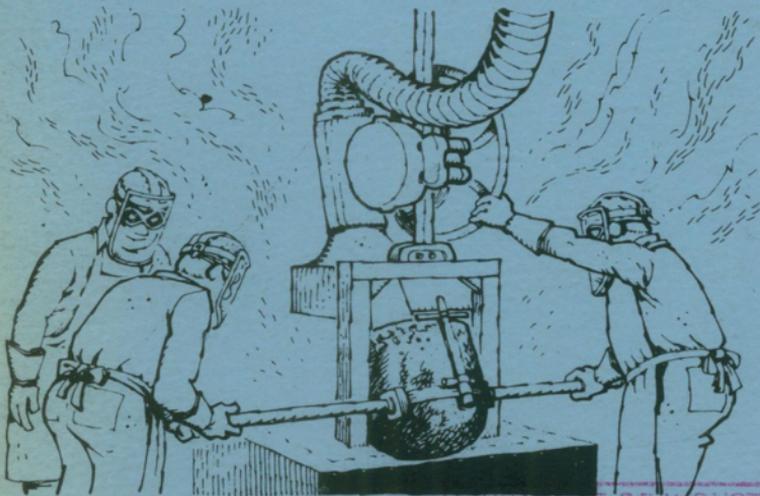


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**A GUIDE TO
HEALTH AND SAFETY LAWS
FOR CALIFORNIA
FOUNDRIES**



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LABOR OCCUPATIONAL HEALTH PROGRAM

California University. IIR. (Berkeley)

¹/₄ A GUIDE TO
HEALTH AND SAFETY LAWS
FOR
CALIFORNIA FOUNDRIES,

by JUNE COOPERMAN . //

Labor Occupational Health Program

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Cover graphic: NIOSH Health and Safety Guide for Foundries. April, 1976.

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I. INTRODUCTION:

HOW TO USE THIS HANDBOOK

As every foundry worker knows, foundries can be very dangerous places to work. However, there are California job health and safety laws which may be used to help protect workers from many foundry hazards. Unfortunately, the specific codes and standards that apply to foundries are scattered throughout the General Industry Safety Orders and so can be very difficult to identify. In order to make them more useful, standards that apply to foundries have been compiled in this booklet. It was written to help you find out whether your foundry complies with the codes and, if not, exactly which codes are being violated. Almost all of the codes found in this booklet have been cited for violations in California foundries over the last few years. Another purpose of this booklet is to explain those rights which workers have, and the obligations of employers under the law.

To make them easy to read and understand, the codes have been shortened and written in plain language. Also, some codes and standards have been left out because they were too long. (For example, this handbook lists the maximum levels allowed for only a small sample of the different types of air pollutants.) So if more information is needed, you may have to request it from Cal/OSHA or the Labor Occupational Health Program in Berkeley.

The codes are listed under subjects which are found in the Table of Contents. After each code you will find a number. This number is the "section number" of the codes either from Title 8, California Administrative Code (8 CAC) or from the California Labor Code (CLC). For example, if a code is followed by "8 CAC 5141(c)" it came from the California Administrative Code, Title 8, Section

TITLE 8**GENERAL INDUSTRY SAFETY ORDERS**

§ 5143

(Register 80, No. 8-2-23-80)

(p. 432.255)

Vapor. The gaseous form of a substance normally liquid or solid. (Title 24, T8-5140)

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

HISTORY:

1. Repealer and new section filed 7-18-75; effective thirtieth day thereafter (Register 75, No. 29).
2. Amendment filed 7-16-76; effective thirtieth day thereafter (Register 76, No. 29).
3. Amendment filed 7-27-77; effective thirtieth day thereafter (Register 77, No. 31).
4. Amendment of definition "Harmful Exposure" filed 5-25-79; effective thirtieth day thereafter (Register 79, No. 21).

5141. Control of Harmful Exposure to Employees.

(a) **Engineering Controls.** Harmful exposures shall be prevented by engineering controls whenever feasible.

(b) **Administrative Controls.** Whenever engineering controls are not feasible or do not achieve full compliance, administrative controls shall be implemented if practicable.

(c) **Control by Respiratory Protective Equipment.** Respiratory protective equipment, in accordance with Section 5144, shall be used to prevent harmful exposures as follows:

- (1) During the time period necessary to install or implement feasible engineering controls;
- (2) Where feasible engineering controls and administrative controls fail to achieve full compliance; and
- (3) In emergencies.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

HISTORY:

1. Repealer and new section filed 7-18-75; effective thirtieth day thereafter (Register 75, No. 29).
2. Repealer and new section filed 5-25-79; effective thirtieth day thereafter (Register 79, No. 21).

Figure 1:

Example of a Cal/OSHA standard. (Title 8, California Administrative Code, Section 5141, Sub-paragraph (c))

5141, Sub-paragraph c. You can use this information when you make a complaint to your employer or to Cal/OSHA (the California Occupational Safety and Health Administration.) See the example (figure 1.) If you're interested, you can use the citation to find the complete text of a standard through Cal/OSHA, LOHP, or many public libraries.

Although it's not necessary to cite a specific code violation when you file a Cal/OSHA complaint, the more specific the complaint the better. However, these codes are not necessarily the only health and safety laws which apply to foundries. For example, every employer has a "general duty" under the law to provide a safe and healthful workplace, and can be charged with a violation for not doing so, even when no specific code is violated.

You may find that some of the codes do not adequately protect you from hazards on your job. You may even find that there are hazards for which no standard exists. If this is the case, you have the right to petition the Cal/OSHA Standards Board to improve an old standard or initiate a new one. To contact the Standards Board, write: Cal/OSHA Standards Board, 1006 Fourth St., Sacramento, CA 95814.



Figure 2:
Grievances can be filed on the basis of health and safety violations. (Graphic: LOHP.)

11. GENERAL HEALTH AND SAFETY LAWS

CHAPTER 1. CAL/OSHA: THE CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

A. What Cal/OSHA Can Do For Workers

All California foundry workers are covered by Cal/OSHA, the state government's department for job safety and health, which is authorized by the California Labor Code (CLC). Among the very few exceptions are federal government employees. Cal/OSHA is a unit of the state's Division of Occupational Safety and Health (DOSH). Cal/OSHA makes the codes and standards listed in this book as Title 8, California Administrative Code (8 CAC).

Cal/OSHA enforces the law by making inspections of workplaces, requiring employers to correct health and safety violations, and fining employers for breaking the codes.

If you use Cal/OSHA's services, you have these rights:

1. The right to complain to Cal/OSHA about unsafe conditions (by calling or writing the Division of Occupational Safety and Health, which has offices throughout California, listed in telephone directories) and have your name kept confidential. [CLC 6309]
2. The right to have a worker representative (e.g., shop steward) accompany the Cal/OSHA inspector on the "walkaround" inspection of the foundry and the right to speak individually with the inspector in private. [CLC 6314(d)]
3. When Cal/OSHA gives the employer a citation(s) during or after the inspection, the employer must post the

citations(s) for you to see (near the place where the citation was given) for at least three days. [CLC 6408(b)]

4. Your employer cannot fire you or punish you in any way for complaining to Cal/OSHA. [CLC 6310, 6312] If the employer does, you may appeal within 30 days to the California Labor Commissioner for help. [CLC 6310, 6312] There are also possible federal appeals.
5. If your employer appeals any Cal/OSHA citation or fine, you have a right to participate in the appeals hearing and any later appeals. In order to do this, you must write to Cal/OSHA and say that you wish to "elect party status." [CLC 6601, 6602, 6603, 6614, 6627]

B. What Cal/OSHA Can Do For Employers

In addition, employers may also use Cal/OSHA services. Cal/OSHA has a free Consultation Service available to both employers and worker organizations. Safety engineers and industrial hygienists will provide on-site information about occupational safety and health matters. This service does not include enforcement of Cal/OSHA codes or standards--just advice.

C. The Limitations of Cal/OSHA

Workers can't rely solely on Cal/OSHA to protect themselves from workplace hazards. Some of the limitations of Cal/OSHA include:

1. There is often a large backlog of complaints that may create long waits for an inspection. For complaints which seem to be reasonable, DOSH has

three days to respond to an alleged serious violation and 14 days to respond to a nonserious violation. The condition is considered serious if there is a substantial possibility that death or serious injury could result. [CLC 6309]

2. There are some hazards for which there are no applicable standards, or inadequate standards. While an inspection may cite an employer under the General Duty Clause [CLC 6400] where there is no applicable standard, these citations are hard to uphold and rarely used.
3. If an employer takes reprisals against a worker for making a health and safety complaint, it's often difficult and time consuming for the worker to make a good legal case of discrimination.
4. Fines are often very small, and may be reduced even further on appeal; they do not often give an employer an incentive not to repeat a violation.

Because of these limitations, workers must pursue other activities, in addition to utilizing Cal/OSHA, in order to improve workplace health and safety. Other activities that have been utilized include collective bargaining for strong health and safety clauses in the union contract and development of active health and safety committees at the worksite.

A SUMMARY OF WORKERS' HEALTH AND SAFETY RIGHTS

1. Workers have the right to a safe and healthy workplace. [CLC 6400-6405]

2. Workers have the right to refuse to do a job which creates a real and apparent hazard and violates California health and safety law. [CLC 6311] Note: This is a difficult right to exercise successfully. Call Cal/OSHA or LOHP for assistance.

3. Workers may not be fired or punished in any way for asking for their health and safety rights. [CLC 6310, 6312]

4. Workers have the right to know about hazardous substances they are exposed to on the job, including the health effects and proper uses of such substances. [CLC 6361(a)] (For more detail, see "Right to Know" laws, section III in this book, Chapter 3A.)



Figure 3:

Workers can refuse to do work which violates California health and safety law and is a real and apparent danger to their health. (Graphic: LOHP.)

