NOT AN EXIT," "TO BASEMENT," "STOREROOM," etc? | ☐ | ☐ |
| Are exit doors side-hinged? | ☐ | ☐ |
| Are all doors that must be passed through to reach an exit or way to an exit, always free to access with no possibility of a person being locked inside? | ☐ | ☐ |
| Are all exit routes always kept free of obstructions? | ☐ | ☐ |

## OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (29 CFR 1910.93, .94)

| | Yes | No |
|---|---|---|
| Is management aware of the hazards caused by various chemicals used in the plant? | ☐ | ☐ |
| Is employee exposure to these chemicals kept within the acceptable levels? | ☐ | ☐ |
| Is adequate ventilation provided to minimize exposure to wood dust? | ☐ | ☐ |
| Are employees required to wear personal protective equipment (gloves, eye protection, respirators, etc.) when working with hazardous materials? | ☐ | ☐ |
| If internal combustion engines are used, is carbon monoxide kept within acceptable levels? | ☐ | ☐ |
| Is dust removed by vacuuming whenever possible, rather than by blowing or sweeping? | ☐ | ☐ |
| Is a regular clean-up procedure outlined to remove accumulated dust on rafters and other equipment? | ☐ | ☐ |

## OCCUPATIONAL NOISE EXPOSURE (29 CFR 1910.95)

| | | |
|---|---|---|
| If a noise problem is suspected, have noise levels been accurately measured? | ☐ | ☐ |
| If a noise problem exists, have plans to reduce noise levels by engineering methods been formulated (e.g., enclosure, maintenance, different methods of processing)? | ☐ | ☐ |
| If engineering controls cannot reduce the noise to safe levels: have administrative controls, such as limiting worker-exposure in a given area, been started? | ☐ | ☐ |
| Are affected employees given annual audiometric tests if necessary? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Do all employees in high-noise areas wear hearing protection? | ☐ | ☐ |
| Are annual noise surveys made to re-evaluate problem areas? | ☐ | ☐ |

# HAZARDOUS MATERIALS

## FLAMMABLE AND COMBUSTIBLE LIQUIDS (29 CFR 1910.106)

| | | |
|---|---|---|
| Are all connections on drums and combustible liquid piping vapor and liquid tight? | ☐ | ☐ |
| Are flammable liquids kept in closed containers when not in use (e.g., parts cleaning tanks, pans, etc.)? | ☐ | ☐ |
| Are all spills of flammable or combustible liquids cleaned up promptly? | ☐ | ☐ |
| Is combustible waste material (oily rags, etc.) stored in covered metal receptacles and disposed of daily? | ☐ | ☐ |
| Are bulk drums of flammable liquids grounded and bonded to containers during dispensing? | ☐ | ☐ |
| Are gasoline and other flammable liquids stored in approved containers? | ☐ | ☐ |
| Do storage rooms for flammable and combustible liquids have explosion-proof lights? | ☐ | ☐ |
| Do storage rooms for flammable and combustible liquids have mechanical or gravity ventilation (at least six air changes per hour)? | ☐ | ☐ |
| Are storage cabinets for flammable and combustible liquids labeled "FLAMMABLE — KEEP FIRE AWAY"? | ☐ | ☐ |
| Is there never more than one day's supply of paint outside of approved storage cabinets or rooms? | ☐ | ☐ |

# PAINT SPRAY OPERATIONS (29 CFR 1910.107)

| GENERAL | Yes | No |
|---|---|---|
| Are portable lamps removed during spray operations? | ☐ | ☐ |
| Do solvents used for cleaning have high flash point (not less than 100°F)? | ☐ | ☐ |
| Are fire control sprinkler heads kept clean? | ☐ | ☐ |
| Are "NO SMOKING" signs posted in the spray area, paint room, paint booth, and paint storage area? | ☐ | ☐ |
| Are the electric motors for exhaust fans placed outside booths or ducts? | ☐ | ☐ |
| Are belts and pulleys inside the booth fully enclosed? | ☐ | ☐ |
| Do ducts have access doors to allow cleaning? | ☐ | ☐ |
| At low temperatures (below 55°) is make-up air heated to at least 65°? | ☐ | ☐ |
| Is the make-up air heater located outside the spray booth? | ☐ | ☐ |
| Do all drying spaces have adequate ventilation? | ☐ | ☐ |
| Is the spray area at least 20 feet from flame, sparks, electric motors, or other ignition sources? | ☐ | ☐ |
| Is the spray area free of hot surfaces? | ☐ | ☐ |
| Is the spray area kept clean of combustible residue? | ☐ | ☐ |
| Are spray booths constructed of metal, masonry, or other substantial noncombustible material? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Are spray booth floors and baffles noncombustible and easily cleaned? | ☐ | ☐ |
| Do spray booths have explosion-proof lights or are they lighted through sealed clear panels? | ☐ | ☐ |
| Is mechanical ventilation on during spray operations? | ☐ | ☐ |
| Is infra-red drying apparatus kept out of the spray area during spraying operations? | ☐ | ☐ |
| Is the spray area completely ventilated before using the drying apparatus? | ☐ | ☐ |
| Is the electric drying apparatus properly grounded? | ☐ | ☐ |

