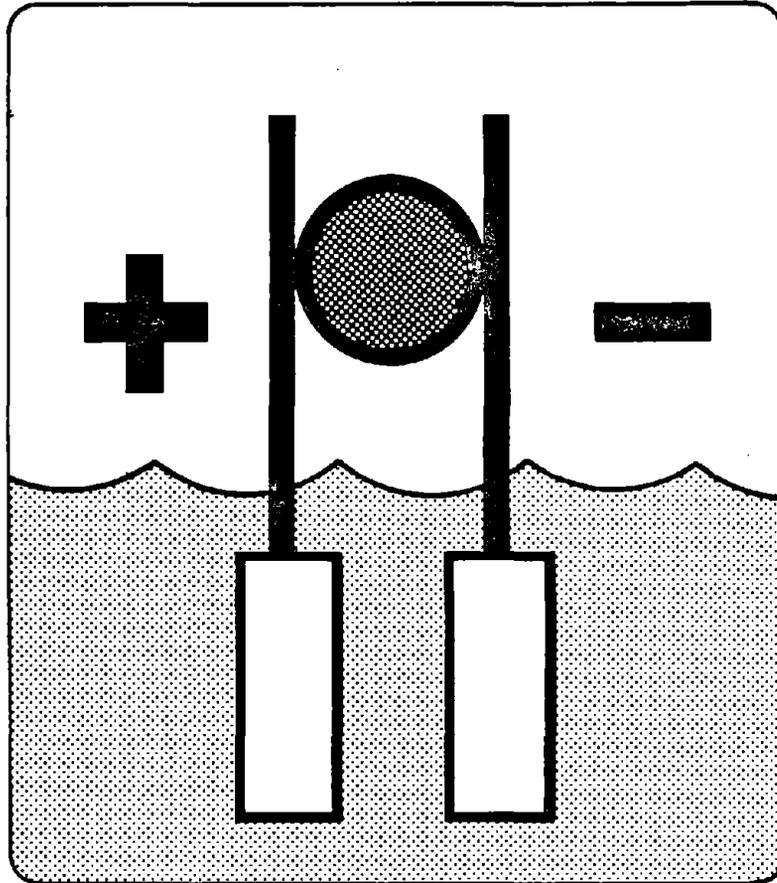


NIOSH

**HEALTH AND SAFETY GUIDE FOR
ELECTROPLATING SHOPS**



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health

NIOSH HEALTH AND SAFETY GUIDES

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Cincinnati, Ohio
April 1975**

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CONTENTS

Introduction	1
Health and Safety Guidelines	
Health and Safety Program	3
Reducing Unsafe Acts and Practices	5
Machine Guarding	6
Good Housekeeping Helps Prevent Fires	7
Hazards in the Electroplating Shop	8
Good Practices in Electroplating Shops	13
Summary of Chemical Hazards	17
Frequently Violated Regulations	
Walking and Working Surfaces	18
Fixed Ladders	19
Portable Ladders	20
Fixed Industrial Stairs	20
Standard Railing and Toeboard	22
Exits and Exit Markings	24
Occupational Health and Environmental Control	26
Personal Protective Equipment	28
General Environmental Controls	29
Medical and First Aid	31
Fire Protection	33
Materials Handling and Storage	34
Machinery and Machine Guarding	37
The National Electrical Code (NEC)	39
Recordkeeping Requirements	41
Checklists	43
Information Sources	61
Fire Extinguisher Chart	61
NIOSH and OSHA Regional Offices	62
How to Lift Safely Chart	63
Emergency Information	64

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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) under the Department of Health, Education, and Welfare (DHEW) and the Occupational Safety and Health Administration (OSHA) under 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"; it is being distributed throughout the 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", "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 are listed addresses 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.

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HEALTH AND SAFETY GUIDELINES

HEALTH AND SAFETY PROGRAM

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".

An effective method to assist in providing for a safe working environment is through a health and safety program. The purpose of such a program is to recognize, evaluate, and control hazards and potential hazards in the workplace.

Hazards may be identified by investigating accidents, reviewing injury and illness records, soliciting employee input (interviews, suggestions, and complaints), performing self-inspections, using material in this Guide and other information sources. Typical examples are unsafe walking surfaces, unguarded machinery, electrical hazards, improper lifting, air contaminants, etc. The "Checklist" in the back of this book is of particular importance in identifying hazards. It can be customized to fit the needs of the program.



Identifying hazards by reviewing injury and illness records

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HEALTH AND SAFETY GUIDELINES (cont.)

Those situations which tend to occur most frequently or to 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 the hazards that have been identified.

For more complex problems, such as those requiring engineering controls to reduce noise or airborne contamination, outside consultants may be needed.



Management leadership is necessary to ensure success

Management may want to assign safety and health responsibilities in the areas of both program development and implementation. Regular meetings or informal discussions can be held to discuss safety promotions, hazards, injury and illness records, etc. To ensure the success and progress of the program, management leadership is necessary. The person assigned responsibility, for instance the supervisor, must be delegated the authority and have management support to carry out the part of the program assigned. Likewise, everyone in the establishment should be aware of the activities of the program 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 employees will likely show interest and a desire to participate.

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HEALTH AND SAFETY GUIDELINES (cont.)

REDUCING UNSAFE ACTS AND PRACTICES

EMPLOYEE TRAINING

A 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, if 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 that employees who are 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. Instruct employees in safe-lifting practices. Such instruction may prevent many injuries. An easily understood chart, "How to Lift Safely", is included in the back of this book for posting where it may be seen by employees.

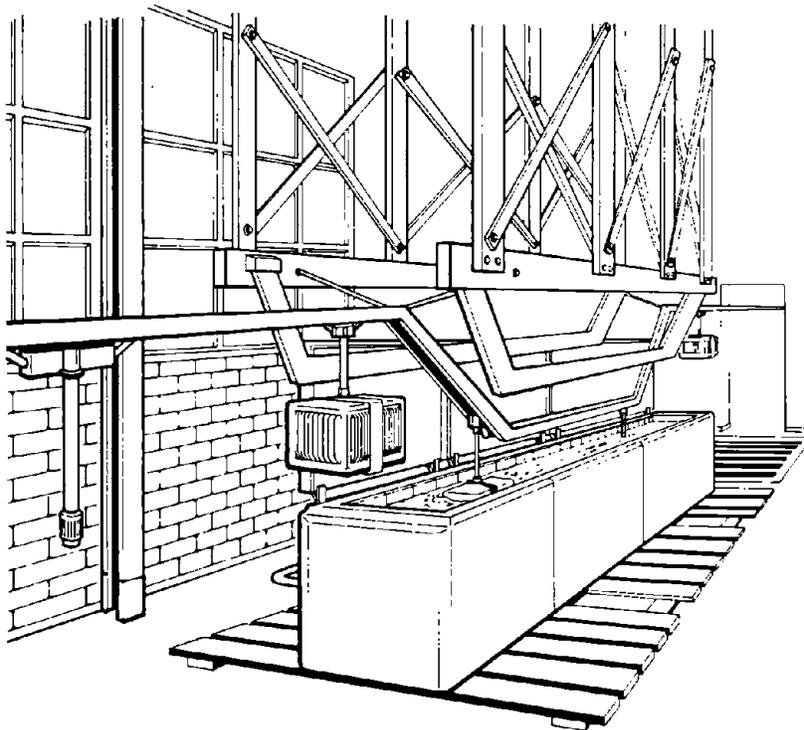
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HEALTH AND SAFETY GUIDELINES (cont.)

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. From time to time, people will react differently to the same environment because of physical, mental, or emotional changes—sometimes reacting safely, sometimes not. It follows that even the well-coordinated and highly trained individual may at times perform unsafe acts which could lead to injury and death, and therefore the safeguarding of machines is important.



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HEALTH AND SAFETY GUIDELINES (cont.)

GOOD HOUSEKEEPING HELPS PREVENT FIRES

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

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

The 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.

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HEALTH AND SAFETY GUIDELINES (cont.)

HAZARDS IN THE ELECTROPLATING SHOP

Employees of electroplating shops face many of the health and safety hazards that are common to many workplaces. In addition, electroplating operations present health and safety problems of a specialized nature which require specific procedures and controls.

The biggest problems in electroplating are occupational exposures to toxic chemicals. These hazards can be greatly reduced by compliance with OSHA requirements concerning proper ventilation and personal protective equipment as well as using recognized safe handling procedures and the appropriate hygienic practices.

It is an OSHA requirement that "All employees working in and around open surface tank operations must be instructed as to the hazards of their respective jobs, and in the personal protection and first-aid procedures applicable to these hazards". Some of the commonly found health and safety hazards in surface preparation and plating are given below.

SOLVENT EXPOSURE (VAPOR DEGREASER)

Although a properly designed and operated vapor degreaser will safely limit the exposure of employees to the solvent vapors of trichloroethylene, perchloroethylene, methyl chloroform, ethylene dichloride, etc., periodic air samples should be collected and analyzed near the degreaser to ensure that it is working properly. While most problems associated with solvents deal with skin irritation, there are other more serious potential dangers. Symptoms of over-exposure include, headache, dizziness, fatigue, nausea, and drowsiness.

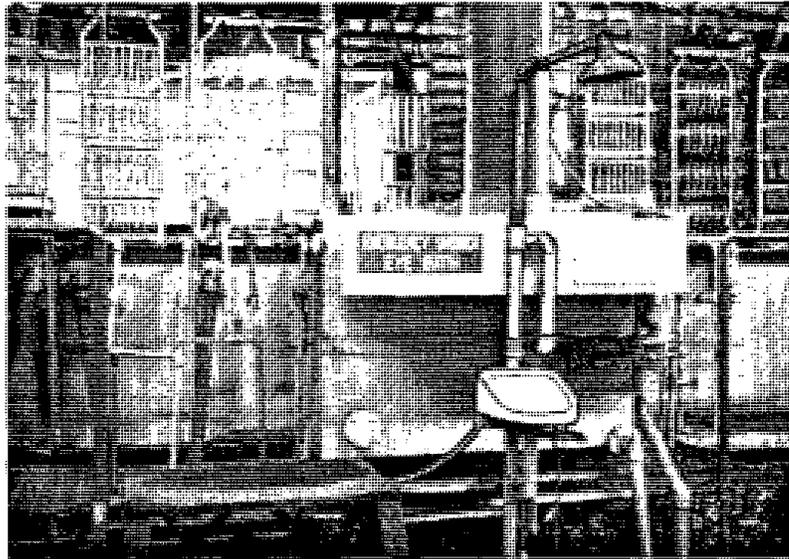
ACCIDENTAL SPLASHING OF ACIDS AND ALKALIES

Protective clothing, including rubber boots, gloves, and aprons, will prevent burns to the body from the accidental splashing of acids and alkali. Eye protection is required, especially when manually making additions to tanks. There must be an adequate supply of clean, cold water near each tank containing a liquid which may burn or irritate the skin.