CHAPTER 2. EMPLOYERS' HEALTH AND SAFETY DUTIES

A. Workplace Inspections, Education, and Training

1. Employers must regularly inspect the workplace hazards and correct any unsafe conditions that are found. [8 CAC 3203(a)(2)]
2. Employers must have a training program for job health and safety. If a worker's job has special hazards or dangers, the training must include special instructions. [8 CAC 3203(a)(1)]
3. The employer must post the Cal/OSHA notice "Safety and Health Protection on the Job" where it can easily be seen. (This poster has important information about workers' rights.) [8 CAC 340]

B. Medical and Exposure Records

1. Medical and exposure records must be made available upon request (for reading and copying) to workers, ex-workers, their unions and other representatives. Exception: individual medical records are only available to the individual worker unless he/she gives written permission for the union or others to see the records. [8 CAC 3204(e)]
2. The types of employer's records which must be made available include:
 - medical examinations (including tests, diagnoses, and treatments) that the employer possesses and/or has paid for. [8 CAC 3204(b),(e)]

- past or present workplace exposures to hazardous substances or physical agents (heat, noise). [8 CAC 3204(b), (e)]
 - any study or research results which are based on worker health records. [8 CAC 3204(b), (e)]
 - Material Safety Data Sheets (MSDS) for any hazardous substances to which the worker has been exposed. [8 CAC 3204(b), (e)]
3. The employer may refuse to give the worker part of these records only if:
 - a doctor thinks it would be bad for the worker's health to see the records. (The worker's representative must still be allowed to see the records in such a case.) [8 CAC 3204(e) (2) (B) (4)-(5)]
 - the records have specific information about trade secrets. [8 CAC 3204(f)]
 4. Employers must give workers their records within 15 days of the workers' request. [8 CAC 3204(e) (1) (A)].
 5. Employers must notify workers at least once a year about what medical and exposure records they have and how workers can get them. [8 CAC 3204(g) (1)]
 6. Employers must keep medical and exposure records for at least 30 years. [8 CAC 3204(d)]
 7. Whenever a worker has been exposed to more than the maximum allowed level of a hazardous substance, or physical agent, the employer must promptly inform the worker in writing. [8 CAC 340.2]
 8. Whenever the employer does any measurements or testing required by Cal/OSHA, he must notify



Figure 4:
Workers have the right to see exposure records.
(Graphic: LOHP.)

the affected workers in advance. Workers have the right to watch the testing and find out the results. [8 CAC 340.1]

C. Reporting Work Injuries and Illnesses

1. Every employer with more than 10 employees must record within 6 days [8 CAC 14301(a), 14311(a)] any work injury or illness which:
 - needs medical treatment beyond first aid, or
 - results in any lost work days past the day of injury, or
 - results in restricted work ability or job transfer, or
 - is diagnosed work-related illness.
2. This information must be written in the employer's "Cal/OSHA Log" (Form 200). Form 200 contains information such as names, dates, type of injury or illness, and length of disability. [8 CAC 14301(b)]
3. At the end of each year, the information on the Form 200 must be added up and summarized in an "Annual Summary." The employer must post the Annual Summary where workers can easily see it and keep it posted at least for the month of February. [8 CAC 14305]
4. Workers, ex-workers, and worker representatives have the right to see the Form 200 and the Annual Summary, and must be given a reasonable opportunity to copy them. [8 CAC 14308(b)]

5. For every work injury or illness, all employers must also write a "Supplementary Report" (called an Employer's Report of Occupational Illness or Injury) which is available to state officials. [8 CAC 14304]
6. The employer must keep the Form 200, the Annual Summaries and the Supplementary Reports for at least five years. [8 CAC 14307]
7. If a worker is killed or seriously injured on the job, the employer must report the accident by telephone to the Division of Occupational Safety and Health within 24 hours. (A serious injury is one that results in more than one day of hospitalization, loss of a body part, or any serious permanent damage.) [8 CAC 342]

D. Medical Services and First Aid

1. Employers must make sure that medical personnel are available for advice if a worker is ill or injured. [8 CAC 3400(a)] If no clinic or hospital is near the foundry, someone who is trained in first aid must always be available. [8 CAC 3400(b)]
2. First aid supplies must always be complete and in good condition. [8 CAC 3400(c)]
3. A worker has the right to be treated by his or her own personal doctor for any job injury if:
 - before the injury, the worker has told the employer in writing the name of the doctor he or she wants in case of injury. [CLC 4600]
 - after the injury, a worker who has not designated a personal physician in advance may be sent to any doctor the employer chooses, and must wait up to 30 days before being transferred to his or her own doctor.

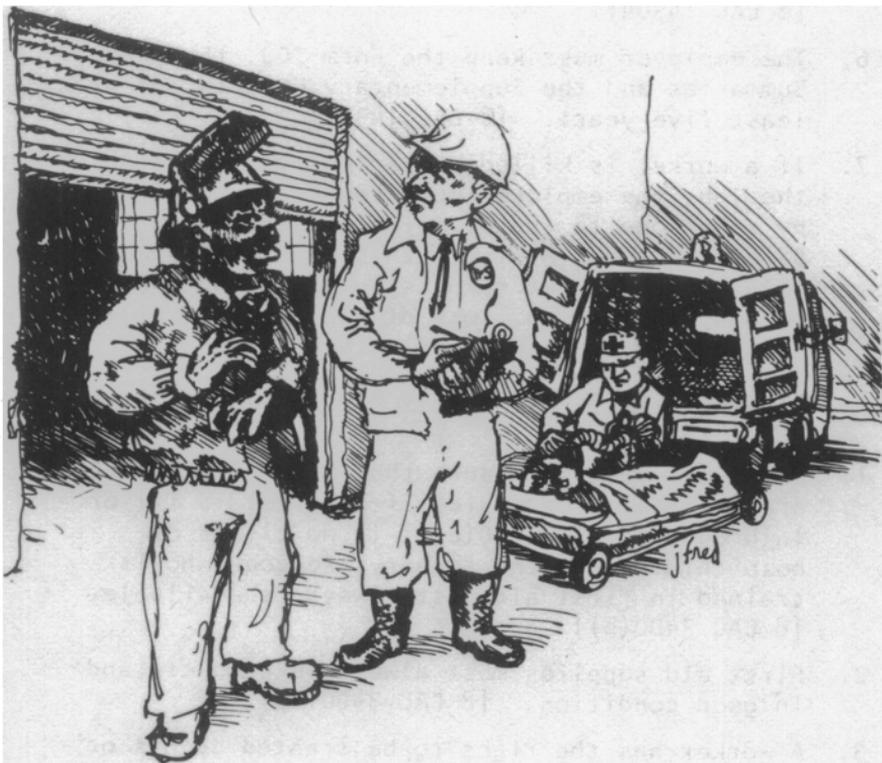


Figure 5:
Employers must report serious injuries to DOSH within 24 hours. (Graphic: LOHP.)

III. HEALTH REGULATIONS

CHAPTER 3. HAZARDOUS SUBSTANCES

A. "Right to Know" Laws

[Foreword: A California "Right to Know" law was passed in 1980 and is known as the Hazardous Substance Information and Training Act. Under this law, a hazardous substance is anything (gases, dusts, metal fumes, liquids, etc.) which can cause short or long term illness or injury. However, the new Cal/OSHA regulations presented here, which enforce this Act, will not be effective until sometime during the last six months of 1982. For more current information, call your local Cal/OSHA office.]

1. Employers must collect information on all hazardous substances workers may be exposed to during normal work operations or during emergencies (spills, explosions, equipment failures, etc.) For each hazardous substance he buys, the employer must ask for a "Material Safety Data Sheet" (MSDS) from the manufacturer or seller. [8 CAC 5194(c)(1)]

The MSDS has this information [CLC 6391]:

- a. chemical and common names;
 - b. health effects of substance, in common language;
 - c. how to work safely with the substance, and what protective equipment to use;
 - d. fire or explosive hazards, and emergency procedures.
2. Employers must inform workers of all hazardous substances in their work area and tell them how

they may see the MSDS for each substance [8 CAC 5194(c)(5)] by:

- posting a list where easily seen, or
 - giving written notice, or
 - putting the MSDSs in notebooks out in the work area where workers can easily see them.
3. During training, employers must give workers the information on the MSDSs for the hazardous substances in their work area. This may be done either in writing or verbally. This training must start for all workers, at most, 60 days after this law goes into effect, or 30 days after the employer has received the MSDS on the hazardous substance(s). Whenever the employer gets new health information to add to the MSDS for a hazardous substance, he must tell workers within 30 days [8 CAC 5194(d)]
 4. Upon request, MSDSs must be made available to workers, their representatives (e.g., unions) or their doctors within a reasonable amount of time. [8 CAC 5194(c)(2)] An employer may adopt procedures for responding to such requests in a reasonable time so that work is not interrupted. [8 CAC 5194(c)(3)]
 5. If an employer does not have a MSDS for a substance a worker wants to know about, the employer must request information from the manufacturer within 7 days (unless he has already tried to get it in the past 12 months). [8 CAC 5194(c)(4)(B)]
 6. Employers must tell workers about their rights under this law and that workers cannot be fired or punished in any way for using their rights. [8 CAC 5194(d)(6)]

B. Labelling Hazardous Substances

1. Containers of harmful substances must be labelled with the chemical or common name (not just the brand name) and the appropriate warnings as listed in Section 5228 (see #2). [8 CAC 5227(a)(b)]
2. Section 5228 shows the special warning labels which must be put on certain dangerous chemicals. Some of these which may be found in foundries [8 CAC 5228] are:

Acrolein	Methanol
Cyanide	Phenol
Formaldehyde	Phosphoric Acid
Hydrogen Chloride	Sulfur Dioxide
Hydrogen Sulfide	Sulfuric Acid
Isocyanates	Trichloroethylene

3. If mixtures of different chemicals are hazardous because they are flammable, corrosive, or poisonous, they must be labelled with warnings of their dangers. [8 CAC 5227(c)(2)]
4. If mixtures contain certain specific chemicals like acrolein, formaldehyde, methanol, phenol, or any chlorinated hydrocarbons, they must list those chemicals and their special warnings separately on the label. [8 CAC 5227(c)(1)]
5. Whenever they contain hazardous substances, all pipes must be marked or color coded. [8,CAC 3321]
6. Any container with a cancer-causing substance (carcinogen) in it must be labelled in large letters: CANCER SUSPECT AGENT. [8 CAC 5209 (e)(2)]



Figure 6:
Silica dust levels often exceed the maximum limit in foundries. (NIOSH Good Practice Manual for Insulation Installers. August, 1977.)

C. Foundry Air Pollutants: Dusts, Gases, Fumes and Vapors

1. Title 8 of the California Administrative Code, Section 5155 (8 CAC 5155) lists the maximum permitted air levels for hundreds of toxic chemicals, gases, and dusts which may have short and/or long-term health effects. These legal limits apply to many air pollutants found in foundries, including:
 - a. Metal Fumes - Aluminum, Beryllium, Cadmium, Chromium, Cobalt, Lead, Iron, Magnesium, Manganese, Nickel, Thallium, Zinc.
 - b. Gases - Ammonia, Carbon Dioxide, Carbon Monoxide, Hydrogen Chloride, Hydrogen Sulfide, Nitrogen Dioxide, Sulfur Dioxide, Ozone.
 - c. Vapors (mostly from resins) - Acetone, Acrolein, Carbon Tetrachloride, Epoxy Resin, Ethanol, Formaldehyde, Ferran Resin, Isopropyl Alcohol, Phenol, Phosphoric Acid, Sulfuric Acid, Toluene, Trichloroethylene, Triethylamine, Urethane.
 - d. Dusts - Silica, Asbestos, Talc, Carbon Black.