## PERSONAL PROTECTIVE EQUIPMENT (29 CFR 1910.132-.137)

| | | |
|---|---|---|
| Is personal protective equipment provided, used, and maintained wherever it is necessary? | ☐ | ☐ |
| Is employee-owned personal protective equipment, such as gloves, protective shoes, etc., adequate, and properly maintained? | ☐ | ☐ |
| Is eye protection available where debris or flying objects could be a hazard? | ☐ | ☐ |
| Are ear plugs or muffs provided and worn when noisy conditions exist? | ☐ | ☐ |

## RESPIRATORY PROTECTION DEVICES (29 CFR 1910.134)

| | | |
|---|---|---|
| Are respirators provided and worn during dusty operations, paint spraying, etc.? | ☐ | ☐ |
| Are there written standard operating procedures for the selection and use of respirators? | ☐ | ☐ |
| Is the user instructed and trained in the proper use of respirators? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Where practicable, are respirators assigned for use by employees individually? | ☐ | ☐ |
| Are respirators cleaned and disinfected after use? | ☐ | ☐ |
| Are respirators stored in a convenient, clean, and sanitary location? | ☐ | ☐ |
| Are routinely-used respirators inspected during cleaning? | ☐ | ☐ |

## GENERAL ENVIRONMENTAL CONTROLS

### SANITATION (29 CFR 1910.141-.149)

| | | |
|---|---|---|
| Are restrooms and washrooms kept in clean and sanitary condition? | ☐ | ☐ |
| Are covered receptacles for waste food kept in clean and sanitary condition? | ☐ | ☐ |
| Is all water that is provided for drinking, washing, and cooking, suitable for drinking? | ☐ | ☐ |
| Are all outlets for water that is not suitable for drinking, clearly posted as "UNSAFE FOR DRINKING, WASHING, OR COOKING"? | ☐ | ☐ |
| Are employees prohibited from eating in areas where toxic materials are present? | ☐ | ☐ |

## MEDICAL AND FIRST AID (29 CFR 1910.151)

| | | |
|---|---|---|
| Is at least one employee on each shift currently qualified to render first aid in the absence of a nearby clinic or hospital? (Some states require first aid trained persons regardless of nearby clinics or hospitals.) | ☐ | ☐ |
| Are first aid supplies readily available, inspected and replenished? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Are first aid supplies approved by a consulting physician? | ☐ | ☐ |
| Are medical personnel readily available for advice and consultation on matters of employee health? | ☐ | ☐ |
| Is there a first aid kit easily accessible to the work area? | ☐ | ☐ |
| Are emergency phone numbers posted? | ☐ | ☐ |
| Where employees may be exposed to injurious corrosive materials, are they provided with quick-drenching and flushing facilities for immediate emergency use? | ☐ | ☐ |

## FIRE PROTECTION (29 CFR 1910.157, .159, .160)

| | | |
|---|---|---|
| Are extinguishers selected for the types of combustibles and flammables in the areas where they are to be used?<br>Class A. Ordinary combustible material fires<br>Class B: Flammable-liquid, or grease fires<br>Class C: Energized-electrical-equipment fires | ☐ | ☐ |
| Are extinguishers fully charged and in designated places? | ☐ | ☐ |
| Are extinguishers located along normal paths of travel? | ☐ | ☐ |
| Are extinguisher locations free from obstruction or blockage? | ☐ | ☐ |
| Are extinguishers properly mounted? If 40 pounds or less, the top must be below 5 feet above floor; greater than 40 pounds, the top must be below 3½ feet above floor. | ☐ | ☐ |
| Have all extinguishers been serviced, maintained, and tagged at intervals not exceeding one year? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Are all extinguishers checked (by management or designated employee) monthly to see if they are in place or if they have been discharged, etc.? | ☐ | ☐ |
| Have all extinguishers been hydrostatically tested according to schedules set for the type of extinguisher? | ☐ | ☐ |