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HEALTH AND SAFETY GUIDELINES (cont.)

In these situations it is preferable to have deluge showers and eye flushes close by, or, at least a water pipe (carrying a pressure not exceeding 25 pounds) must be provided, which has a quick-opening valve and at least 48 inches of hose with a diameter no smaller than $\frac{3}{4}$ inch.



Deluge showers and eye flushes are recommended where very corrosive or otherwise harmful liquids are used.

ALKALI AND ACID MISTS

When alkaline and acid solutions are heated and/or an electric current passes through them, alkaline or acid misting may occur over the tank. Since these mists can cause irritation of the skin and upper respiratory tract, local exhaust ventilation is recommended to control excessive workplace air contamination.

PLATING SOLUTIONS

In addition to the problems associated with alkaline and acid solutions, there are various hazards involved with the various plating solutions.

HEALTH AND SAFETY GUIDELINES (cont.)

PLATING SOLUTIONS (cont.)

Nickel:

The plating hazards involving nickel are few. In fact, the most common problem is "nickel itch", a rash caused by contact with nickel plating solutions. For those workers who are susceptible, protective clothing is a "must" to avoid contact with any nickel solutions.

Chrome:

1. Hazards of Chromic Acid

There are several serious hazards involved with chrome plating. There are many cases on record of workers who have developed holes inside their nose after breathing chromic acid mist on a daily basis. Early signs of this problem include nasal dryness, nose bleeds and scabbing.

The most common malady suffered by chrome platers, however, is skin inflammation (dermatitis). This usually occurs on the hands and arms of workers who come in contact with chromic acid mist or the actual plating solutions. The dermatitis is characterized by wet or dry eruptions of the skin which normally take a long time to heal. Chrome ulcers may form where breaks in the skin occur. These ulcers produce "chrome holes" and can leave unsightly scars on skin surfaces.

It is required that employees working with chromic acids have periodic medical examinations of the nose and other parts of the body to detect the first stages of ulceration.

2. Prevention of Chromic-Acid-Related Injury

Local exhaust ventilation should be employed with all chromic acid tanks. The recommended exhaust volume is 150-300 cubic feet per minute per square foot of tank surface. Exhaust ventilation controls the amount of chromic acid mist emitted into the workplace, protecting the worker's health as well as preventing the contamination of adjacent plating solutions.

An additional method of preventing mist escape is to cover the open tank with plastic beads, balls or chips. Chemical additives which tend to reduce the surface tension of the solutions are also used.

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HEALTH AND SAFETY GUIDELINES (cont.)

PLATING SOLUTIONS (cont.)

Although chemical additives help in reducing the "misting" problem over plating tanks, none are completely effective, and hence, should be used in conjunction with exhaust hoods.

Personal protection is the key to safety here as in other plating or cleaning processes. Rubber gauntlet gloves are indispensable when handling plated objects directly from the bath or when cleaning chromic acid tanks. It is also advisable to coat hands and forearms with a protective cream such as lanolin before putting on rubber gloves. For employees who spend the entire day working with the plating operation, i.e., platers, rackers, etc., rubber aprons and boots must be worn. Goggles must be worn by those workers who are exposed to any chemicals or mists that may irritate or damage the eyes. Because many workers unavoidably get their clothes contaminated with plating or cleaning solutions in the course of a day, it is advisable for workers to shower and change clothes at the end of each work shift.

Copper:

Copper plating baths are of two types—acid or alkaline. The alkaline bath is more hazardous due to the presence of cyanide salts. It is extremely important to avoid breathing the cyanide salt particles that may become airborne during the charging of tanks. Therefore, respirators may be necessary for these operations. Cyanide salts or solutions can be readily absorbed and should not be allowed to come in contact with the skin. Since cyanides, if ingested, are also extremely toxic, workers should be encouraged to practice good personal hygiene by washing frequently, especially before eating or smoking.

The formation of deadly hydrogen cyanide gas is the result of mixing acid with cyanide salts. Hydrogen cyanide can be formed in a plating tank containing cyanide salts if the work-piece was rinsed in a water tank containing traces of acid. If this happens, the cyanide tank should be exhaust ventilated or an additional rinse step should be included to further eliminate acid carryover.

HEALTH AND SAFETY GUIDELINES (cont.)

PLATING SOLUTIONS (cont.)

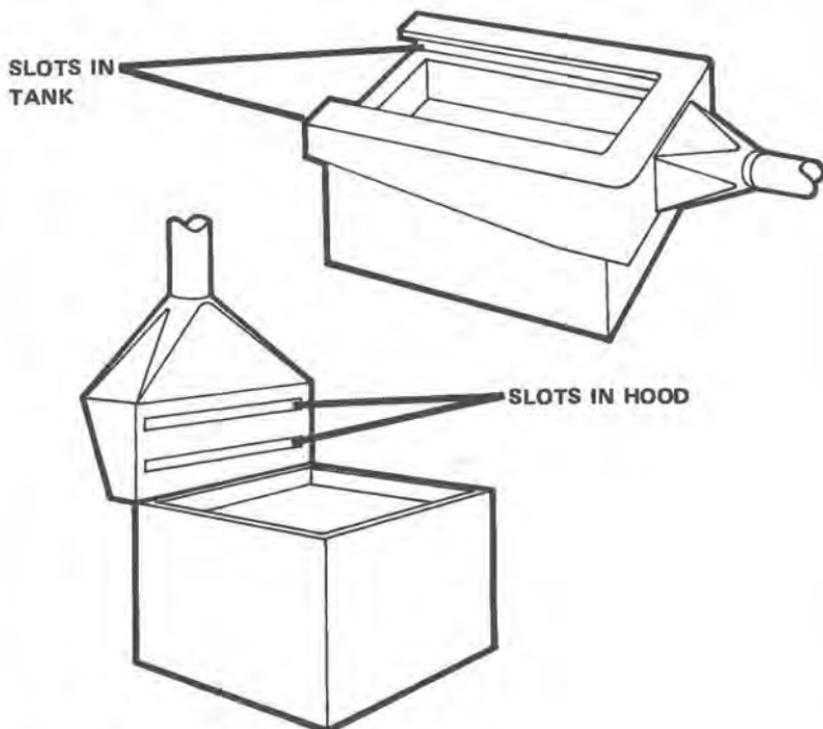
Zinc and Cadmium:

Usually cyanide baths are also used in zinc and cadmium plating. As stated before, care should be taken in the handling of the cyanide salts and solutions. Zinc and cadmium plating baths operated at room temperature and low current density will probably not require local exhaust ventilation to protect against gassing and mist production.

Others:

There are, of course, many other types of metal plating (gold, silver, lead, tin, etc.), but since most are plated from cyanide or acid baths, the potential problems will be similar to those already discussed.

Some examples of local exhaust ventilation for open surface tanks are shown below:



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HEALTH AND SAFETY GUIDELINES (cont.)

GOOD PRACTICES IN ELECTROPLATING SHOPS

POSTING OF HAZARDOUS CHEMICAL SIGNS

Toxic solutions should always be identified, as well as posting the steps to be taken should an emergency occur. Example: if splashing of chromic acid occurs, the affected area (skin, eyes, etc.) is flushed with large amounts of water.

HAZARDOUS WALKING SURFACES

Since it is difficult to maintain dry, safe walking surfaces in plating shops, elevated board platforms can be placed on the floor to allow water to drain through the boards.

Articles, such as hoses, should not be left lying around on the floor since they constitute tripping hazards.



DEGREASERS

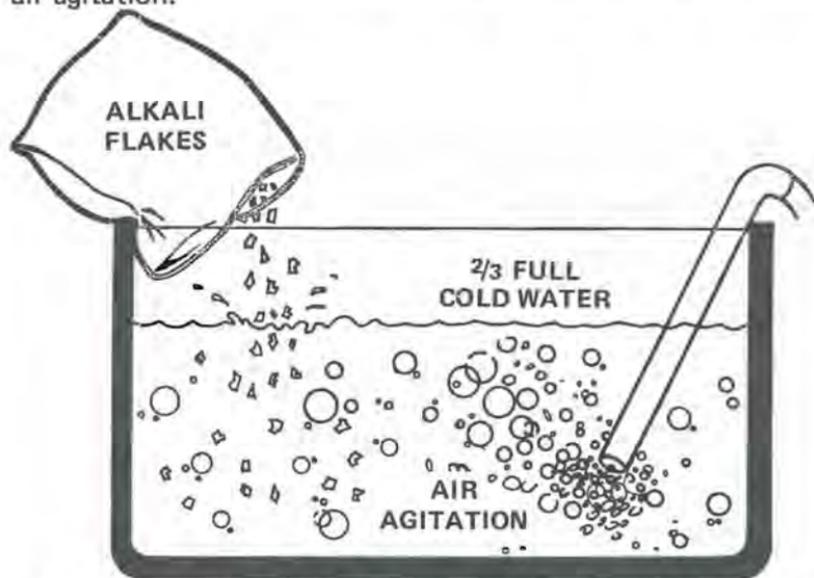
It is suggested that the manufacturer's operating and maintenance manual be followed. In addition, the following good practices are recommended:

1. Cup-shaped articles should be placed upside-down on the rack to drain.
2. To promote quick drying, items should be left in the vapor zone until condensation ceases.
3. Articles coming from the degreaser should be dry and handled with protective gloves.
4. The covers should be closed when the degreaser is not in use.
5. Extreme care is necessary during cleanout to avoid excessive solvent-vapor inhalation.
6. Where overhead hoisting is needed, the operating speed should be a maximum of 12 feet per minute.
7. Open flames in space heaters should not be located near vapor degreasers, nor should welding be done in the immediate vicinity.