Air testing (e.g., by an OSHA inspector) must be done to establish whether air pollutants are over the limit [8 CAC 5155].

D. Monitoring Air Quality

1. Employers must closely watch air conditions in the work area and regularly evaluate the air for increases in the content of harmful substances or for new toxic substances. [8 CAC 5144(f)(3)]
2. Whenever it is reasonable to expect that dust, gases, or fumes are over the maximum permitted

TABLE AC-1—Continued
CHEMICAL CONTAMINANTS

Chemical Abstracts Registry Number	Skin	Name	PEL		Ceil- ing
			ppm	mg/M ³	
110905	S	Cellosolve; 2-ethoxyethanol	100	370	
111159	S	Cellosolve acetate; 2-ethoxyethyl acetate	100	540	
PM9004346		Cellulose (paper fiber)	-	10 ⁽¹⁾	
21351791		Cesium hydronide	-	2	
57749	S	Chlordane; 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane	-	0.5	
MX8001352	S	Chlorinated camphene	-	0.5	
		Chlorinated diphenyl oxide	-	0.5	
7782905		Chlorine	1	3	C
10049044		Chlorine dioxide	0.1	0.3	
7790912		Chlorine trifluoride	0.1	0.4	C
107300		Chloroacetaldehyde	1	3	C
532274		alpha-Chloroacetophenone; phenacyl chloride	0.05	0.3	
108907		Chlorobenzene; monochlorobenzene	75	350	
2698411	S	o-Chlorobenzylidene malononitrile; OCBM	0.05	0.4	
74975		Chlorobromomethane	200	1,050	
126998	S	2-Chloro-1,3-butadiene; chloroprene	25	90	

Figure 7:

CAL/OSHA Standards which regulate maximum permitted air levels for hundreds of substances are contained in Title 8, CAC, Section 5155. A sample page is shown above. "PEL" means "Permissible Exposure Limit" (usually an average over an eight-hour work day unless shown as a Ceiling). The PEL may be expressed in "ppm" (parts of the substance per million parts of air), "mg/M³" (milligrams of the substance per cubic meter of air), or both. Common measuring instruments read in one of these two ways.

Pump and filter assembly.

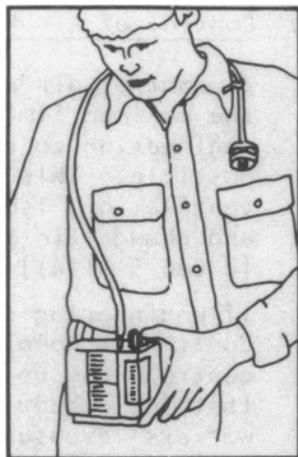
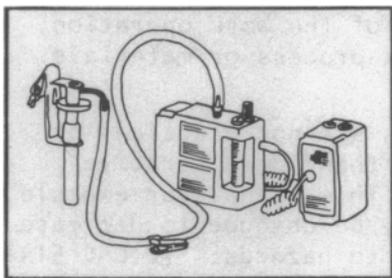


Figure 8:
Air testing equipment. (Graphic: LOHP.)

levels, the employer must have air levels tested or monitored by a qualified person. [8 CAC 5155 (e)(1)(3)]

3. Whenever air pollutants are proven to be (or even expected to be) over the maximum permitted level, control measures (see next section) must be taken. [8 CAC 5155(e)(2)]

E. Control of Air Pollutants

1. To control air pollutants and keep them below the maximum limits, the employer must first try engineering controls, whenever reasonably possible. This kind of control includes ventilation, isolation of the work operation, and changes in the work process or materials. [8 CAC 5141(a)]
2. If engineering controls are not practical or don't work completely, then administrative controls may be used. This means, for example, that job scheduling may be changed to decrease workers' exposure time to hazards. [8 CAC 5141 (b)]
3. Respirators may be used only:
 - when it is clearly not feasible (i.e., not reasonably possible) to use engineering and administrative controls as described in #1 and #2. [8 CAC 5141(c)]
 - when engineering and administrative controls do not provide complete protection from air pollutants. [8 CAC 5141(c)]
 - in emergencies. [8 CAC 5141(c)]

Exceptions: Approved respiratory equipment is required in the following foundry jobs:

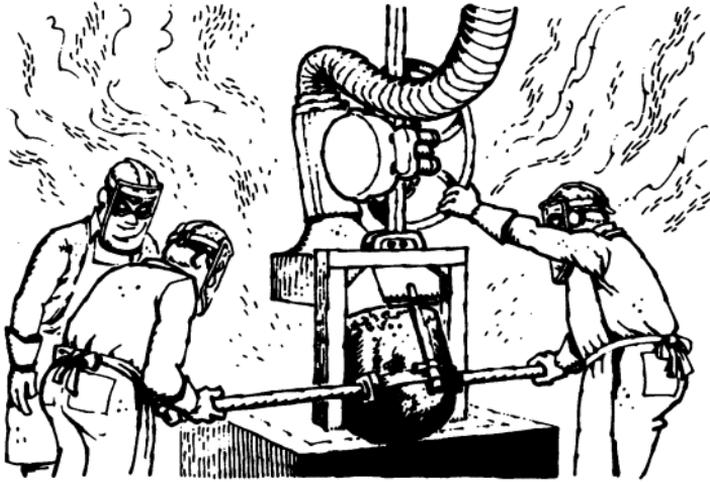


Figure 9:
When possible, local exhaust ventilation, like this portable pouring hood, should be used. (NIOSH Health and Safety Guide for Foundries. April, 1976.)

- spray booth operators (when downstream from the sprayed object; see Spray Coating, chapter 9.C).
- certain blasting operations (see Abrasive Blasting, chapter 9.B).
- certain types of welding (see Welding, Brazing and Cutting, chapter 9.A).

Note: Procedures for selection, use and maintenance of respirators are found in Chapter 4E.

4. Mechanical ventilation systems (local or general) must:
 - be effective enough to carry away dust, fumes, and gases which are present in harmful amounts. [8 CAC 5143(a)(1)]
 - be operated constantly during the operation and also for the necessary amount of time afterward. [8 CAC 5143(b)]
 - dispose of the dirty air safely into the outside air. [8 CAC 5143(c)(1)]
 - supply make-up air which is clean and fresh. [8 CAC 5143(d)]
 - be tested for ventilation rate at least once a year. [8 CAC 5143(a)(5)]
5. If exhaust from a vehicle (or any internal combustion engine) combined with poor ventilation leads to air pollutant levels (of carbon monoxide, for example) over the permitted maximum, exhaust purifiers must be used. [8 CAC 5146(a)]

F. Cancer-Causing Agents (Carcinogens)

At least two recognized and officially regulated cancer-causing substances (carcinogens) may be found

in foundry air--BCME (bischoloromethyl ether) and asbestos. There are currently 20 officially regulated carcinogens altogether under California law. [8 CAC 5209(a)] Probably many more hazardous substances will be added to the list of regulated carcinogens in the coming years; hundreds of substances are suspected of being carcinogens. The fact that a substance is not now included on the list does not mean it is not as dangerous as those listed.

BCME, a gas byproduct of certain resins, is formed from formaldehyde and hydrogen chloride. Asbestos may escape into the air from riser sleeves when cut or during shakeout. Special, highly restrictive procedures must be followed whenever workers are exposed to these substances. A short summary of these regulations is presented here.

1. BCME Regulations

- a. Any process producing BCME must be done in a restricted area in an isolated or closed system where it can't escape into the air. [8 CAC 5209(c)]
- b. Clear warning signs and instructions must be posted in the restricted area. [8 CAC 5209(e)(1)]
- c. If it must be released into air during transfer of materials, only authorized workers working with laboratory-type hoods and continuous flow supplied-air respirators may be exposed to BCME. [8 CAC 5209(c)(4)]
- d. Workers must be thoroughly trained to work with BCME and be told about all the relevant regulations. [8 CAC 5209(e)(5)]

- e. The employer must report the presence of BCME at the workplace and any incidents of worker exposure to DOSH. [8 CAC 5209(f)]
 - f. Medical examinations at no cost must be given at least yearly to exposed workers. [8 CAC 5209(g)]
2. Asbestos Regulations:
- a. When possible, asbestos must be worked with wet. [8 CAC 5208(c)(1)]
 - b. Where asbestos air levels may be over the the maximum level permitted, the employer must test the air at least every 6 months. [8 CAC 5208(g)(1)]
 - c. Various special respirators must be used depending on the air level of asbestos. [8 CAC 5208(d)]
 - d. If air levels are over the maximum, whole body protection must be worn and locker rooms with two lockers per worker (to keep work and street clothes separate) must be provided. [8 CAC 5208(e)]
 - e. Caution signs must be posted wherever asbestos might be above the maximum allowed limit. [8 CAC 5208(h)] Caution labels must be put on all products containing asbestos. [8 CAC 5208(i)]
 - f. Special medical exams must be provided to any worker exposed to asbestos. [8 CAC 5208(j)]

CHAPTER 4. PROTECTIVE EQUIPMENT
AND CLOTHING

A. General

1. The employer must:
 - a. supply protective equipment which is appropriate for the hazard and adequately protects the worker. [8 CAC 3380(a)]
 - b. supply equipment which is reasonably comfortable and does not interfere too much with work tasks. [8 CAC 3380(e)]
 - c. train workers to use protective equipment according to the manufacturer's instruction. [8 CAC 3380(c)]
 - d. make sure any worker-owned protective equipment is well maintained and meets the standards of the Division of Occupational Safety and Health (DOSH). [8 CAC 3380(d)]
 - e. provide any protective equipment which is called for on the label of hazardous substances. [8 CAC 5229]
2. The employer must purchase and supply any protective equipment the worker is required to wear because of company policy or OSHA regulations. Workers cannot be required to buy their own personal protective equipment or safety devices. [CLC 6401, 6403] [Upheld by California Supreme Court, Bendix Forest Products Corp. v. Dept. of Industrial Relations, 25 Cal. 3d 465 (1979)]