## AUTOMATIC SPRINKLER (if applicable)

| | | |
|---|---|---|
| Is there at least one automatic water supply of adequate pressure, capacity, and reliability? | ☐ | ☐ |
| Are water-flow alarms provided on all sprinklers? | ☐ | ☐ |
| Are the sprinkler systems periodically inspected and continuously maintained? | ☐ | ☐ |
| Is the clearance between sprinkler deflectors and the top of storage at least 18 inches? | ☐ | ☐ |
| Is combustible material never piled within 36 inches of the sprinkler system for Class I storage? | ☐ | ☐ |
| Is combustible material never piled next to lights or within 18 inches of the sprinkler system for Class II and III storage? | ☐ | ☐ |

## DRY CHEMICAL SYSTEMS (if applicable)

| | | |
|---|---|---|
| Does a competent inspector make annual inspections and perform tests on all dry chemical systems? | ☐ | ☐ |
| Are the inspector's reports kept on file? | ☐ | ☐ |
| Are visual inspections regularly made? | ☐ | ☐ |
| Are all dry chemical systems continuously maintained? | ☐ | ☐ |

## COMPRESSED AIR (29 CFR 1910.169)

| | Yes | No |
|---|---|---|
| Are pulleys and belts on compressors and motors completely guarded? | ☐ | ☐ |
| Are flexible cords or plugs on electric motors periodically checked and replaced if in a deteriorated condition? | ☐ | ☐ |
| Do the relief valves operate properly? | ☐ | ☐ |
| Are air tanks drained regularly? | ☐ | ☐ |
| Is the pressure-relief device and gauge in good operating condition? | ☐ | ☐ |

## MATERIALS HANDLING AND STORAGE (29 CFR 1910.176-.181)

| | | |
|---|---|---|
| Is there safe clearance for equipment through aisles and doors? | ☐ | ☐ |
| Is stored material stable and secure? | ☐ | ☐ |
| Are storage areas free from tripping hazards? | ☐ | ☐ |
| Are only trained operators allowed to operate powered lift trucks? | ☐ | ☐ |
| Are appropriate overhead guards installed on powered lift trucks? | ☐ | ☐ |
| Is battery charging on electric units performed only in designated areas? | ☐ | ☐ |
| Are "NO SMOKING" signs posted near electric battery charging units? | ☐ | ☐ |
| On units using internal combustion engines, are the exhaust gases in the room within allowable limits for carbon monoxide? | ☐ | ☐ |
| Are dock boards (bridge plates) used when there is loading or unloading from dock to truck or dock to rail car? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Are containers of combustibles or flammables, when stacked one upon the other, always separated by dunnage sufficient to provide stability? | ☐ | ☐ |
| Are racks and platforms loaded within the limits of their capacity? | ☐ | ☐ |
| Is all storage secured against sliding or collapsing? | ☐ | ☐ |
| Are all vehicles shut off prior to loading? | ☐ | ☐ |
| Have aisles been designated and kept clear to allow unhindered passage? | ☐ | ☐ |
| If motorized equipment, such as lift trucks, is used, are aisles permanently marked, providing sufficient clearance for passage of the equipment? | ☐ | ☐ |
| Are specifications posted for maximum loads which are approved for floors (except slabs with no basements), roofs of buildings, other structures? | ☐ | ☐ |

## MACHINERY AND MACHINE GUARDING (29 CFR 1910.212)

| | | |
|---|---|---|
| Are belts, pulleys, and rotating shafts properly guarded? | ☐ | ☐ |
| Are chains, sprockets, and gears properly guarded? | ☐ | ☐ |
| Are all in-going nip points properly guarded? | ☐ | ☐ |
| Are rotating shafts that are not smooth properly guarded? | ☐ | ☐ |
| Are all rotating parts (lubrication, fittings, etc.) recessed or covered with collars? | ☐ | ☐ |
| Are all pieces of equipment with an electric motor or any electrical connection effectively grounded? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Are sprockets and belt drives within reach of platforms and passageways or less than seven feet from the floor completely enclosed? | ☐ | ☐ |
| Are fans less than seven feet above floor guarded, having openings ½ inch or less? | ☐ | ☐ |