RECHARGING ALKALI TANKS

Most problems stemming from the handling of alkaline cleaning solutions, such as recharging tanks, can be avoided if sufficient care is taken. A good practice for recharging tanks is:

1. Fill the tank approximately $\frac{2}{3}$ full with COLD water.
2. Add the prescribed amount of cleaner at a slow rate to the tank. Provide forced-air agitation to assure complete mixing.
3. Fill the remainder of the tank with water and continue air agitation.



The reaction of cleaner with water may cause an explosion due to large quantities of heat evolved if the water is not cold initially, or if the cleaner collects in a pile at the bottom of the tank, (because it was added too rapidly).

ALKALI HANDLING AND STORAGE

Some of the chemical properties of alkalis require that precautions be taken when handling these substances. Employees must be instructed to observe these following precautions:

1. Caustic alkali powder, flakes, or pellets are not to be

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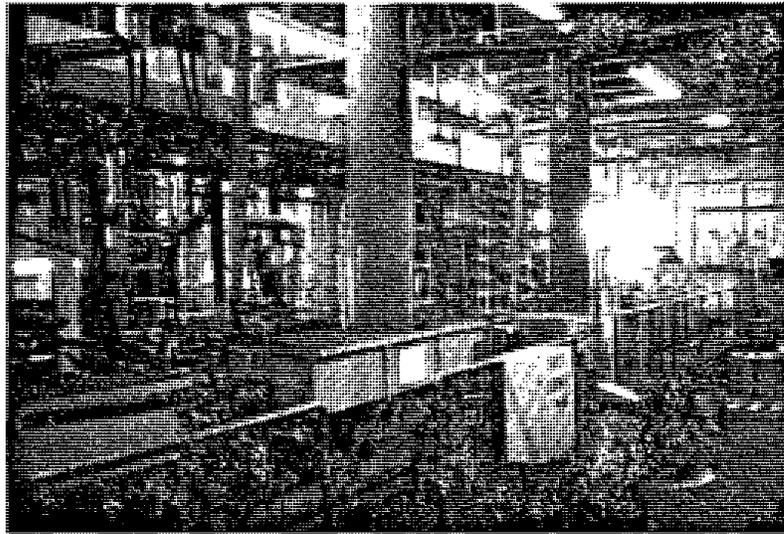
HEALTH AND SAFETY GUIDELINES (cont.)

mixed with acid solutions or stored near them since their reaction could cause an explosion.

2. Care should be taken not to breathe the dry chemicals when recharging an alkaline bath.

3. Drums that contain alkali should be tightly sealed and labeled when stored.

4. Drums containing alkali should be stored in dry areas, or on platforms if the floor is likely to become wet.



Proper exhaust ventilation must be provided on tanks containing strong acids or alkali solutions, if misting and/or gassing occurs.

RECHARGING ACID TANKS

Some acid reactions have already been mentioned, for example (1) the heat generated when acid is added to alkali, (2) when acid is added to cyanide salts, DEADLY hydrogen cyanide gas is evolved, and (3) the heat released when concentrated acids are added to water. Precautions involved are:

1. Employees handling acids should be cautioned to **ALWAYS ADD ACID TO WATER**—never the reverse. The reaction between acid and water can be explosive.

2. Protective clothing, such as rubber gloves, boots, and eyeshields, are usually required to be worn when pouring

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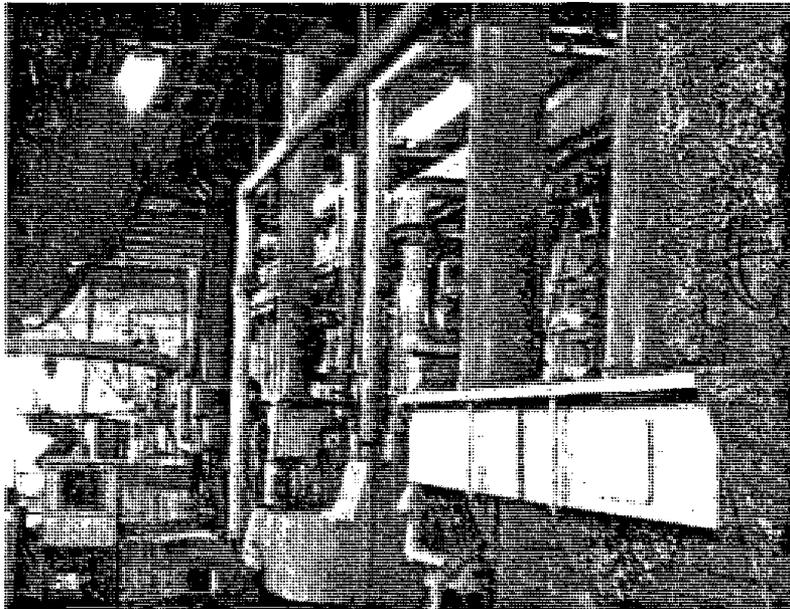
HEALTH AND SAFETY GUIDELINES (cont.)

concentrated acids from carboys or when cleaning tanks.

3. Acid carboys should be stored away from alkali and must be stored away from cyanide salts.

STORAGE OF CYANIDE SALTS

Because the combination of cyanide salts and acids produces lethal hydrogen cyanide gas, they must be stored separately; however, if there are acid tanks located nearby, the cyanide containers should also be elevated above the floor to prevent possible mixing with acid released due to a tank rupture.



Proper ventilation is essential in areas where toxic or otherwise harmful amount of vapors and mists escape into the workplace.

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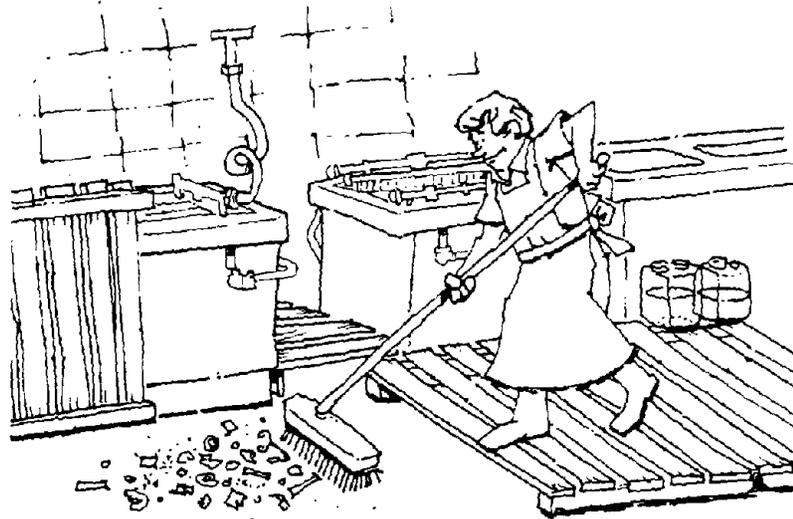
HEALTH AND SAFETY GUIDELINES (cont.)

SUMMARY OF CHEMICAL HAZARDS IN ELECTROPLATING INDUSTRY

OPERATION	POSSIBLE HAZARD	SYMPTOMS	PRECAUTIONS	COMMENTS
<p>PRECLEANING</p> <p>Trichloroethylene Perchloroethylene</p>	<p>Skin irritation</p> <p>Relatively toxic by inhalation of vapors</p>	<p>Skin rash</p> <p>Lightheaded feeling, headache, sleepiness</p>	<p>Protective gloves</p> <p>Local exhaust ventilation</p>	
<p>ALKALI CLEANING</p> <p>Caustic Soda (Sodium Hydroxide)</p>	<p>Skin irritation</p> <p>"Eats" organic materials</p>	<p>Painful burns</p>	<p>Slowly add cleaner to large amounts of cold water with complete mixing to prevent an explosion</p>	
<p>OXIDE REMOVAL</p>	<p>Skin irritation</p>	<p>Severe burns</p>	<p>Acid always added to water</p>	<p>Acid carry over to a cyanide solution produces a deadly gas</p>
<p>PLATING</p> <p>Nickel</p>	<p>Skin irritation</p>	<p>"Nickel itch"</p>	<p>Protective clothing</p> <p>Showering and changing clothes after work</p>	
<p>Chromium</p>	<p>Skin inflammation (dermatitis) and ulceration</p>	<p>Early signs include nose bleeds, wet and dry skin eruptions</p> <p>Prolonged exposure—hole in nose or "chrome hole"</p>	<p>Protective equipment</p> <p>Exhaust ventilation</p> <p>Showering and changing clothes at end of every work day</p>	<p>To create another barrier, it is advisable to coat hands and forearms with lanolin before putting on rubber gloves</p>
<p>Copper</p>	<p>Copper cyanide salts—highly toxic by inhalation, skin absorption, and ingestion</p>	<p>Skin irritant</p> <p>Can be fatal due to presence of copper cyanide salts</p>	<p>Prevention of skin contact and ingestion</p> <p>Exhaust ventilation or respirators if necessary</p>	<p>Cyanides and acids must be stored apart so that they can never come in contact</p>
<p>Cadmium, Zinc</p>	<p>Cyanide salts—Extremely toxic, but greater hazard is the formation of deadly hydrogen cyanide gas by contact of cyanide salts or solutions with acids</p>	<p>Cyanide solutions contacting skin can be absorbed in toxic amounts and cause death</p>	<p>Exhaust ventilation and respirator, if necessary</p> <p>Protective clothing for the prevention of skin contact</p>	<p>Cyanides and acids must be stored apart so that they can never come in contact</p>
<p>Lead</p>	<p>Very hazardous by inhalation and ingestion</p>	<p>Blood and organ effects, death</p>	<p>Exhaust ventilation, appropriate respirators, and proper protective equipment</p>	<p>All lead compounds are toxic.</p> <p>Accumulative poison (tends to be stored in the body)</p>