B. Safety Boots and Gloves

1. Foot protection must be worn whenever a worker's feet are exposed to hot or corrosive substances,

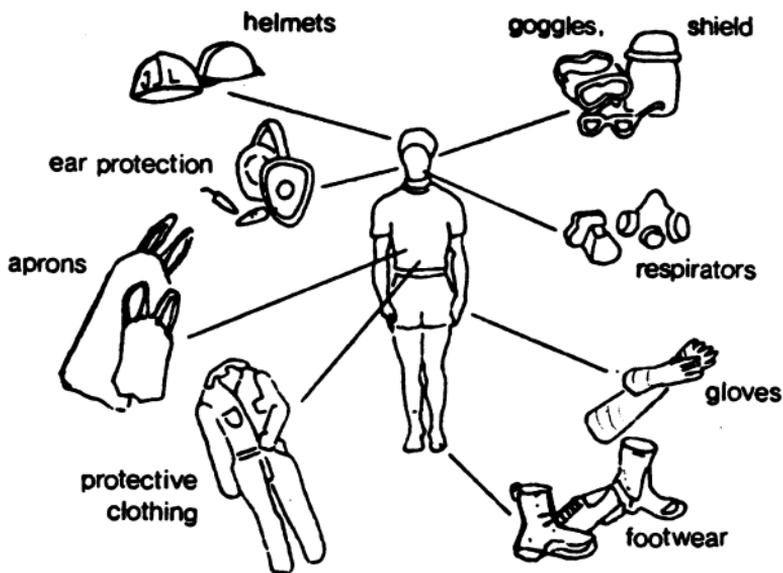


Figure 10:
Employers must pay for all necessary protective equipment. (NIOSH Health and Safety Guide for Manufacturers of Woodworking Machinery. March, 1979.)

or falling or crushing objects. [8 CAC 3385 (a)]

2. Any boots or shoes worn on the job must be safe enough to protect workers' feet from possible injury. [8 CAC 3385(b)]
3. Safety-toe boots must meet the requirements of the American National Standard for Men's Safety-Toe Footwear. [8 CAC 3385(c)]
4. When hands are exposed, in any unusual or excessive way, to burns, cuts, harmful chemicals, or physical agents, hand protection must be supplied and worn. [8 CAC 3384]

C. Body Protection and Work Clothes

1. Only proper work clothes are allowed. The law prohibits clothing which:
 - could get caught in machinery. [8 CAC 3383 (b)]
 - is dirty or soaked with flammable liquids or corrosive chemicals. [8 CAC 3383(c)]
2. Workers who are exposed to hazardous or flying objects or substances may be required to wear body protection. [8 CAC 3383(a)] But shields, guards, or covers must be tried first whenever possible. [8 CAC 3303]
3. Whenever harmful substances in the air may be taken into the body through the skin, protective clothing must be supplied and worn. [8 CAC 5155 (d)] (Section 5155 lists which air pollutants are absorbed through the skin.)
4. Emergency showers and eye wash fountains must be provided in areas where workers are exposed to harmful, corrosive substances or materials (e.g. acids). [8 CAC 3400(d)]

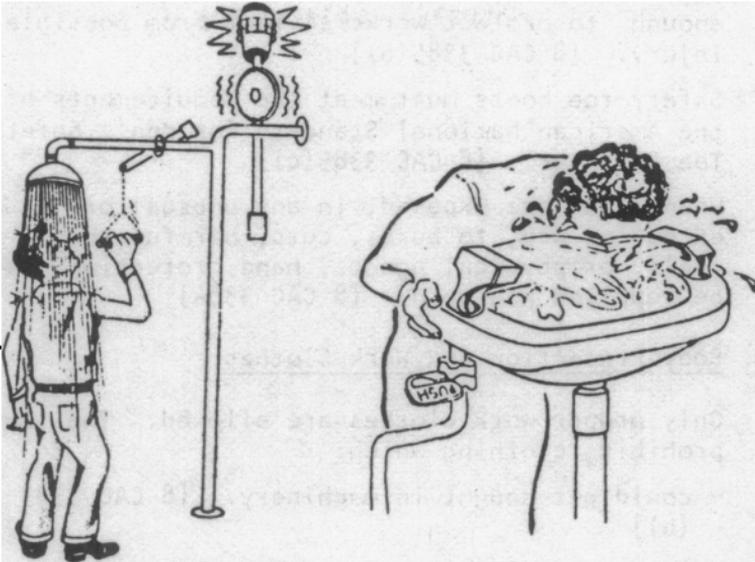


Figure 11:
Emergency shower and eye wash facilities must be present where corrosive or highly toxic chemicals are used.
(NIOSH: *Carcinogens- Working With Carcinogens*. August, 1977.)

D. Eye, Face and Head Protection

1. Proper eye and face protection must be worn whenever workers' eyes may be injured [8 CAC 3382(a)] by:
 - flying or projecting objects;
 - hazardous substances; or
 - light rays.
2. Workers who wear glasses must be given appropriate safety goggles, such as the kind that fit over glasses. [8 CAC 3382(c)]
3. Workers whose heads are exposed to flying or falling objects or to burns must be given helmets which meet the American National Standards Institute Safety Requirements. [8 CAC 3381]
4. For hearing protection, see "Noise Control" (Chapter 5.B).

E. Respirators

1. See "Control of Air Pollutants" (Chapter 3.E) to find out about air conditions for which respirators are required.
2. Employers must have written operating procedures for respirator selection, use, training and maintenance. [8 CAC 5144(f)(1)]
3. The correct type of respirator, in accordance with the American National Standard Practices for Respiratory Protection, shall be used for each job. [8 CAC 5144(f)(2)]
4. Only respirators and spare parts which have been approved by the National Institute for Occupational Safety and Health (NIOSH) or the Mining Enforcement and Safety Administration (MESA) may be used. [8 CAC 5144 (b)]

5. The employer must repair or replace respirators when necessary. [8 CAC 5144(d)(1)]
6. Respirator training must include the following [8 CAC 5144(c)]:
 - their proper uses;
 - their limitations (what they can't do);
 - their proper maintenance and sanitary care;
 - how to check the facepiece fit;
 - testing of the respirator in normal air and in a test atmosphere.
7. Respirators must have a tight seal between facepiece and face. [8 CAC 5144(c)]
8. Supplied respirator air must be pure and free of dust, fumes and gases. [8 CAC 5144(e)]
9. Employers must make sure that routinely used respirators are regularly inspected, cleaned, and sanitized by a qualified person. [8 CAC 5144(d)(2)] Different workers can use the same respirator, if it has been cleaned and sanitized between uses. [8 CAC 5144(d)(3)] Exception: Filter-type respirators must not be used by more than one worker. [8 CAC 5148(d)]
10. Respirators must be stored where they are protected from dirt and damage. [8 CAC 5144(d)(4)]
11. A worker should not be assigned work using a respirator unless a doctor has determined that her/his health allows it. Yearly health check-ups should be provided for workers who use respirators. Contact lenses should not be worn when respirators are needed. [8 CAC 5144(h)]

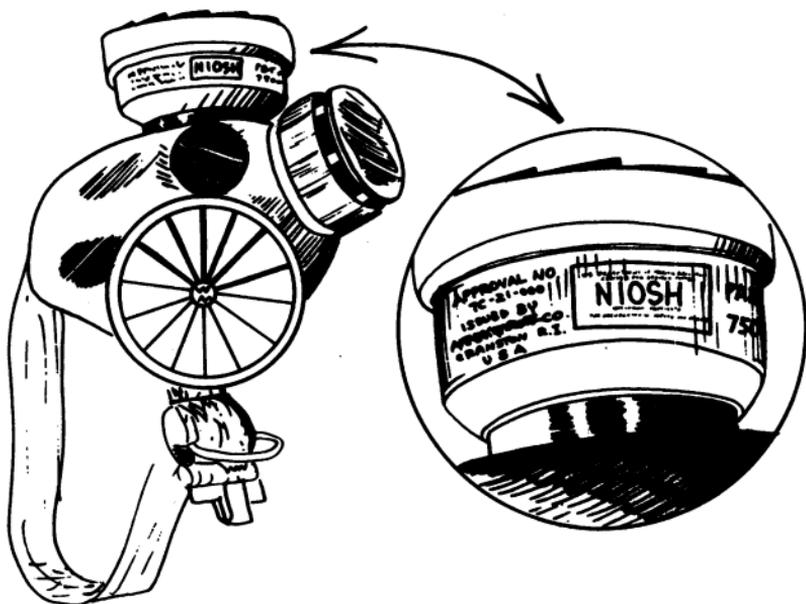


Figure 12:
Only NIOSH or MESA approved respirators may be worn.
(NIOSH: *Safety and Health in Arc Welding, Gas Welding,
and Cutting*. January, 1978.)

CHAPTER 5. NOISE

A. Maximum Noise Levels

Over an eight-hour work shift, workers cannot be exposed to a noise level which averages more than 90 dBA. (This means that the average or "time weighted" noise level over eight hours may not exceed 90 decibels, a unit of sound measured on a scale called the "A" scale.) For shorter periods of time, more noise is allowed. The adjacent table shows how much time each day a worker may be exposed to different noise levels.

The noise standards are contained in 8 CAC 5097. Note that if, during the day, a worker is exposed to any noise level over 90 dBA for the maximum period (for example, 100 dBA for two hours), then for the rest of the day she or he must only be exposed to noise less than 90 dBA.

Good medical evidence has been developed to support lowering the noise standard to 85 dBA (eight-hour time weighted average). Many competent authorities, including federal NIOSH, have recommended an 85 dBA standard, but there is no assurance that it will be adopted.

B. Noise Control and Monitoring

1. When noise is greater than the maximum permitted level (see Noise Table), the employer should try to reduce noise whenever reasonably possible, by making changes in the work area or process (engineering controls) or in work scheduling (operational controls.) [8 CAC 5098]
2. If noise is still too high after engineering and operational controls have been tried, an effective "hearing conservation program" must be followed. [8 CAC 5098] This includes:

- providing and maintaining acceptable ear protectors (plugs or muffs), [8 CAC 5099(a) (d)]
- teaching workers when and how to use ear protectors. [8 CAC 5099(b)]

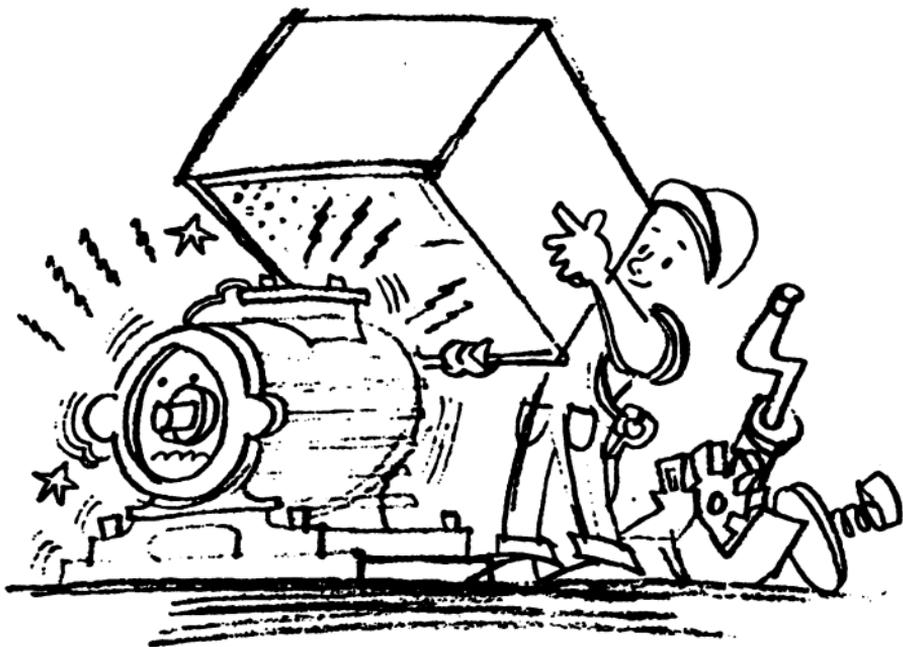


Figure 13:
Noise control must start at the source whenever possible. (UAW Social Security Department: Noise Control - A Worker's Manual. February, 1978.)