## ABRASIVE WHEEL MACHINERY (Grinders) (29 CFR 1910.215)

| | | |
|---|---|---|
| Is the work rest used and kept adjusted to within ⅛ inch of wheel? | ☐ | ☐ |
| Is the adjustable tongue on top side of grinder used and kept adjusted to within ¼ inch of wheel? | ☐ | ☐ |
| Do side guards cover the spindle, nut, and flange, and 75% of the wheel diameter? | ☐ | ☐ |
| Are bench and pedestal grinders permanently mounted? | ☐ | ☐ |
| Are goggles or face shields always worn when grinding? | ☐ | ☐ |

## WOODWORKING EQUIPMENT (29 CFR 1910.213)

Are there proper guards on all:

| | | |
|---|---|---|
| Rip saws? | ☐ | ☐ |
| Table saws? | ☐ | ☐ |
| Radial arm saws? | ☐ | ☐ |
| Swing saws? | ☐ | ☐ |
| Miter saws? | ☐ | ☐ |
| Band saws? | ☐ | ☐ |
| Skill saws? | ☐ | ☐ |
| Jointers? | ☐ | ☐ |
| Planers? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Tenoning machines? | ☐ | ☐ |
| Disc sanders? | ☐ | ☐ |
| Belt sanders? | ☐ | ☐ |
| Drum sanders? | ☐ | ☐ |
| Shapers? | ☐ | ☐ |
| Routers? | ☐ | ☐ |
| Other specialty equipment? | ☐ | ☐ |
| Are there limit chains or stops on: | | |
| Swing saws? | ☐ | ☐ |
| Radial arm saws? | ☐ | ☐ |
| Are there devices used to automatically return the swing saw or radial saw back to its original position? | ☐ | ☐ |
| Are saws used for ripping equipped with antikick-back dogs? | ☐ | ☐ |
| Are all surfacers or planers that run stock of varying thickness equipped with yielding sectional rolls or antikickback fingers at the infeed end? | ☐ | ☐ |
| Does every machine have a master switch to keep it inoperative during repairs or adjustments? | ☐ | ☐ |
| Are there stop switches handy to each operator on machines requiring more than one operator? | ☐ | ☐ |

## HAND AND PORTABLE POWER TOOLS (29 CFR 1910.242-.244)

| | | |
|---|---|---|
| Are tools and equipment (both company and employee-owned) in good condition? | ☐ | ☐ |
| Have mushroomed heads on chisels and punches been reconditioned or replaced if necessary? | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Have broken hammer handles been replaced? | ☐ | ☐ |
| Have worn or bent wrenches been replaced? | ☐ | ☐ |
| Have deteriorated air hoses been replaced? | ☐ | ☐ |
| Are portable abrasive wheels appropriately guarded? | ☐ | ☐ |
| Have employees been made aware of the hazards caused by faulty or improperly used hand tools? | ☐ | ☐ |
| Has compressed air used for cleaning been reduced to 30 psi when dead ended? | ☐ | ☐ |
| Have employees been instructed that the use of compressed air to blow debris from clothing or body is prohibited because it can enter the body and cause serious harm? | ☐ | ☐ |

## NATIONAL ELECTRICAL CODE (29 CFR 1910 .308 & .309)

| | | |
|---|---|---|
| Have exposed wires, frayed cords, and deteriorated insulation been repaired or replaced? | ☐ | ☐ |
| Are junction boxes, outlets, switches, and fittings covered? | ☐ | ☐ |
| Is all metal fixed electrical equipment grounded? | ☐ | ☐ |
| Does all equipment connected by cord and plug have grounded connections? | ☐ | ☐ |
| Are electrical appliances such as vacuums, polishers, vending machines, etc. grounded? | ☐ | ☐ |
| Are all portable electrical hand tools grounded? (Double insulated tools are acceptable without grounding.) | ☐ | ☐ |

| | Yes | No |
|---|---|---|
| Are breaker switches identified as to their use? | ☐ | ☐ |
| Do flexible cords and cables not run through holes in wall or ceiling or through doorways or windows? | ☐ | ☐ |
| Are flexible cords and cables free from splices or taps? | ☐ | ☐ |
| Are flexible cords and cables fastened so that there is no direct pull on joints or terminal screws? | ☐ | ☐ |
| Are flexible cords and cables never substituted for fixed wiring? | ☐ | ☐ |
| Are flexible cords and cables not attached to building surfaces? | ☐ | ☐ |