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FREQUENTLY VIOLATED REGULATIONS WALKING AND WORKING SURFACES



GENERAL REQUIREMENTS

1. The workplace must be maintained 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.

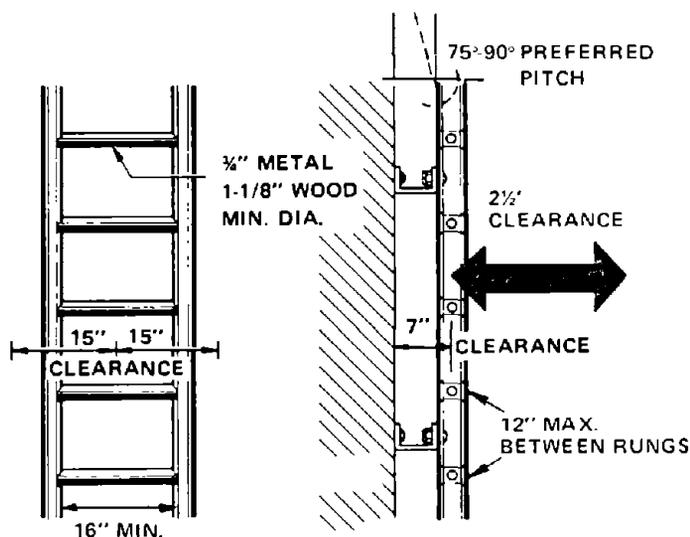
6. The floor-load capacity is the maximum weight which can be safely supported by the floor, expressed in pounds per square foot. When this information is not available and when floor-load capacity is in doubt, it is suggested that a competent engineer be consulted. These floor-load capacities must be posted in a readily visible location (except for slab floors with no basements).

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FREQUENTLY VIOLATED REGULATIONS WALKING AND WORKING SURFACES (cont.)

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 $\frac{3}{4}$ inches for metal ladders, or $1\frac{1}{8}$ inches for wood ladders.



3. Not have rungs spaced more than 12 inches apart and must be at least 16 inches wide.
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 3 feet for 75° pitch on the climbing side of ladder (unless caged).
7. Have at least seven inches 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 more than 30 feet long. 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).

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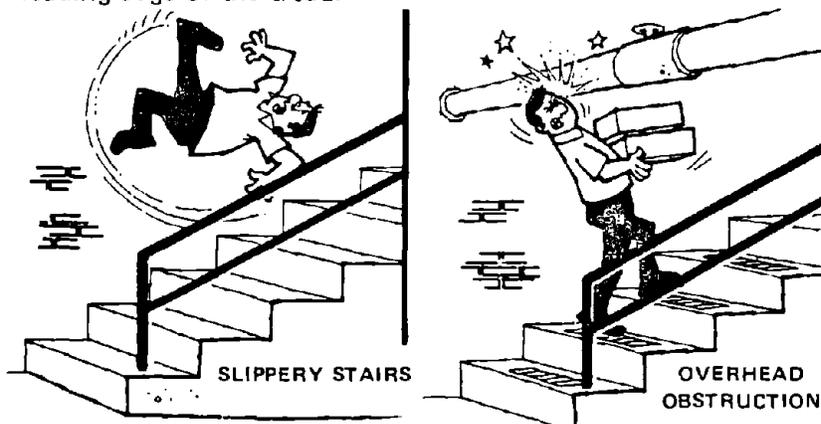
FREQUENTLY VIOLATED REGULATIONS WALKING AND WORKING SURFACES (cont.)

PORTABLE LADDERS

1. Must be maintained in good condition at all times.
2. Should be kept coated with a suitable protective material. Wood ladders can be painted if carefully inspected prior to painting, providing the ladder is not for resale.
3. Must be inspected frequently. Those which have developed defects must be tagged, "DANGEROUS—DO NOT USE" and be removed from service for repair or destruction.
4. Wood ladders should be stored where they will not be exposed to the elements, and where there is good ventilation.
5. Metal ladders should not be used near energized electrical equipment.
6. Must be so placed that the side rails have a secure footing. They may not be placed on boxes, barrels or other unstable bases to obtain additional height. Nonslip bases should be used.

FIXED INDUSTRIAL STAIRS

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.

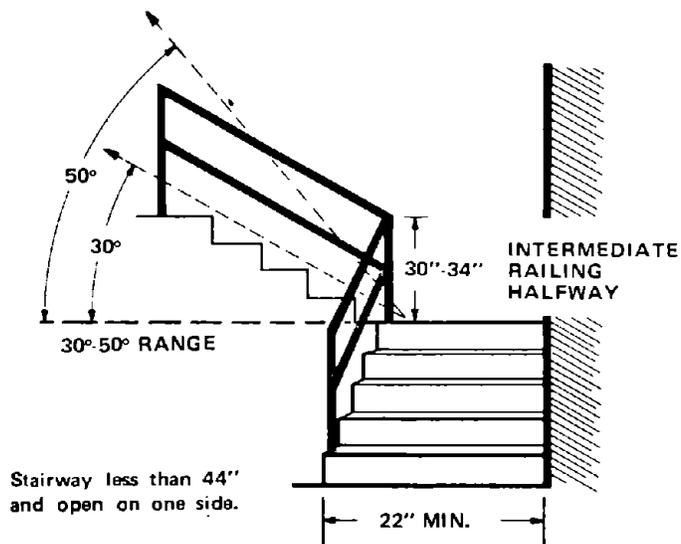


4. The minimum permissible width is 22 inches (if a means of exit access, at least 28 inches).

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FREQUENTLY VIOLATED REGULATIONS WALKING AND WORKING SURFACES (cont.)

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. Certain conditions applied to flights of stairs having four or more risers.
 - a. A stair railing is required on each open side.
 - b. If the stairway is less than 44 inches wide, and both sides are enclosed, at least one handrail is required, preferably on the right side descending.
 - c. If the stairway is more than 44 inches wide, a handrail is required on each enclosed side.
 - d. Furthermore, if the stairway is 88 or more inches wide, an intermediate stair railing located midway is also required.
9. The vertical height of the railing must be 30 to 34 inches and of construction similar to the standard railing described later in this section.



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FREQUENTLY VIOLATED REGULATIONS 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" x 4" stock with posts spaced not more than six feet.

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

For structural steel railings, posts and rails must be of 2 x 2 x 3/8-inch angles or other metal shapes of equivalent strength with posts spaced not more than 8 feet apart.

The standard toeboard must be approximately four inches in height from the floor to its top edge, with no more than a quarter 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 one inch.

WHERE A STANDARD RAILING IS REQUIRED

1. Every open-sided floor or platform four 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.

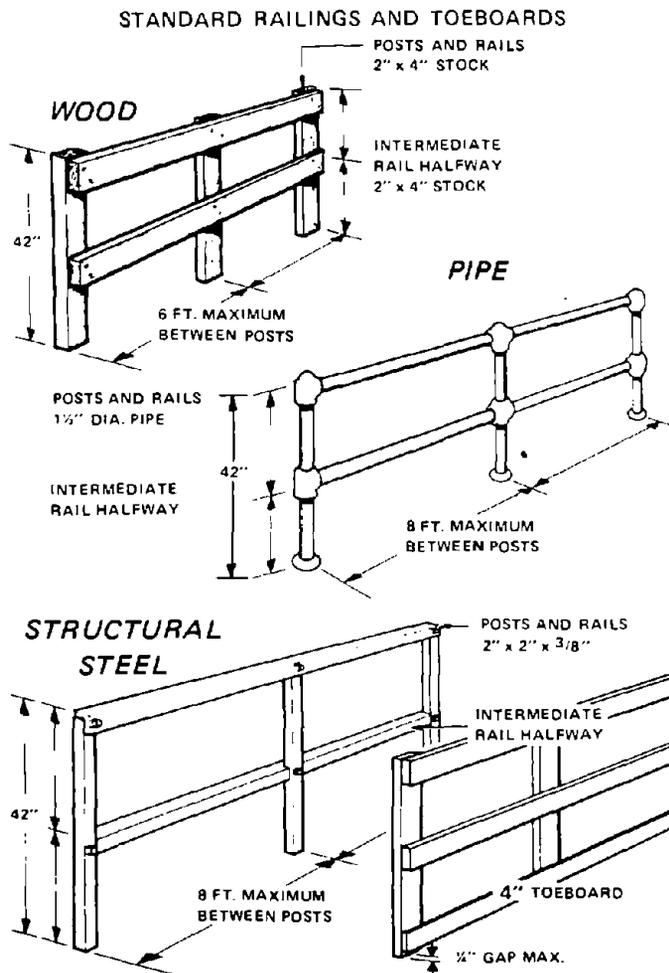
3. Every ladderway floor opening must be guarded by a standard railing and toeboard on all sides, with passage through the railing so constructed as to prevent a person from walking directly into the opening.

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

NIOSH

FREQUENTLY VIOLATED REGULATIONS 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).



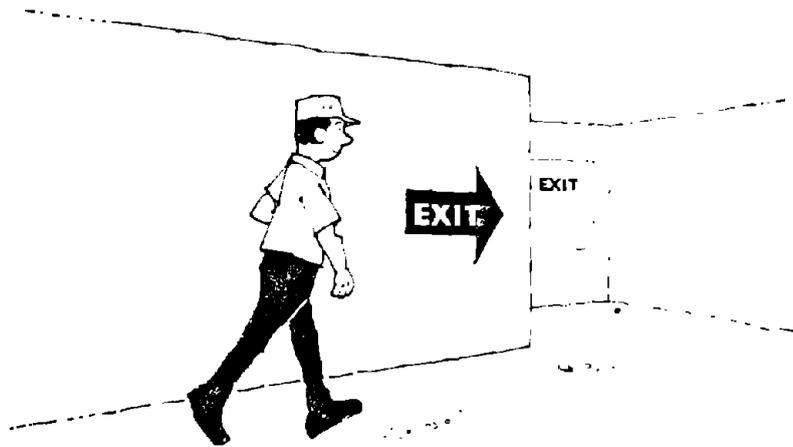
NIOSH

FREQUENTLY VIOLATED REGULATIONS

EXITS AND EXIT MARKINGS

1. Every exit must have the word "EXIT" in plain legible letters not less than six inches high with the strokes of the letters not less than $\frac{3}{4}$ inches 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", "TO BASEMENT", etc.