NOISE TABLE

Sound Level	Maximum Exposure Per Day	Speaking Difficulty Between Two People	Foundry Examples
1. 85 dBA	unlimited	·normal voice at 1 ft ·raised voice at 2 ft	·diesel truck (40 mph at 50 ft) ·torch cutting
2. 90 dBA	8 hours	·normal voice at 1/2 ft ·raised voice at 1 ft ·shout at 2 ft	·boiler room
3. 95 dBA	4 hours	·shout at 1 ft	·none available
4. 100 dBA	2 hours	·shout at 1/2 ft	·jolt squeeze machine ·tumbler 6'x3', small castings
5. 105 dBA	1 hour	·shout with hands cupped into other person's ear	·grinding of castings ·pneumatic air hose ·electric furnace
6. 110 dBA	30 minutes	·very difficult to communicate by voice	·casting shake out area ·electric arc cutting
7. 115 dBA	15 minutes	·nearly impossible to communicate by voice	·pneumatic chipper at 5 ft

Excerpted from Health and Safety Guide for Foundries, National Institute for Occupational Safety and Health, 1976, p.34.

Figure 14.

CHAPTER 6. EATING AND WASH UP AREAS

A. Eating and Drinking

1. Food and drinks cannot be stored, eaten or drunk in toilet rooms or in areas which are contaminated with hazardous substances. [8 CAC 3368 (b)]
2. There must be plenty of clean drinking water. [8 CAC 3363(a)] Drinking fountains must be kept clean and be separate from toilet rooms. [8 CAC 3363(b)]
3. Where there are no drinking fountains, throw-away cups must be provided. [8 CAC 3363(h)] Cups cannot be used by more than one person. [8 CAC 3363(g)]
4. Non-drinking water must not be used for drinking or washing of any kind (including bathing and clothes washing.) [8 CAC 3363(i)]

B. Showers and Sinks

1. Whenever needed in order to maintain healthful conditions, there must be a locker room with lockers, hot showers, and sinks available. [8 CAC 5148(c)]
2. For each ten workers who need to shower, there must be one shower. Soap and towels must be provided. [8 CAC 3366(h)]
3. There must be a sink in or near every room with a toilet. [8 CAC 3364(h)]
4. Sinks must be clean and in good working condition. [8 CAC 3366(b)] Soap and towels must be provided. Warm water (at least 85° F) must be available whenever carcinogens or hazardous substances which may be absorbed



Figure 15:
No eating or drinking in contaminated areas is permitted.
(NIOSH Health and Safety Guide for Grain Mills. April, 1975.)

through the skin. (as listed in 8 CAC 5155) are used in the workplace. [8 CAC 3366(e)(f)]

Foundry examples of such substances are: asbestos, BCME, cyanide, methanol and toluene.

5. The total number of sinks must be at least one for every 10 workers up to 100 (then one for every 15 workers over 100). When long, multi-faucet sinks are used, each faucet head counts as one sink. [8 CAC 3366(c)]
6. Sinks and showers (if required) must be reasonably accessible to all workers. [8 CAC 3366(a)]

C. Toilets

1. Toilets must work well and be kept clean. They must always be open to workers and should not be more than 200 feet from the workplace. [8 CAC 3364(c)]
2. Each toilet must have its own private stall. [8 CAC 3365(a)]
3. Men and women must have separate toilets. [8 CAC 3364(a)]
4. For each sex, the minimum number of toilets [8 CAC 3364(a)] is:

<u>number of workers</u>	<u>number of toilets</u>
1-15	1
16-35	2
36-55	3
56-80	4
81-110	5
111-150	6
over 150	6+one for every 40 workers

Note: urinals may substitute for one-third of toilets.

IV. SAFETY REGULATIONS

CHAPTER 7. GENERAL RULES FOR WORKPLACE SAFETY

A. Housekeeping and Cleaning

1. All areas of the workplace must be kept as neat and clean as possible. [8 CAC 3362(a)]
2. Dust and debris from hazardous substances must not build up on surfaces in or around work areas. (Hazardous substances are discussed in Chapter 3.) [8 CAC 5148(a)]
3. Walkways, aisles, ladders and stairways must be kept clear and in good condition. [8 CAC 3272(b)(c)]
4. Floors and platforms must stay clear and be kept in good condition. They must not be wet or greasy. Slippery floors must be protected. [8 CAC 3273(a)]
5. Yard areas must be kept clear of obstructions. [8 CAC 3273(b)]
6. Storage material must be stacked or racked so that there is no danger of falling or spreading. Bins, racks, or blocks must be used if necessary. [8 CAC 3241(k)]

B. Walkways and Exits

1. At all times, workers must be able to exit easily through clearly marked exit doors. [8 CAC 3225(a), 3216(a)]
2. Walkways and aisles along the exit paths must be at least two feet wide and 6 feet, 8 inches high. [8 CAC 3272(b)]



Figure 16:
Exits must be clearly marked and unobstructed. (NIOSH
Health and Safety Guide for Grain Mills. April, 1975.)

C. Decks, Platforms and Floors

1. Every work area above the floor which is frequently used must have a safe platform or maintenance runway and a permanent ladder, ramp, or stairway. [8 CAC 3270(b)]
2. Platforms, decks, and ramps more than 30 inches above the ground must have guard rails on their open sides. Work areas higher than six feet from the floor where there is danger of falling must also have toe-boards. Exceptions to these rules [8 CAC 3210(a)] are:
 - open hearth and hot metal pouring platforms; and
 - platforms, ramps, etc. built before 1967 which are less than four feet off the floor.
3. When workers must walk over conveyors, proper crossovers with standard railings, toe-boards, and a fixed ladder, ramp or stairway must be provided. [8 CAC 3999(e)]
4. Floors must be constructed to safely support the maximum load of normal use. [8 CAC 3241(a)]
5. In every building, the official floor capacity must be clearly posted. [8 CAC 3241(i)] Note: for specific floor weight-bearing capacities, see 8 CAC 3241.

D. Sandpiles, Pits, Open Holes and Tanks

1. Whenever there is danger of a cave-in from climbing on sandpiles, chutes or conveyors, workers must have a safety belt, life line, and the help of another worker. [8 CAC 3482(a)]
2. When not in use, foundry pits must be covered or guarded. [8 CAC 3212(a)]

3. Floor openings, holes, hatchways, and chutes must at all times be either guarded, covered, or attended by a worker. [8 CAC 3212(a)]
4. When hazardous substances are stored in open vats or tanks where workers could fall, they must be covered or guarded. [8 CAC 3480 (a)]

E. Stairs and Ladders

1. Stairs must be provided between floors or platforms where there is regular travel. Stairs must also be provided to areas where there is daily maintenance or inspection and where workers must carry tools or be exposed to hazardous substances. (Exceptions: overhead travelling cranes and elevated tanks.) [8 CAC 3234 (b)]
2. Stairways must be clear, have slip resistant treads, and be well maintained. [8 CAC 3231 (d)]

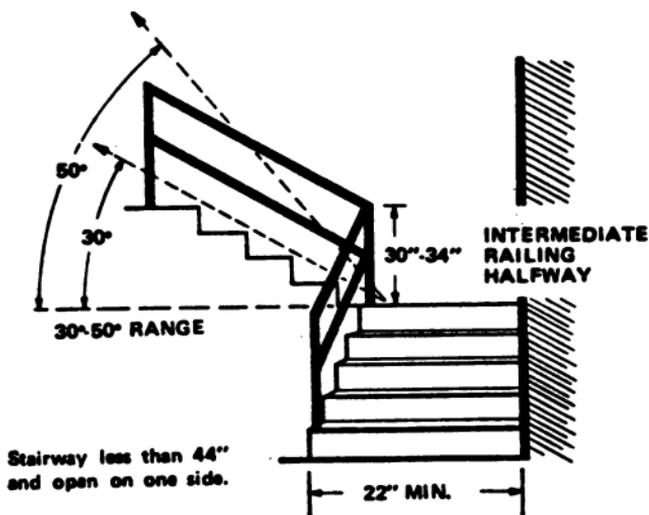


Figure 17: Specifications for industrial stairs. (NIOSH Health and Safety Guide for Foundries. April, 1976.)

3. Stairs must rise at an angle of 30 to 50 degrees. [8 CAC 3234(e)(1)]
4. All stairways of more than three steps must have at least one handrail (two for stairs wider than 44 inches.) All open sides of stairways, regardless of width, must have handrails. [8 CAC 3214(a)] Handrails must be continuous, easy to grasp and strong enough to hold a 200 pound load. [8 CAC 3214(c),(f)]
5. Portable ladders must always be kept in good working condition. [Wood ladders: 8 CAC 3278(e)(1); metal ladders: 8 CAC 3279(d)(2)] They may not be used with broken steps, cleats, rails or other faulty parts. Temporary repairs are not allowed. [Wood ladders: 8 CAC 3278(e)(14); metal ladders: 8 CAC 3279(c)(d)(5)]
6. Any defective ladder must be tagged "DANGEROUS -- DO NOT USE" and cannot be used until correctly repaired. [Wood ladders: 8 CAC 3278(e)(5); metal ladders: 8 CAC 3279(d)(5)]
7. Wood ladders must be placed so the side rails have a secure footing. [8 CAC 3278(e)(9)] Non-slip bases must be used when necessary. [8 CAC 3278(e)(26)] They must not be placed on boxes or other unstable bases to add height. [8 CAC 3278(e)(11)]
8. Metal ladders must not be used near electrical circuits and must be marked "CAUTION -- DO NOT USE NEAR ELECTRICAL EQUIPMENT." [8 CAC 3279(d)(13)]

CHAPTER 8. GENERAL SAFETY FOR MACHINES AND EQUIPMENT

A. Operating Rules

1. Machines and equipment which are dangerous because of bad or broken parts must not be used. [8 CAC 3328(c)]
2. Machines and equipment must not be dangerously overloaded or operated dangerously fast. [8 CAC 3328(a)]
3. Stationary machines must be secured so that they can't move during operation. [8 CAC 3328(d)]

B. Maintenance and Repairs

1. Machines and equipment must be maintained in safe operating condition. [8 CAC 3328(g)] When available, the manufacturer's recommendations for maintenance must be followed. [8 CAC 3328 (b)]
2. When machines or equipment are being cleaned or repaired, the following precautions must be taken [8 CAC 3314] whenever possible:
 - the power must be turned off.
 - machine controls must be locked out or fixed in the "off" position. Machines without lockable controls must be disconnected.
 - accident prevention tags or signs must be put on the controls.
 - moving parts must be blocked or locked.
 - if moving parts must be free in order to service the machine, extension tools or other protective methods must be provided and used. Workers must be trained properly in their use.