## RECORDKEEPING (29 CFR 1903.2–1904.8)

| | | |
|---|---|---|
| Is employee poster (OSHA or equivalent state poster) prominently displayed? | ☐ | ☐ |
| Have occupational injuries or illnesses, except minor injuries requiring only first aid, been recorded on OSHA Form Nos. 100 and 101, or equivalent? | ☐ | ☐ |
| Has a summary of all occupational injuries and illnesses been compiled at the conclusion of each calendar year and been recorded on OSHA Form No. 102? Was it posted during the month of February? | ☐ | ☐ |
| Have all OSHA records been retained for a period of five years, excluding the current year? | ☐ | ☐ |

# INFORMATION SOURCES

## AMERICAN NATIONAL STANDADS INSTITUTE (ANSI)
**1430 Broadway, New York, N.Y. 10018**

| | | |
|---|---|---|
| ☐ | A12.1 | Floor and Wall Openings |
| ☐ | A14.1 | Portable Wood Ladders |
| ☐ | A58.1 | Minimum Design Load |
| ☐ | A64.1 | Fixed Stairs |
| ☐ | B15.1 | Mechanical Power Transmission |
| ☐ | C1 | National Electric Code |
| ☐ | Z4.1 | Sanitation in Places of Employment |
| ☐ | Z87.1 | Eye and Face Protection |

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
**470 Atlantic Avenue**
**Boston, Mass. 02210**

| | | |
|---|---|---|
| ☐ | NFPA-10-1970 | Installation of Portable Fire Extinguishers |
| ☐ | NFPA-101-1970 | Life Safety Code |
| ☐ | NFPA-13A-1971 | Sprinkler Systems, Maintenance |
| ☐ | NFPA-17-1969 | Dry Chemical Extinguishing Systems |

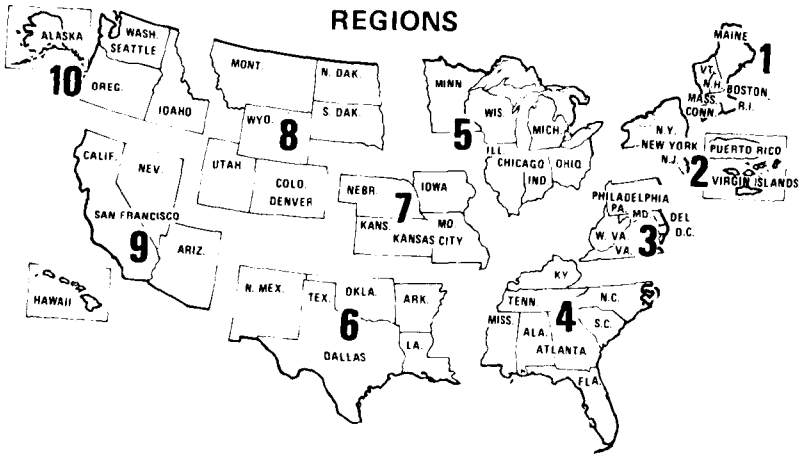
## NATIONAL SAFETY COUNCIL
**425 North Michigan Avenue**
**Chicago, Illinois 60611**

## NIOSH REGIONAL DIRECTORS
## OSHA AREA DIRECTORS

Your trade association, state and local governmental agencies, and your workmen's compensation insurance carrier can also provide you with useful information. The Small Business Administration will provide information concerning procedures for securing economic assistance for compliance with the OSHA Standards (if needed).

# NIOSH AND OSHA REGIONAL OFFICES

The following pages list NIOSH and OSHA regional offices which can provide information on the OCCUPATIONAL SAFETY AND HEALTH ACT including questions on standards interpretations, voluntary compliance information, copies of the *OSHA Standards, OSHA Act, Employee Rights Posting Notice,* and publications.