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

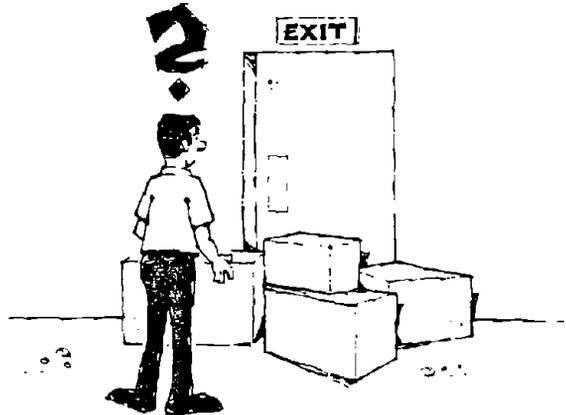
- a. 50 or more persons occupy a room or
- b. the exit is for an area of high hazard potential.

NIOSH

FREQUENTLY VIOLATED REGULATIONS EXITS AND EXIT MARKINGS (cont)



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:
- 50 or more persons occupy a room or
 - 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 at times 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.



FREQUENTLY VIOLATED REGULATIONS

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL

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 8-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 8 hours daily. If no hearing loss is observed, ear protection is not required.

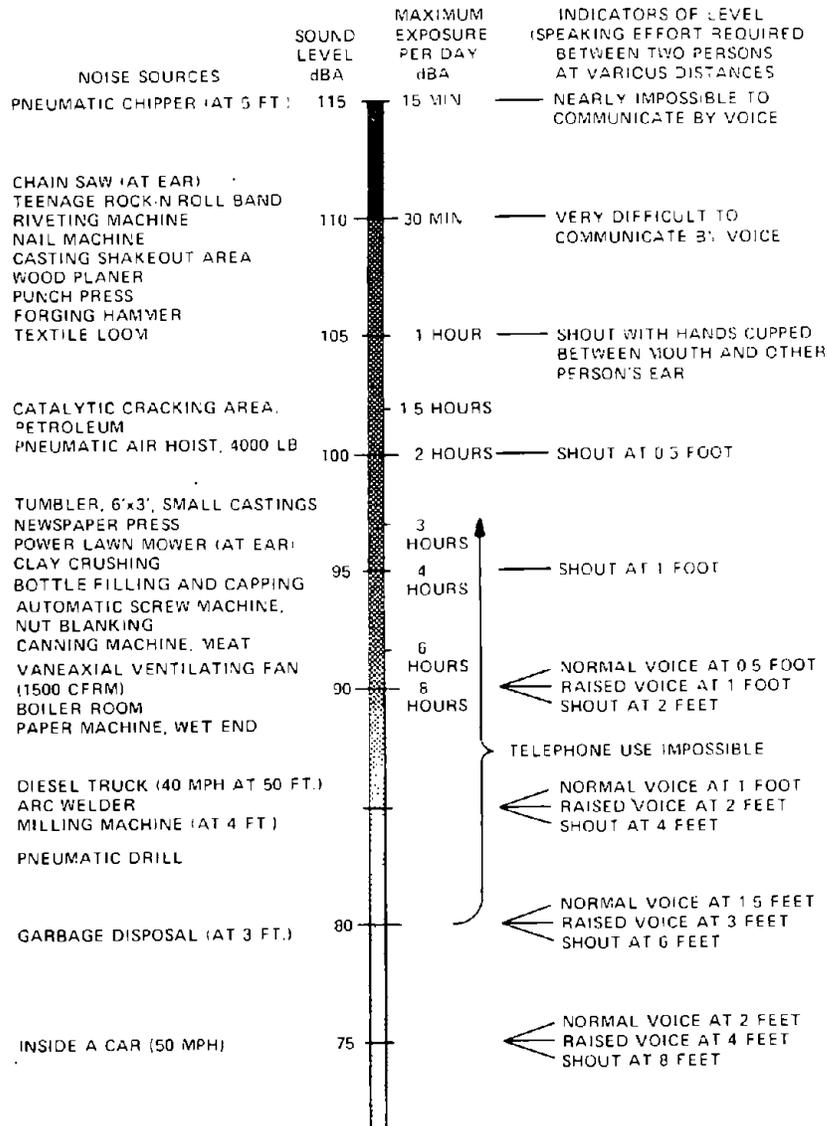
At greater than 90 dBA exposure (8 hours per day) or for higher noise levels in excess of the allowable time (e.g. 100 dBA for more than 2 hours) a continuing, effective hearing conservation program must be administered. Reference to the following table gives estimates of noise levels and the maximum 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



NIOSH

FREQUENTLY VIOLATED REGULATIONS

PERSONAL PROTECTIVE EQUIPMENT

1. All employees working in and around open surface tanks must be instructed as to the hazards of their job.
2. Employees must also be informed on how to protect themselves from these hazards.
3. Employees must know the proper first aid procedures for the hazards involved.
4. All employees whose duties may cause them to get their feet wet, must be provided with waterproof footwear.
5. All employees handling work that is wet with liquid other than water must be provided with gloves impervious to such a liquid. The gloves must be long enough to prevent entrance of the liquid over the top.
6. All employees whose work may get their clothing wet, must be provided with protective aprons, jackets, or other garments that will keep them dry. Aprons must extend well below the boot tops to prevent liquid from splashing into boots.
7. Protective eye and face equipment is required where there is a reasonable chance of injury that can be prevented by its use. Such equipment must be designed to provide adequate protection against the particular hazards to which the employee is exposed. Equipment must be easy to clean and capable of being disinfected. When there is a danger of splashing in the eyes, tight-fitting goggles or an effective face shield are required. If goggles are worn by persons whose vision requires corrective lenses, the goggles must be of the type that can be worn over glasses or are made so corrective lenses can be mounted behind the protective lenses.
8. An adequate supply of clean, cold water must be available instantly near each tank that contains liquid which may burn, irritate or otherwise be harmful to the skin. Emergency deluge showers and eye flush fountains are preferable to a water hose (see "Guidelines Section"), but in any case, harmful liquids must be washed off quickly and thoroughly.
9. Employees with sores, burns or other lesions must not be allowed to work at their regular jobs until authorized to do so by a physician.
10. If there is danger from falling objects, head protection must be worn.

NIOSH

FREQUENTLY VIOLATED REGULATIONS GENERAL ENVIRONMENTAL CONTROLS

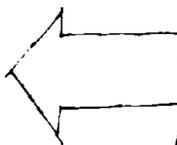
SANITATION

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, including covered containers for sanitary napkins.



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.

REST ROOMS



NIOSH

FREQUENTLY VIOLATED REGULATIONS

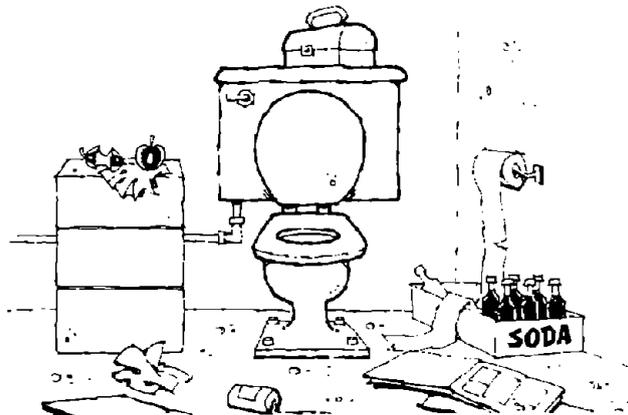
GENERAL ENVIRONMENTAL CONTROLS (cont.)

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. No employee is allowed to eat or drink in a toilet room or in any area exposed to toxic materials.



8. No food or beverages are to be stored in a toilet room or in an area exposed to toxic materials.

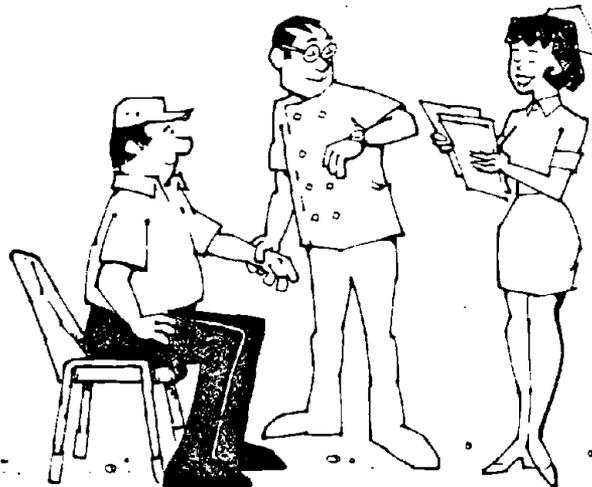
9. Employees working with toxic substances should wash and remove contaminated clothing before eating, drinking, or smoking.

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FREQUENTLY VIOLATED REGULATIONS 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 warm 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 (usually interpreted to be within 10 minutes under the worst conditions) which is used for treatment of injured or ill employees the following are required:

1. At least one and preferably two 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 provide acceptable training.

NIOSH

FREQUENTLY VIOLATED REGULATIONS MEDICAL AND FIRST AID (cont.)