- machines must be secured or blocked to prevent movement.
3. Machine or equipment modifications must follow good engineering practices. [8 CAC 3328(f)]
- C. Safety Guards--General
1. Guards must be properly designed, built, and secured. [8 CAC 3942(a)]
 2. Machines and equipment must be designed, covered, or secured so that workers are protected if parts fall or break. [8 CAC 3328(e)]
 3. Dangerous parts which move back and forth or in circles must be guarded. Anything projecting out from these parts must also be guarded. [8 CAC 4002]
 4. Whenever workers can accidentally touch or fall on dangerous machine or motor parts, the parts must be fenced, shielded, or guarded. [8 CAC 3942(a)]
 5. Whenever flying substances or objects create a danger, adequate shields, guards, or covers must be provided. When guarding is not possible, workers must be given protective equipment or clothing. [8 CAC 3303]
 6. When practical, surfaces or pipes which are hot enough to burn skin (about 140° F) must be guarded or insulated if they are less than 15 inches from stairways, ramps, or ladders, or are less than 7 feet from the ground. [8 CAC 3308]
 7. The following machine parts must be guarded if they are less than 7 feet above a work area:
 - belt and pulley drives. [8 CAC 4070(a)]
 - V-belt and pulley (or step cone pulley) drives. [8 CAC 4070(c)]

- shafting. [8 CAC 4050(a)]
 - projecting shaft exits. [8 CAC 4051(a)]
 - collars and couplings. [8 CAC 4052(a)]
 - clutches, cut-off couplings, and clutch pulleys. [8 CAC 4052(b)]
 - gears and sprockets (shield guard or complete enclosure). [8 CAC 4075]
 - screw conveyors (complete covering or guard rails). [8 CAC 3999(a)]
8. All dangerous electric-power machines with fully automatic starters must have clear warning signs. [8 CAC 3320]

D. Safety Guards for Machine Operators

Note: These codes refer to "point of operation" guards--safety guards which are specifically designed to protect the worker operating a machine.

1. All point of operation guards must be properly set up, be safe, and be kept in good condition. [8 CAC 4186(b)]
2. All saws, cutting tools, and heads on machines must be kept sharp, secured, and well-adjusted. [8 CAC 4186(a)]
3. All point of operation guards must be close enough to the feed table so that workers' hands can't get caught in the machinery. [8 CAC 4186(b)] The maximum openings allowed between guard and feed table are listed in Section 4186.
4. All foot pedals, bars, or switches which control machines must be protected from accidental operation. [8 CAC 4185]

E. Hand Tools

1. Hand tools must be kept in good condition, stored safely, and used only by qualified workers for the correct purposes. Unsafe hand tools must not be used. [8 CAC 3556]
2. Special hand tools for moving materials must be easy and safe to use. Such tools must not be used in place of other required guarding or protection. [8 CAC 3330]

CHAPTER 9. SAFETY FOR SPECIFIC
MACHINES AND JOBS

A. Welding, Brazing and Cutting

1. A local exhaust ventilation system (a hood) must be used whenever feasible or practical. Otherwise, mechanical dilution ventilation (for example, a general air blowing system) may be used as long as the dust and air pollutant levels are kept below the maximums listed in Section 5155. (See Chapter 3.C.) [8 CAC 5150 (a)]

Exceptions: a hood must always be used when potentially hazardous materials are used indoors as base metals, fillers, coatings, fluxes, etc. Some of these materials [8 CAC 5150(b)(1)] are:

Beryllium	Mercury
Cadmium	Oxygen cutting of stainless steel
Chromium	Zinc
Fluorides	Inert-gas metal-arc welding
Lead	

2. Respirators must be used only when adequate ventilation is not feasible or practical. [8 CAC 5150(a)(2)] Appropriate supplied-air respirators must be worn. [8 CAC 5150(b)(3)]
3. No ventilation or respirators are required only if air pollutant levels are proven (by testing) to be below the permitted levels. [8 CAC 5150 (a)(3)]
4. Ventilation exhaust must be safely vented away from workers. [8 CAC 5150(b)(2)]
5. More safety standards for welding gas system procedures and for electric welding are found in 8 CAC 4794-4852.

B. Abrasive Blasting

1. Blast cleaning enclosures must be ventilated so that there is a continuous inward air flow through all openings. [8 CAC 5151 (a)(1)]
2. Blast cleaning enclosures [8 CAC 5151 (a)(2)] must have:
 - doors, windows and openings that keep dust from escaping;
 - doors which can be opened from both inside and out;
 - when hard abrasives are used, safety glass and screening in observation windows.
3. Eye and face protection must be worn by all workers near blasting operations. [8 CAC 5151 (b)(2)]
4. Supplied-air abrasive blasting respirators [8 CAC 5151 (b)(1)] must be worn:
 - inside blasting rooms;
 - whenever dust levels go over the allowed limit (see Figure 7);
 - when silica sand is used in blasting or toxic materials are blasted. Note: A dust filter may be used if concentration of silica is less than ten times the limit, but for no more than two hours per shift.

C. Spray Coating

1. When practical, spray coating must take place in a special spray room or booth. In any case, no spraying is allowed outside established spray areas. [8 CAC 5453 (a), 5153 (a)]
2. Spray booths must have adequate ventilation during and after the spraying until the air is cleared. [8 CAC 5153 (b)] (See air velocities in 5153 (e).)
3. Exhaust from spray operations must not be recircula-

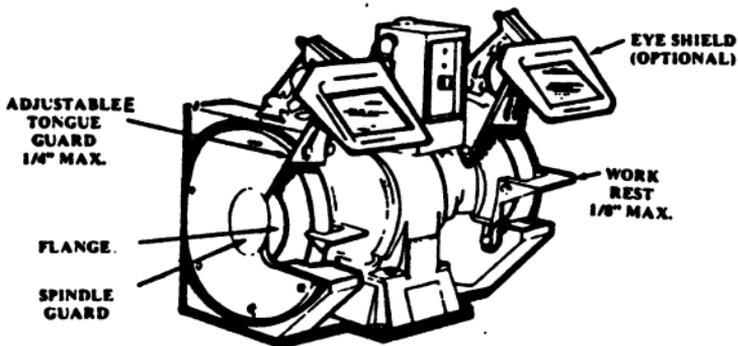


Figure 18: Grinder safety guards. (NIOSH Health and Safety Guide for Manufacturers of Lighting Fixtures.)

ted. Plenty of make-up air must be supplied safely. The make-up air must not be heated inside the spray booth. [8 CAC 5153 (c)]

4. Workers in spray booths must wear proper respirators if they are downstream from the object being sprayed. [8 CAC 5153(g)]
5. Waste which can catch on fire must not build up in spray areas. If this happens, spraying must stop until it is cleaned up. [8 CAC 5453(c)]
6. Used filter pads and rolls must be kept completely covered in water or be immediately isolated and then thrown away at the end of the day. [8 CAC 5447(a)(3)]
7. In dry type spray booths, overspray dry filters or filter rolls must have gauges or alarms which measure the air velocity. [8 CAC 5447(a)(1)]

D. Grinding Machines

1. Stationary grinders must be securely mounted and heavy enough to prevent dangerous vibration. [8 CAC 3576(a)]

2. Any grinder where the worker must hold the work material must have a work rest (unless the shape of work interferes). Work rests must be strongly constructed, and must be adjustable when the wheel wears down. They must be closely adjusted to the wheel (no more than 1/8 inch separation) in any case where the work material might become jammed between the wheel and the work rest. [8 CAC 3577(e)]
3. Whenever possible, the hoods or guards on grinding wheels must be built to protect workers from flying pieces of broken or burst wheel. Exceptions: when grinding inside of work object or using a portable drill with a wheel less than three inches in diameter. [8 CAC 3577(b)]
4. Wheel safety guards must cover the spindle end, nut and flange projections. Safety guards must be properly aligned with the wheel. The attachment of the guard must be stronger than the guard itself. (Exceptions: portable saws and some cylindrical grinding machine operations.) [8 CAC 3577(c)]
5. For bench and floor stands, and cylindrical grinders, safety guards must be built so that they can be adjusted down for smaller wheels. The distance between the guard and the wheel cannot be more than 1/4 inch. [8 CAC 3578(g)]
6. On bench and floor stands, no more than 1/4 (90°) of the grinding wheel edge can be exposed. [8 CAC 3578(a)]
7. On cylindrical grinders, no more than 1/2 (180°) of the wheel may be exposed. [8 CAC 3578(b)]
8. On swing frame and portable grinders no more than the bottom half (180 degrees) wheel may be exposed. [8 CAC 3578 (d)]

9. Portable grinders can only be used as bench grinders [8 CAC 3576(b)] if:
 - they are secured and bolted with band clamps;
 - they have standard wheel guards and work rests (see # 2-4 above); and
 - there is plenty of clearance between the wheel and bench.
10. Grinding wheels which are cracked, broken, or out of balance must not be used. [8 CAC 3579 (b)]
11. Grinding wheels must not be used at speeds faster than the manufacturer's recommended maximum (which must be marked permanently on each wheel). Exception: mounted wheels must be operated at speeds listed in 8 CAC 3581. [8 CAC 3581(a)(b)(c)]

E. Die Casting Machines

1. Die casting machines must be shielded:
 - between machines at the parting line of the die to protect against metal spitting [8 CAC 4265(a)], and
 - so that workers will be protected from molten metal. [8 CAC 4265(b)]
2. Both cold chamber and hot chamber die casting machines must be built so that [cold chamber-- 8 CAC 4261; hot chamber--8 CAC 4260]:
 - two hands are necessary to operate the controls until the die are completely closed, or

- the controls are too far from the die parting line for the operator to reach it with a free hand, or
- it has a sliding gate guard which must be closed in order for the die to close, or
- for cold chamber only, controls require two hands except for the last two inches of closing cycle, during which an interlocking limit switch is activated.