## NIOSH REGIONAL OFFICES

DHEW, Region I
Government Center (JFK Fed. Bldg.)
Boston, Massachusetts 02203
Tel.: 617/223-6668/9

DHEW, Region II — Federal Building
26 Federal Plaza
New York, New York 10007
Tel.: 212/264-2485/8

DHEW, Region III
3525 Market Street, P.O. Box 13716
Philadelphia, Pennsylvania 19101
Tel.: 215/596-6716

DHEW, Region IV
50 Seventh Street, N.E.
Atlanta, Georgia 30323
Tel.: 404/526-5474

DHEW, Region V
300 South Wacker Drive
Chicago, Illinois 60607
Tel.: 312/886-3651

DHEW, Region VI
1200 Main Tower Building, Room 1700-A
Dallas, Texas 75245
Tel.: 214/655-3081

DHEW, Region VII
601 East 12th Street
Kansas City, Missouri 64106
Tel.: 816-374-5332

DHEW, Region VIII
19th & Stout Streets
9017 Federal Building
Denver, Colorado 80202
Tel.: 303/837-3979

DHEW, Region IX
50 Fulton Street (223 FOB)
San Francisco, California 94102
Tel.: 415/556-3781

DHEW, Region X
1321 Second Avenue (Arcade Bldg.)
Seattle, Washington 98101
Tel.: 206/442-0530

## OSHA REGIONAL OFFICES

**Region I**
U.S. Department of Labor
Occupational Safety and Health Administration
JFK Building, Room 1804
Boston, Massachusetts 02203 ..... Telephone: 617/223-6712/3

**Region II**
U.S. Department of Labor
Occupational Safety and Health Administration
1515 Broadway (1 Astor Plaza), Room 3445
New York, New York 10036 ..... Telephone: 212/971-5941/2

**Region III**
U.S. Department of Labor
Occupational Safety and Health Administration
15220 Gateway Center, 3535 Market Street
Philadelphia, Pennsylvania 19104 ..... Telephone: 215/596-1201

**Region IV**
U.S. Department of Labor
Occupational Safety and Health Administration
1375 Peachtree Street, N.E., Suite 587
Atlanta, Georgia 30309 ..... Telephone: 404/526-3573/4 or 2281/2

**Region V**
U.S. Department of Labor
Occupational Safety and Health Administration
230 S. Dearborn, 32nd Floor
Chicago, Illinois 60604 ..... Telephone: 312/353-4716/7

**Region VI**
U.S. Department of Labor
Occupational Safety and Health Administration
555 Griffin Square Building, Room 602
Dallas, Texas 75202 ..... Telephone: 214/749-2477/8/9 or 2567

**Region VII**
U.S. Department of Labor
Occupational Safety and Health Administration
Federal Building, Room 3000, 911 Walnut Street
Kansas City, Missouri 64106 ..... Telephone: 816/374-5861

**Region VIII**
U.S. Department of Labor
Occupational Safety and Health Administration
Federal Building, Room 15010, 1961 Stout Street
Denver, Colorado 80202 ..... Telephone: 303/837-3883

**Region IX**
U.S. Department of Labor
Occupational Safety and Health Administration
9470 Federal Building, 450 Golden Gate Avenue
Post Office Box 36017
San Francisco, California 94102 ..... Telephone: 415/556-0584

**Region X**
U.S. Department of Labor
Occupational Safety and Health Administration
6048 Federal Office Building, 909 First Avenue
Seattle, Washington 98174 ..... Telephone: 206/442-5930



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# HOW TO LIFT SAFELY

***The following safe practices should be observed in order to avoid injury.***

**The factors that contribute to safe lifting are...**

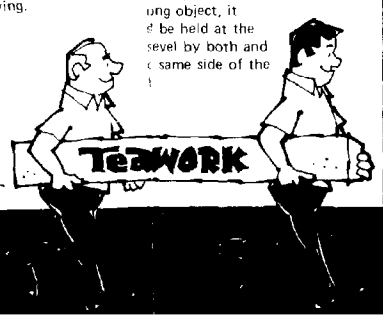



**DETERMINE IF OBJECTS CAN BE LIFTED AND CARRIED, SAFELY.**

Stack material in such a manner as to permit full view while carrying.

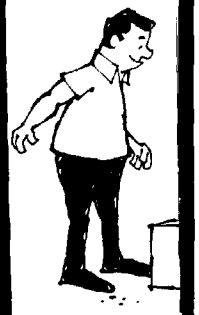
When lifting and carrying with another person, teamwork is important. The load should be equally distributed. Movements must be coordinated so you both start, finish the lift action at the same time, perform turning movements together.