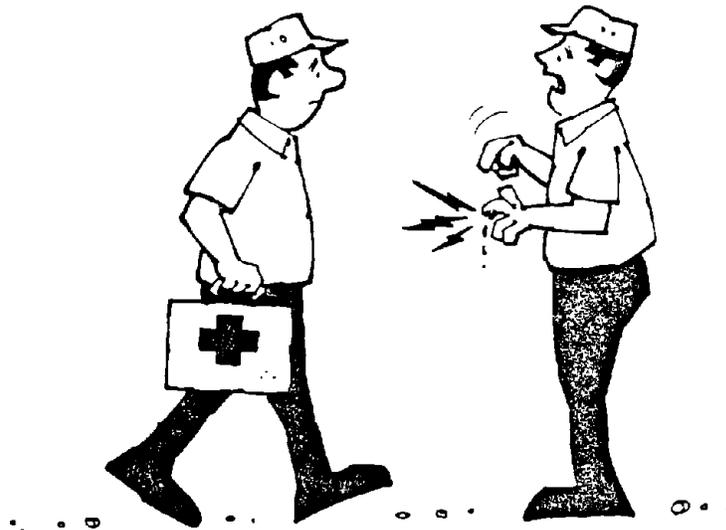
2. First aid supplies must be readily available and approved by a consulting physician. These supplies should be in sanitary containers with individually sealed packages for material such as gauze, bandages, and dressings that must be sterile. Other items often needed are adhesive tape, triangular bandages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

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.

Note: First aid is immediate, temporary treatment given in the event of accident or illness—before the doctor arrives.

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.

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



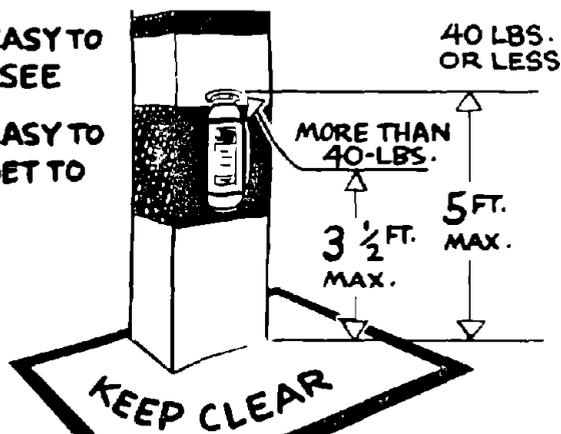
NIOSH

FREQUENTLY VIOLATED REGULATIONS

FIRE PROTECTION

• EASY TO SEE

• EASY TO GET TO



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. Do not have corrosion or other impairment.
6. Be inspected at least yearly and/or 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 booklet.

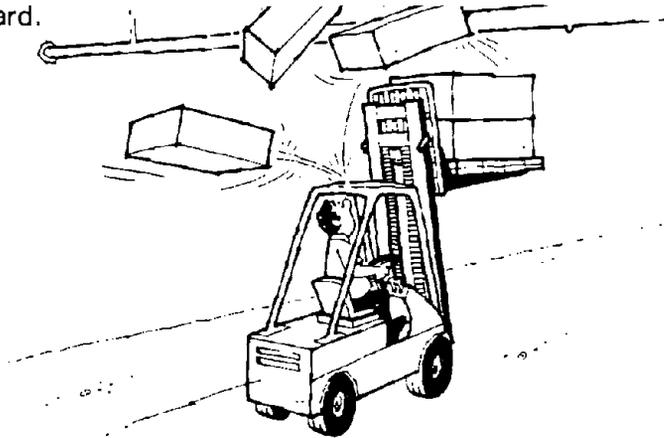
NIOSH

FREQUENTLY VIOLATED REGULATIONS MATERIALS HANDLING AND STORAGE

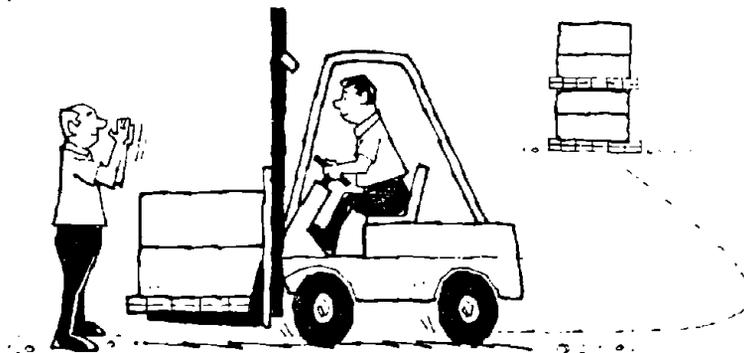
POWERED INDUSTRIAL TRUCKS

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. Suppliers can assist in the proper selection.

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

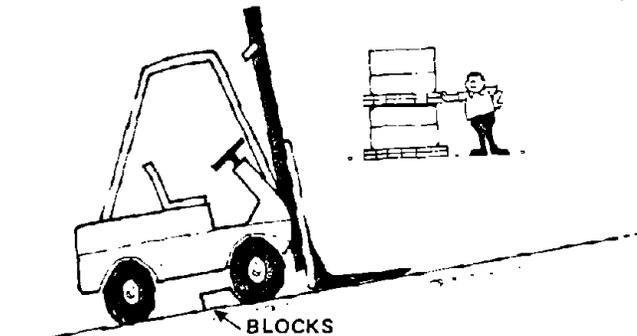


2. Methods must be developed and used to effectively train operators in the safe operation of powered industrial trucks, and only trained and authorized operators may operate the truck.



NIOSH

FREQUENTLY VIOLATED REGULATIONS MATERIALS HANDLING AND STORAGE (cont.)



3. When a powered industrial truck is left unattended (operator more than 25 feet from the truck), the forks must be fully lowered, the control lever positioned in neutral, the power shut off and the brakes set. The wheel must be blocked if parked on an incline.

4. 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.



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

6. 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.

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

NIOSH

FREQUENTLY VIOLATED REGULATIONS MATERIALS HANDLING AND STORAGE (cont.)

HOISTS

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

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 the 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.

NIOSH

FREQUENTLY VIOLATED REGULATIONS

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 and 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. Enclose the operation.
2. Interlocking devices.
3. Moving barriers.
4. Removal devices.
5. Remote control.
6. Two-hand tripping devices.
7. Electronic safety devices.

The following page contains examples of specific equipment that must be guarded. Generally all powered equipment must be safeguarded to prevent employees from the various dangers caused by moving parts.

NIOSH

FREQUENTLY VIOLATED REGULATIONS MACHINERY AND MACHINE GUARDING (cont.) SPECIFIC EXAMPLES FOR MACHINE GUARDING GRINDERS

1. Wheel Guard—Safety guards must cover the spindle end, nut, and flange projections.

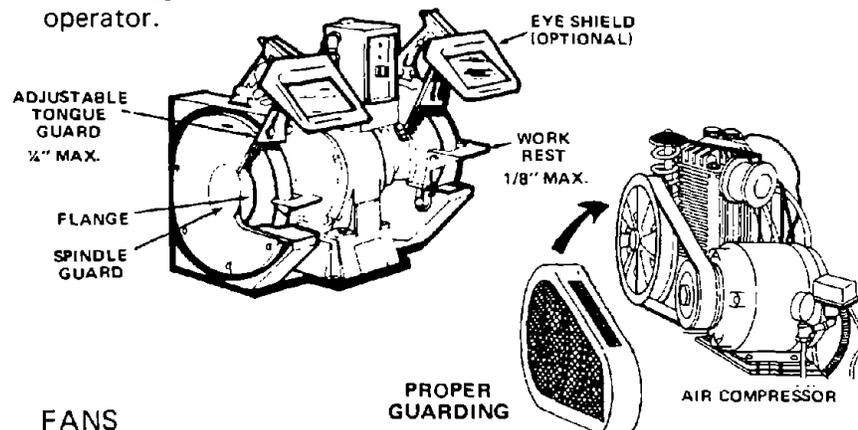
The exposed area of the grinding wheel and sides for the safety guards should not exceed more than one-fourth of the entire wheel.

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

2. Work or Tool Rests—These 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 of $\frac{1}{8}$ inch, to prevent the work from becoming jammed between the wheel and the work rest.

3. Exposure Adjustment or Tongue Guards—This safety guard 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 $\frac{1}{4}$ inch.

4. Goggles or a Face Shield—These 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 $\frac{1}{2}$ inch.

AIR COMPRESSORS

Must have their flywheel and drive pulley fully enclosed.

NIOSH

FREQUENTLY VIOLATED REGULATIONS THE NATIONAL ELECTRICAL CODE (NEC)

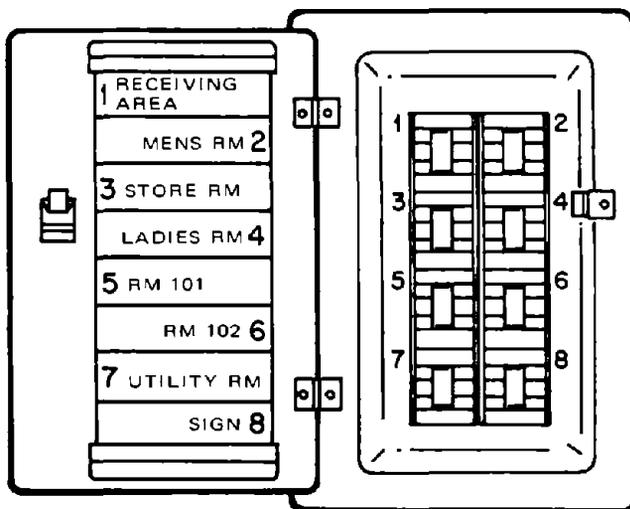
ELECTRICAL REQUIREMENTS

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 persons and 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 (e.g., circuit breaker or fuse boxes) must be legibly marked to indicate its purpose unless its purpose is evident.



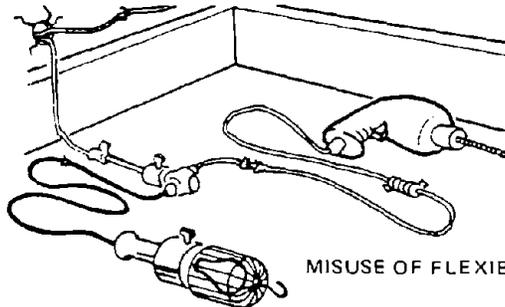
Proper labeling of circuit breakers.