F. Metal Working Machines

1. Circular metal cutting saws [8 CAC 4231]:
 - must have an adjustable hood that covers at least to the depth of the teeth and never leaves more than 3/8 inch between the guard and the material.
 - may have a horizontally sliding guard or a guard with an opening for the stock when cutting material that has an odd shape. Exceptions: 1) hot metal saws; 2) saws with speeds less than 500 ft/min; 3) electrotype or stereotype saws which have safety glass shields.
 - must have a guard for the parts of the saw blade under the table.
2. On buffing and polishing machines, exposed arbors and arbor ends without acorn nuts must be guarded. [8 CAC 4237]
3. Tumbling barrels must be completely enclosed or have movable guardrails with an interlock so that the drum can't turn unless the guardrails are closed. [8 CAC 4238]

G. Wood Working Machines and Saws

1. Dangerous knife and cutting heads of wood shapers and other machines must be guarded. [8 CAC 4318(a)]
2. On radial arm saws (horizontal pull):
 - there must be a stop which prevents the saw blade from passing the front edge of the table. These stops must be easy to inspect and be kept in good condition. [8 CAC 4309 (b)]
 - the upper saw blade and arbor ends must be guarded. [8 CAC 4309(a)]
 - an anti-kickback device must be used during ripping operations. [8 CAC 4309(c)]
 - the saw must return automatically to the back of the table. [8 CAC 4309(d)]
3. On band saws:
 - all parts of the blade must be guarded, except between the guide rolls and table. [8 CAC 4310(a)]
 - band saw wheels must be fully enclosed. [8 CAC 4310(b)]
4. Belt sanders must have both pulleys and the unused run of the sanding belt enclosed. For pulleys with smooth disc wheels, rim guards are acceptable. [8 CAC 4312]
5. Circular rip saws (manual feed) and circular crosscut saws must have hoods which cover the saw at least to the depth of the teeth. The hood must be adjustable so that the distance between the guard and the cutting material is never more than one-half inch. [8 CAC 4302(a); 8 CAC 4300 (a)(b)(c)] On circular rip saws, "kick-back" must be prevented by a hood or other device. A

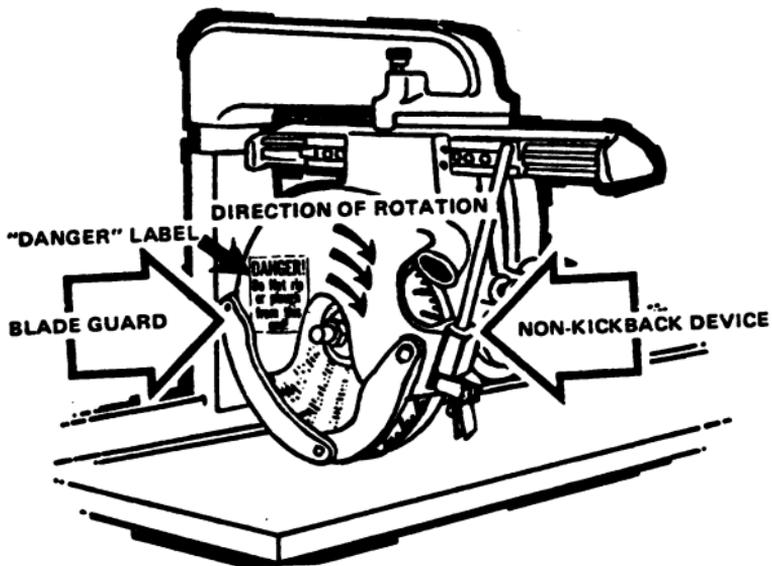


Figure 19:
 Radial arm saw guards. (NIOSH Health and Safety Guide for Foundries. April, 1976.)

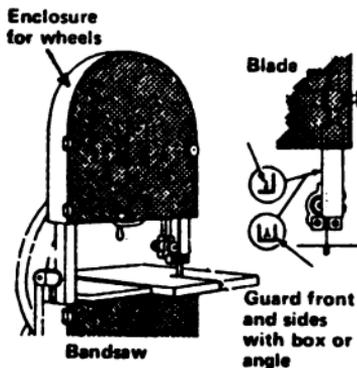


Figure 20:
 Band saw guarding. (NIOSH Health and Safety Guide for Foundries. April, 1976.)

pusher stick must be provided and used. [8 CAC 4300(d)]

H. Compressed Air

1. Compressed air shall be used safely and with proper body and eye protection. [8 CAC 3301(c)]
2. Compressed air cannot be used to blow dirt off clothing while it is being worn. [8 CAC 3301(a)]

I. Handling Gas Cylinders

1. Compressed gas cylinders must be stored and moved without danger of falling or rolling. Liquefied fuel-gas cylinders must be stored and moved right-side up. [8 CAC 4650(e)]
2. All gas cylinders in service or in trucks must be in racks or tied down. [8 CAC 4650(h)]
3. Oxygen cylinders must be at least 20 feet away from materials which can burn easily, like oil, grease, stocks of carbide, acetylene, or other fuel gas cylinders. [8 CAC 4845(w)]
4. Oil or grease from clothing, hands, or surfaces must never come into contact with an oxygen stream or oxygen equipment. [8 CAC 4845(e)]
5. Safety devices on cylinders must not be disturbed. [8 CAC 4845(n)] Any leaking safety devices must be tagged and repaired quickly. [8 CAC 4845(m)]



Figure 21: Abuse of compressed air. (Ontario PIRG: *The Magic and Deadly Dust*. 1980.)

CHAPTER 10. HOISTS AND CRANES

A. Hoists

1. Each hoist must have its rated load clearly marked. [8 CAC 4973]
2. All chains and ropes shall be strong enough to safely lift the maximum load (as stated in the manufacturer's tables). [8 CAC 4980(a)]
3. When the hook is lowered completely, at least two complete turns of rope must be wrapped around the drum. [8 CAC 4980(b)]
4. The operating controls must be marked with the direction of motion. [8 CAC 4975]
5. In general, end attachments must be made following the manufacturer's instructions. Socketing must be done with zinc (spelter). No "contractor's standby" (knot and clip) attachments may be used. [8 CAC 4981]

B. Loading and Operating Cranes

1. A crane must not be loaded more than is safe or more than its rated capacity, whichever is smaller. If a load cannot be weighed, but seems too large, a qualified person must estimate the weight and okay the load before the crane operator may lift. [8 CAC 4999(a)]
2. Baskets, tubs, skips, etc. must not be loaded more than is safe. [8 CAC 4999(b)(3)]
3. The load must be:
 - safely attached to the hook by slings or other suitable apparatus. [8 CAC 4999(b)(1)]
 - hooked so that it won't swing when raised. [8 CAC 4999(d)(3)]

4. Chain and rope slings must not have twists or kinks. [8 CAC 4999(b)(2)]
5. The hoist rope must not be wrapped around the load. [8 CAC 4999(b)(4)]
6. The worker directing the lift must make sure:
 - the crane is properly leveled and, if necessary, blocked. [8 CAC 4999(c)]
 - the load is secure and balanced. [8 CAC 4999(c)]
7. The crane operator must always move the load safely and should not carry loads over other workers. [8 CAC 4999(g)]
8. In general, operations must be performed so that workers are not exposed to overhead loads. Whenever a load attached by load block hooks must pass over workers, safety type hooks or their equivalent must be used. [8 CAC 5002]
9. When a load is left suspended, it must:
 - be held with both a brake and drum holding mechanisms. [8 CAC 4999(i)(1)]
 - if unattended, be supported from below. [8 CAC 4999(i)(2)]

C. Crane Inspection

1. Before every shift a qualified person (e.g., crane operator) must inspect the following crane parts for wear, breakage, and maladjustment [8 CAC 5031(a)]:
 - moving parts;
 - limit switches, hooks, ropes, attachment chains, and end connections;
 - air or hydraulic systems.

2. At least once every three months (or after 750 operating hours), a written report must be made of the crane's condition. [8 CAC 5031(b)]
3. Every year a registered engineer or accredited inspector must make a complete examination of the crane. [8 CAC 5031(c)]
4. Cranes with a rated capacity of more than three tons must be tested and inspected every year by a registered engineer or accredited inspector. [8 CAC 5021(b)] These cranes must not be used unless certificates documenting the tests and examination are up-to-date. [8 CAC 5021(a)]
5. All cranes must be "unit proof" tested (with a capacity load) every four years or after major structural repairs. [8 CAC 5022(a)]

D. Crane Maintenance

1. When unsafe conditions are found during inspections, adjustments and repairs must be done quickly by qualified workers. [8 CAC 5034(a)] Any condition which creates an immediate danger must be corrected **immediately**. [8 CAC 5031]
2. Brakes, safety devices, control systems, power plants, and functional operating mechanisms must be correctly adjusted. [8 CAC 5034(b)]

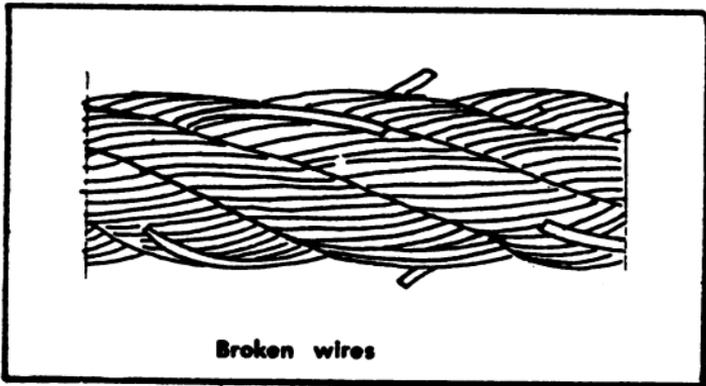
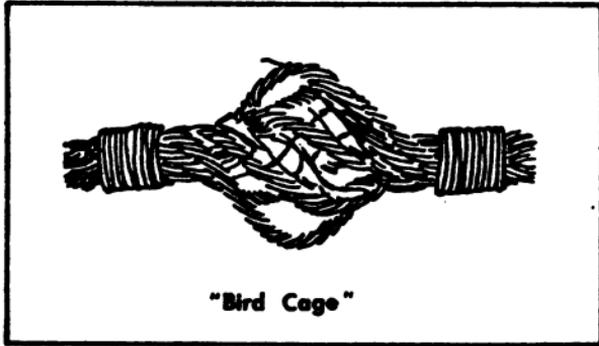
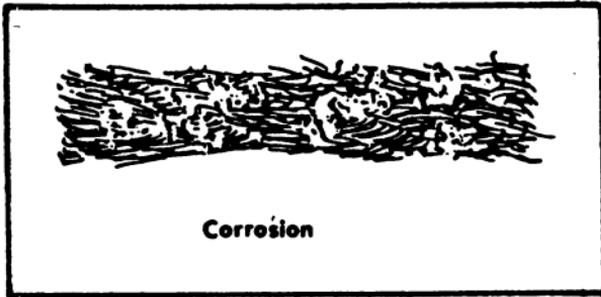


Figure 22:
Wire rope must be inspected for damage. (NIOSH: A
Guide to Good Work Practices for Operators - Cranes.
September, 1978.)