If two persons carrying object, it should be held at the same level by both and on same side of the body.




1. Approach the load and size it up (weight, size and shape.) Consider your physcial ability to handle the load.

2. Place the feet close to the object to be lifted 8 to 12 inches apart for good balance.



3. Bend the knees to the degree that is comfortable and get a good handhold. Then using both leg and back muscles. . .

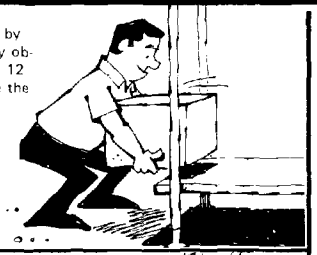
4. Lift the load straight up—smoothly and evenly. Pushing with your legs, keep load close to your body.

5. Lift the object into carrying position, making no turning or twisting movements until the lift is completed.

6. Turn your body with changes of foot position after looking over your path of travel making sure it is clear.

7. Setting the load down, is just as important as picking it up. Using leg and back muscles, comfortably lower load by bending your knees. When load is securely positioned, release your grip.

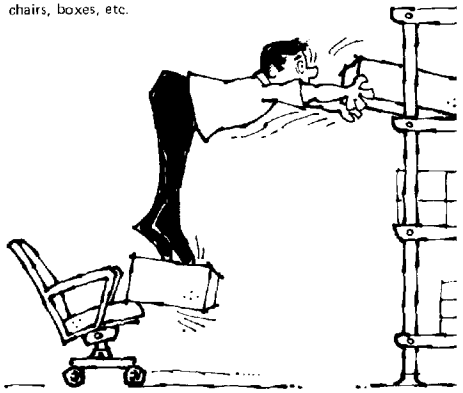
Avoid strain by storing heavy objects at least 12 inches above the floor.



Avoid awkward positions or twisting movements while lifting.

Over-reaching and stretching to reach overhead objects may result in strains or falls.

Use a ladder instead of chairs, boxes, etc.



# KIND OF FIRE

DECIDE THE CLASS OF FIRE YOU ARE FIGHTING. . .

. . .THEN CHECK THE COLUMNS TO THE RIGHT OF THAT CLASS

# APPROVED TYPE OF EXTINGUISHER

MATCH UP PROPER EXTINGUISHER WITH CLASS OF FIRE SHOWN AT LEFT

| | FOAM<br>Solution of Aluminum Sulphate and Bicarbonate of Soda | CARBON DIOXIDE<br>Carbon Dioxide Gas Under Pressure | SODA ACID<br>Bicarbonate of Soda Solution and Sulphuric Acid | PUMP TANK<br>Plain Water | GAS CARTRIDGE<br>Water Expelled by Carbon Dioxide Gas | MULTI-PURPOSE DRY CHEMICAL | ORDINARY DRY CHEMICAL |
|---|---|---|---|---|---|---|---|
| **CLASS A FIRES**<br>USE THESE EXTINGUISHERS<br>ORDINARY COMBUSTIBLES<br>• WOOD<br>• PAPER<br>• CLOTH<br>ETC. | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✗ |
| **CLASS B FIRES**<br>USE THESE EXTINGUISHERS<br>FLAMMABLE LIQUIDS, GREASE<br>• GASOLINE<br>• PAINTS<br>• OILS, ETC. | ✓ | ✓ | ✗ | ✗ | ✗ | ✓ | ✓ |
| **CLASS C FIRES**<br>USE THESE EXTINGUISHERS<br>ELECTRICAL EQUIPMENT<br>• MOTORS<br>• SWITCHES<br>ETC. | ✗ | ✓ | ✗ | ✗ | ✗ | ✓ | ✓ |

# HOW TO OPERATE

FOAM: Don't Play Stream into the Burning Liquid. Allow Foam to Fall Lightly on Fire.

CARBON DIOXIDE: Direct Discharge as Close to Fire as Possible. First at Edge of Flames and Gradually Forward and Upward

SODA-ACID, GAS CARTRIDGE: Direct Stream at Base of Flame

PUMP TANK: Place Foot on Footrest and Direct Stream at Base of Flames

DRY CHEMICAL: Direct at the Base of the Flames. In the Case of Class A Fires, Follow Up by Directing the Dry Chemicals at Remaining Material That is Burning