NIOSH

FREQUENTLY VIOLATED REGULATIONS

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, or
 - b. Appliances, or
 - c. Any equipment operated in excess of 150 volts to ground.
5. Outlets, switches, junction boxes, etc., must be covered.



6. Flexible cords may not be:
 - a. Used as a substitute for fixed wiring.
 - b. Run through holes in walls, ceilings, or floors.
 - c. Run through doors, windows, etc.
 - d. Attached to building surfaces.
7. Flexible cords must be:
 - a. Continuous lengths without splices or taps.
 - b. Fastened so that there is no pull on joints or terminal screws.
 - c. Replaced when frayed or insulation has deteriorated.

NIOSH

RECORDKEEPING REQUIREMENTS

Recordkeeping requirements under OSHA are intended to compile factual information about accidents that have happened. These records provide employers with a measure for evaluating the success of their health and safety activities and of identifying high risk areas of the business to which attention should be directed. Federal regulations require that employers with 11 or more employees at any time during the calendar year are required to complete OSHA Forms 100, 101 (or their equivalent), and 102. These records must be maintained for five years, excluding the current year. Forms 100 and 101 must be kept current to within six days.

The types of work-related injuries and illnesses which must be recorded are those involving fatalities, lost workdays, or those which are nonfatal and do not cause lost workdays for the employee, but do require medical treatment, job transfer or termination, or resulted in loss of consciousness. Employers are also required to report within 48 hours to OSHA any occurrence of a work-related fatal accident, or an accident requiring the hospitalization of five or more employees. An annual summary, Form 102, must be posted for the entire month of February.

Employers are required to maintain accurate records of certain potentially toxic or harmful physical agents which must be monitored or measured, and to promptly advise any employee of any excessive exposure and the corrective action undertaken.

For more detailed information, the booklet "Recordkeeping Requirements Under the Williams-Steiger Occupational Safety and Health Act of 1970" is available from OSHA.

NIOSH

RECORDKEEPING REQUIREMENTS (Cont.)

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 is the primary responsibility for administering the Act. OSHA issues occupational safety and health standards and its Compliance, Safety and Health Officers conduct on-site 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 inspectors for the purpose of assisting the inspection.

Where there is no union and employee representative, the OSHA Compliance Officer must consult with a verifiable 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 regarding any perceived safety and health hazard in the workplace. In these cases, OSHA will attempt to require the employer or employees to comply.

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 defining such violation will be issued to the employer. Such citation will specify a time period within which the violation must be corrected.

The OSHA citation must be posted in a conspicuous place at the place of violation for 15 days or until it is corrected, whichever is later, to warn employees of dangers that may be involved.

Proposed Penalty: The Act provides for monetary penalties against employers of not to \$ 20,000 for each violation and for no more than \$ 10,000 for each non-serious violation. In addition, \$ 10,000 penalty may be assessed for a willful or repeated violation within the jurisdiction of the Act. An 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 is punishable by a fine of up to \$ 100,000 or by imprisonment for not more than 3 years, or by both such fine and imprisonment. A conviction of an employer after 2 prior convictions carries the maximum penalty.

Voluntary Activity: Any providing penalties for violations of the Act and any other safety and health management system for OSHA inspection. Such activities must be carried out in good faith.

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

For more information, please contact your local OSHA office. For a list of OSHA offices, contact the nearest OSHA Regional Office, the Department of Labor, or the nearest State Government listing.



Washington, D.C.
20340
OSHA 2-1073

By _____
Director, Bureau
Secretary of Labor

U. S. Department of Labor
Bureau of Safety and Health Administration

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

CHECKLISTS

Since safe conditions depend on vigilance for possible hazards and immediate remedial action, periodic inspections are 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, supervisor, or employee representative makes 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."



NIOSH

CHECKLISTS (Cont.)

WALKING AND WORKING SURFACES

AISLES AND FLOOR (29 CFR 1910.22)

	Yes	No
Are all places of employment kept clean and orderly? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are floors, aisles and passageways kept clean and dry and all spills cleaned up immediately? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are floor holes, such as drains, covered? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are permanent aisles appropriately marked? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are wet surface areas covered with non-slip materials? _____	<input type="checkbox"/>	<input type="checkbox"/>

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

Are signs showing floor-load capacity present? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are platforms, storage lofts, balconies, etc. that are more than 4 feet above the floor protected with standard guardrails? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all platforms, lofts, and balconies (where people or machinery could be exposed to falling objects) guarded with standard 4-inch toeboards? _____	<input type="checkbox"/>	<input type="checkbox"/>

STAIRS (29 CFR 1910.24)

Are there standard stair rails or handrails on all stairways having 4 or more risers? _____	<input type="checkbox"/>	<input type="checkbox"/>
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NIOSH

CHECKLISTS (cont.)

	Yes	No
Are all stairways at least 22 inches wide? _____	<input type="checkbox"/>	<input type="checkbox"/>
Do stairs have at least a 7-foot overhead clearance? _____	<input type="checkbox"/>	<input type="checkbox"/>
Do stairs angle no more than 50° and no less than 30°? _____	<input type="checkbox"/>	<input type="checkbox"/>
LADDERS (29 CFR 1910.25., .26, .27)		
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? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is it prohibited to use the top of an ordinary step ladder as a step? _____	<input type="checkbox"/>	<input type="checkbox"/>
Do fixed ladders have at least 3½ feet of extension at the top of the landing? _____	<input type="checkbox"/>	<input type="checkbox"/>
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? _____	<input type="checkbox"/>	<input type="checkbox"/>
Do all fixed ladders have a preferred pitch of 75°-90°? _____	<input type="checkbox"/>	<input type="checkbox"/>
EGRESS (29 CFR 1910.36-.38)		
Are all exits marked with an exit sign and illuminated by a reliable light source? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is the lettering at least 6 inches high with the principle letter strokes at least ¾ of an inch wide? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

	Yes	No
Is the direction to exits, when not immediately apparent, marked with visible signs? _____	<input type="checkbox"/>	<input type="checkbox"/>
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.? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are exit doors side-hinged? _____	<input type="checkbox"/>	<input type="checkbox"/>
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? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all exit routes always kept free of obstructions? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

OPEN SURFACE TANKS (29CFR 1910.94)

	Yes	No
Are all employees working in and around open surface tanks instructed as to the hazards and the personal protection applicable to these hazards? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is protective clothing such as gloves, aprons and boots worn by employees to prevent skin contact with corrosive chemicals? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is eye protection such as goggles or face shields required where cleaning and/or plating solutions could accidentally splash into people's eyes? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are means for rinsing the eyes (eye wash fountains, water pipes or showers) available for instant use in areas of potential acid or alkali splashes? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are cyanides stored separately away from acid solutions? _____	<input type="checkbox"/>	<input type="checkbox"/>
In chrome plating operations, are all exposed employees given periodic medical examinations? _____	<input type="checkbox"/>	<input type="checkbox"/>
Where open surface tanks are ventilated, are the systems operating properly? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (Cont.)

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (29 CFR 1910.93, .94, .95)

	Yes	No
Is management aware of the hazards caused by various chemicals used in the establishment? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is employee exposure to these chemicals kept within the acceptable levels? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are eye wash fountains and safety showers provided in areas where chemicals, such as caustics, are used? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all containers, such as vats, storage tanks, etc. labeled as to their contents? _____	<input type="checkbox"/>	<input type="checkbox"/>
If internal combustion engines are used, is carbon monoxide kept within acceptable levels? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are employees required to wear personal protective equipment (gloves, eye protection, respirators, etc.) when handling hazardous materials? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is employee exposure to welding fumes controlled by ventilation, use of respirators, exposure time or other means? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is vacuuming used wherever possible rather than blowing or sweeping dust? _____	<input type="checkbox"/>	<input type="checkbox"/>



CHECKLISTS (cont.)

	Yes	No
OCCUPATIONAL NOISE EXPOSURE (29 CFR 1910.95)		
If a noise problem is suspected, have noise levels been accurately measured? _____	<input type="checkbox"/>	<input type="checkbox"/>
If a noise problem exists, have plans to reduce noise levels by engineering methods been formulated (e.g. enclosure, maintenance, different methods of processing)? _____	<input type="checkbox"/>	<input type="checkbox"/>
If engineering controls cannot reduce the noise to safe levels: have administrative controls, such as limiting worker-exposure in a given area, been started? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are affected employees given annual audiometric tests if necessary? _____	<input type="checkbox"/>	<input type="checkbox"/>
Do all employees in high-noise areas wear hearing protection? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are annual noise surveys made to re-evaluate problem areas? _____	<input type="checkbox"/>	<input type="checkbox"/>



CHECKLISTS (Cont.)

PERSONAL PROTECTIVE EQUIPMENT (29 CFR 1910.132-137)

	Yes	No
Is personal protective equipment provided, used, and maintained wherever it is necessary? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is employee-owned personal protective equipment, such as gloves, protective shoes, etc., adequate, and properly maintained? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is eye protection available where debris or flying objects could be a hazard? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are respirators provided and worn during dusty operations, paint spraying, etc.? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is the proper respirator in use for the hazards present? (For example, dust masks do not protect against solvent vapors.) _____	<input type="checkbox"/>	<input type="checkbox"/>
Are ear plugs or muffs provided and worn during noisy conditions? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is slip-resistant footwear worn? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

GENERAL ENVIRONMENTAL CONTROLS

SANITATION (29 CFR 1910.141-149)

Are restrooms and washrooms kept in clean and sanitary condition?

Yes No

Are covered receptacles for sanitary napkins provided in the women's restroom?

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?



CHECKLISTS (cont.)

MEDICAL AND FIRST AID (29 CFR 1910-151)

	Yes	No
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.) _____	<input type="checkbox"/>	<input type="checkbox"/>
Are first-aid supplies readily available, inspected and replenished? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are first-aid supplies approved by a consulting physician, indicating that they are adequate? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are medical personnel readily available for advice and consultation on matters of employee health? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is there a first-aid kit easily accessible to the work area? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are emergency phone numbers posted? _____	<input type="checkbox"/>	<input type="checkbox"/>
Where employees may be exposed to injurious corrosive materials, are they provided with quick-drenching and flushing facilities for immediate emergency use? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

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?

- Class A. Ordinary combustible material fires
- Class B. Flammable-liquid, or grease fires
- Class C. Energized-electrical-equipment fires

Yes No

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 not mounted too high? If not exceeding 40 pounds, the top must not be higher than 5 feet above floor-greater than 40 pounds, the top must not be higher than 3½ feet above floor.

Have all extinguishers been serviced, maintained and tagged at intervals not to exceed 1 year?

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?



CHECKLISTS (Cont.)

MATERIALS HANDLING AND STORAGE (29 CFR 1910.176-181)

	Yes	No
Is there safe clearance for equipment through aisles and doors? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is stored material stable and secure? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are storage areas free from tripping hazards? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are only trained operators allowed to operate powered lift trucks? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are appropriate overhead guards installed on powered lift trucks? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is battery charging on electric units performed only in designated areas? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are "NO SMOKING" signs posted near electric battery charging units? _____	<input type="checkbox"/>	<input type="checkbox"/>
On units using internal combustion engines, do the exhaust gases in the room not exceed allowable limits for carbon monoxide? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are dock boards (bridge plates) used when loading or unloading from dock to truck or dock to rail car? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

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



CHECKLISTS (cont.)

MACHINE AND MACHINE GUARDING (29CFR 1910.212)

	Yes	No
Are belts, pulleys, and rotating shafts (air compressor, drill presses, etc.) properly guarded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are chains, sprockets and gears properly guarded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all in-going nip points properly guarded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are rotating shafts that are not smooth properly guarded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all rotating parts (lubrication, fittings, etc.) recessed or covered with collars? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all pieces of equipment with an electric motor or any electrical connection effectively grounded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are sprockets and V-belt drives within reach of platforms and passageways or less than 7 feet from the floor completely enclosed? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are fans less than 7 feet above floor guarded, having openings 1/2 inch or less? _____	<input type="checkbox"/>	<input type="checkbox"/>
ABRASIVE WHEEL MACHINERY (Grinders) (29CFR 1910.215)		
Is the work rest used and kept adjusted to within 1/8 inch of wheel? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is the adjustable tongue on top side of grinder used and kept adjusted to within 1/4 inch of wheel? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

	Yes	No
Do side guards cover the spindle, nut and flange and 75% of the wheel diameter? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are bench and pedestal grinders permanently mounted? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are goggles or face shields always worn when grinding? _____	<input type="checkbox"/>	<input type="checkbox"/>



CHECKLISTS (cont.)

NATIONAL ELECTRICAL CODE

ELECTRICAL WIRING

	Yes	No
Have exposed wires, frayed cords and deteriorated insulation been repaired or replaced? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are junction boxes, outlets, switches and fittings covered? _____	<input type="checkbox"/>	<input type="checkbox"/>
Is all metal fixed electrical equipment grounded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Does all equipment connected by cord and plug have grounded connections? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are electrical appliances such as vacuums, blowers, vending machines, etc. grounded? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are all portable electrical hand tools grounded? (Doubly insulated tools are acceptable without grounding.) _____	<input type="checkbox"/>	<input type="checkbox"/>
Are breaker switches identified as to their use? _____	<input type="checkbox"/>	<input type="checkbox"/>
Do flexible cords and cables not run through holes in wall or ceiling or through doorways or windows? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are flexible cords and cables free from splices or taps? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

	Yes	No
Are flexible cords and cables fastened so that there is no direct pull on joints or terminal screws? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are flexible cords and cables never substituted for fixed wiring? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are flexible cords and cables not attached to building surfaces? _____	<input type="checkbox"/>	<input type="checkbox"/>

NIOSH

CHECKLISTS (cont.)

RECORDKEEPING (29 CFR 1904.2-.8)

	Yes	No
Is employee poster (OSHA or equivalent state poster) prominently displayed? _____	<input type="checkbox"/>	<input type="checkbox"/>
Have occupational injuries or illnesses, except minor injuries requiring only first aid, been recorded on OSHA Form Nos. 100 and 101, or equivalent? _____	<input type="checkbox"/>	<input type="checkbox"/>
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? _____	<input type="checkbox"/>	<input type="checkbox"/>
Have all OSHA records been retained for a period of five years, excluding the current year? _____	<input type="checkbox"/>	<input type="checkbox"/>



INFORMATION SOURCES

AMERICAN NATIONAL STANDARDS 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
- Z9.1 Ventilation and Operation of Open-Surface Tanks
- Z9.2 Local Exhaust Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
60 Batterymarch Street
Boston, Mass. 02110

- NFPA-10-1970
- NFPA-101-1970

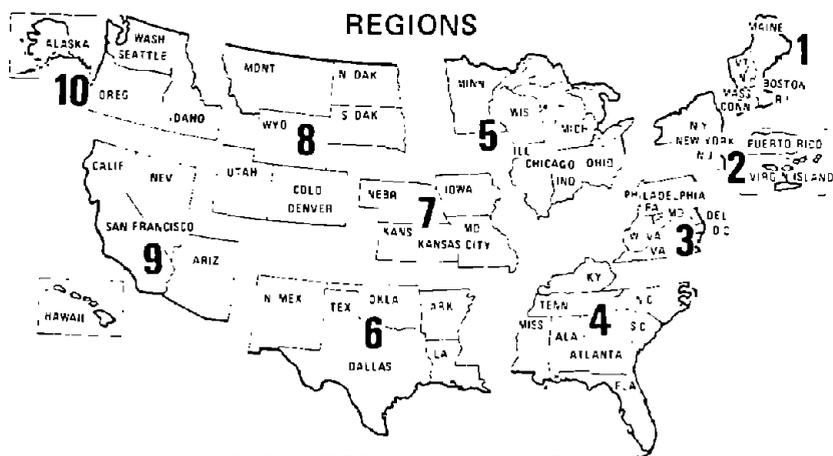
NATIONAL SAFETY COUNCIL
425 North Michigan Avenue
Chicago, Illinois 60611

NIOSH AND OSHA REGIONAL DIRECTORS

Trade associations and insurance companies can also provide useful information. The Small Business Administration will provide information concerning procedures for securing economic assistance in compliance with the OSHA Standards (if needed).

NIOSH AND OSHA REGIONAL OFFICES

The following pages list NIOSH and OSHA regional offices. Either of these facilities serving the state 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 other OSHA publications.



NIOSH REGIONAL OFFICES

DHEW, Region I
Government Center (JFK Fed. Bldg.)
Boston, Massachusetts 02203
Tel.: 617/223-5807

DHEW, Region VI
1114 Commerce Street (Rm. 8-C-53)
Dallas, Texas 75202
Tel.: 214/749-2261

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

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

DHEW, Region III
3525 Market Street P.O. Box 13716
Philadelphia, Pennsylvania 19101
Tel.: 215/597-6716

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

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

DHEW, Region IX
50 Fulton Street (254 FOB)
San Francisco, California 94012
Tel.: 415/556-3781

DHEW, Region V
300 South Wacker Drive
Chicago, Illinois 60607
Tel.: 312/353-1710

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
18 Oliver Street, Fifth Floor
Boston, Massachusetts 02110 Telephone: 617/223-6712/3

Region II

U.S. Department of Labor
Occupational Safety and Health Administration
1515 Broadway (1 Astor Plaza)
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: 215/597-1201

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
300 South Wacker Drive, Room 1201
Chicago, Illinois 60606 Telephone: 312/353-4716/7

Region VI

U.S. Department of Labor
Occupational Safety and Health Administration
7th Floor, Texaco Building, 1512 Commerce Street
Dallas, Texas 75201 Telephone: 214/749-2477/8/9 or 2567

Region VII

U.S. Department of Labor
Occupational Safety and Health Administration
Waltower Building, Room 300, 823 Walnut Street
Kansas City, Missouri 64106 Telephone: 816/374-5249 or 5240

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
1808 Smith Tower Building, 506 Second Avenue
Seattle, Washington 98104 Telephone: 206/442-5930

HOW TO LIFT SAFELY

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

The factors that contribute to safe lifting are:

Weight

Size

Shape

DETERMINED BY WEIGHT, SIZE AND SHAPE
SAFELY

- Approach the load and size it up (weight, size and shape.) Consider your physical ability to handle the load.
- Place the feet close to the object to be lifted 8 to 12 inches apart for good balance.
- Bend the knees to the degree that is comfortable and get a good handhold. Then using both leg and back muscles...
- Lift the load straight up—smoothly and evenly. Pushing with your legs, keep load close to your body.
- Lift the object into carrying position, making no turning or twisting movements until the lift is completed.
- Turn your body with change of foot position after looking over your path of travel making sure it is clear.
- 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.

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

When two persons carry a long object, it should be held at the same level by both and on the same side of the body.

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

TEAMWORK

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



APPROVED TYPE OF EXTINGUISHER

MATCH UP PROPER EXTINGUISHER WITH CLASS OF FIRE SHOWN AT LEFT

FOAM Solution of Aluminum Sulfate and Bicarbonate of Soda	CARBON DIOXIDE Carbon Dioxide Gas Under Pressure	SODA ACID Bicarbonate Solution of Soda and Sulfuric Acid	PUMP TANK Plain Water	GAS CARTRIDGE Water Expelled by Carbon Dioxide Gas	MULTI-PURPOSE DRY CHEMICAL	ORDINARY DRY CHEMICAL

KIND OF FIRE

DECIDE THE CLASS OF FIRE YOU ARE FIGHTING. . . . THEN CHECK THE COLUMNS TO THE RIGHT OF THAT CLASS

CLASS A FIRES
USE THESE EXTINGUISHERS

ORDINARY COMBUSTIBLES

- WOOD
- PAPER
- CLOTH
- ETC.

CLASS B FIRES
USE THESE EXTINGUISHERS

FLAMMABLE LIQUIDS, GREASE

- GASOLINE
- PAINTS
- OILS, ETC.

CLASS C FIRES
USE THESE EXTINGUISHERS

ELECTRICAL EQUIPMENT

- MOTORS
- SWITCHES
- ETC.

65

11