CHAPTER 11. INDUSTRIAL TRUCKS AND FORKLIFTS

A. Inspection and Maintenance

1. On every shift, drivers must check the truck's tires, horn, lights, battery, controller, brakes, steering, and fork lift system. If a hazard exists, the foreman or mechanic must be told, and the truck may not be used until it is fixed. [8 CAC 3664(a)(7)]
2. Every industrial truck must have:
 - brakes which can stop the truck when fully loaded. [8 CAC 3661(a)]
 - a parking brake. [8 CAC 3661(b)]
 - a working horn louder than the normal background noise. [8 CAC 3661(c)]
 - overhead protection (e.g., a canopy) whenever there is danger of things falling on the driver. [8 CAC 3657(c)]
3. No trucks can be operated with a leak in the fuel system. [8 CAC 3664(a)(8)]

B. Loads

1. On lift trucks, the rated lifting capacity (maximum load) must be posted where the driver can easily see it. [8 CAC 3660(a)]
2. Trucks and fork lifts must not be loaded to more than their rated capacity. [8 CAC 3664(a)(25); 8 CAC 3660(b)]
3. Loads must be piled and tied down so they are completely stable. [8 CAC 3704]

C. Driving and Operating Rules

Every employer must post and follow these rules:

1. Workers must be adequately trained and have permission from their employer before they can operate trucks. [8 CAC 3664(a)(1)]
2. Drivers must stay at safe speeds, pass only when safe, and honk at blind corners and intersections. [8 CAC 3664(a)(9)-(11)]
3. A vehicle cannot be moved unless the driver is looking in the direction of travel and the path is clear of people [8 CAC 3664(a)(12)]
4. Student driving and horseplay are prohibited. [8 CAC 3664(a)(2)]
5. Workers must never ride on forks or on any part of a truck where there is no proper riding place. [8 CAC 3664(a)(3)(4)]
6. Workers must not put any part of their bodies outside the truck where they might be hit. [8 CAC 3664(a)(5)]
7. Workers may never go under the forks unless the forks are blocked. [8 CAC 3664(a)(6)]
8. Forks must be carried as low as possible. [8 CAC 3664(a)(15)]
9. When a driver (or lift operator) leaves a vehicle [8 CAC 3664(a)(16)]:
 - the power must be shut off unless the front and rear wheels are blocked;
 - the brakes must be set;
 - the mast position must be vertical;
 - the forks must be down; and
 - on a hill or slope, the wheels must be blocked.

Exception: If the driver is less than 25 feet away and can see the truck, it is only necessary to lower the forks and set the brakes. [8 CAC 3664(a)(17)]



Figure 23:
Drivers must be protected from falling objects.
(NIOSH Health and Safety Guide for Manufacturers
of Woodworking Machinery. March, 1979.)

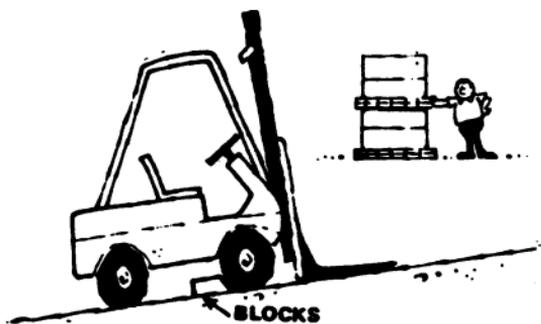


Figure 24:
Wheels must be blocked on a hill. (NIOSH Health and
Safety Guide for Manufacturers of Woodworking Machinery.
March, 1979.)

CHAPTER 12. FIRE PREVENTION

A. Preventing Flarebacks

1. Only specially trained workers are allowed to light equipment. Lighting instructions must be clearly posted near the equipment. [8 CAC 3311(a)]
2. Fireboxes and combustion chambers must be purged or well-vented before lighting. [8 CAC 3311(b)]
3. Extension lighting rods must be provided and used where necessary. Valves or other controls must be located where workers won't be in danger if a flareback occurs. [8 CAC 3311(c)]

B. Flammable Liquids

1. All flammable liquids must be plainly marked with a warning label. [8 CAC 5417(a)]
2. Flammable liquids must be stored and transported in closed containers. [8 CAC 5417(e)]
Drums containing flammable liquids cannot be stored where they are exposed to heat. [8 CAC 5419]
3. Chemicals which, when mixed together, create toxic, explosive, or flammable substances must be stored separately. [8 CAC 5184(a)]
4. Flammable liquids must not be used:
 - for indoor washing without adequate ventilation [8 CAC 5417(b)], or
 - for spray cleaning, except outdoors or in a ventilated booth. [8 CAC 5417(c)]
5. Whenever work is done inside a tank or small area where flammable liquids are or have been stored, the worker must be told about the dangers. Pipelines to the tank must be

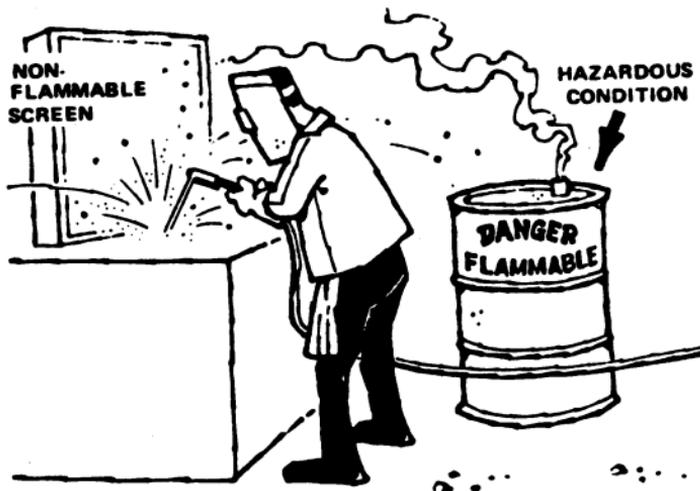


Figure 25:
Flammable liquids must be stored safely. (NIOSH: *Good Practices for Employees - Auto Body Repair Shops*. August, 1977.)

disconnected. If the work requires using a flame or other source of ignition, the vessel must be cleaned and fire tested beforehand. [8 CAC 5420(a)]

6. To prevent fires starting from static electricity, all flammable liquids including tanks containing light oils, must be effectively bonded or grounded. [8 CAC 5168(a)(b)]
7. When flammable liquids are being transferred between containers, both containers must be bonded and grounded. [8 CAC 5451(p)]

C. Fire Extinguishers

1. Portable fire extinguishers must be:
 - kept fully charged and in their assigned places. [8 CAC 6151(b)]
 - placed along normal paths of travel. [8 CAC 6151(c)]
 - kept in full view. [8 CAC 6151(d)]
 - placed so that the top of the extinguisher is not more than five feet from the floor. (If it weighs more than 40 lbs., it can't be more than 3-1/2 feet from the floor.) [8 CAC 6151(g)]
 - available in the correct sizes and quantities, according to the workplace fire hazard level. (See 8 CAC 6156 for details.)
2. Extinguishers must be checked at least once a month [8 CAC 6159(a)] to make sure:
 - they are in their assigned places;
 - they have not been operated; and
 - they are undamaged.

3. At least once a year, extinguishers must be thoroughly inspected by a person registered with the State Fire Marshal. [8 CAC 6151(e); 6160(a) (b)] A signed and dated maintenance tag must be on the extinguisher. [8 CAC 6160(f)] Any needed repairs or recharging must be done right away. [8 CAC 6160(b)]
4. For standpipe and hose systems, hose stations must be put in places where they are easy to see and not likely to be blocked or obstructed. Hose outlets must be easy to reach and must not be more than six feet from the floor. [8 CAC 6165(d)]

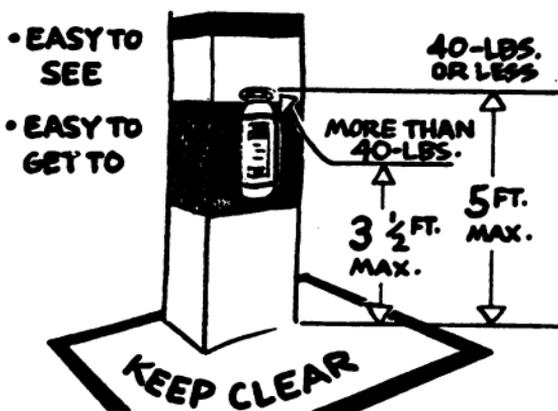


Figure 26:
Placement of fire extinguishers. (NIOSH Health and Safety Guide for Foundries. April, 1976.)

CHAPTER 13. ELECTRICAL SYSTEM

A. General Rules

1. Only qualified people can work on electrical equipment. [8 CAC 2320.1]
2. All electrical installations must be maintained in safe condition. [8 CAC 2340.1]
3. Electric equipment must be firmly secured to the wall or surface where it is mounted. [8 CAC 2340.13]
4. Electrical equipment and wiring must be protected from damage, deterioration, and extreme temperatures. [8 CAC 2340.26; 2340.11]
5. Covers or barriers must be installed on boxes, fittings, and enclosures to prevent accidental contact with live parts. [8 CAC 2340.17(a)] Any openings in fittings or boxes must also be well-guarded. [8 CAC 2340.23]
6. Enough working space must be kept open around all electrical equipment to allow for easy and safe operation and maintenance. [8 CAC 2340.16 (a)] (The specific dimensions of required clearances are shown in 8 CAC 2340.16(b))
7. Each disconnecting means for motors and utilization equipment and each service, feeder and branch circuit must be clearly labelled. [8 CAC 2340.22]
8. All switches (and circuit breakers used as switches) must be easy to reach. They may not be more than 6-1/2 feet from the floor unless the equipment they supply is also more than 6-1/2 feet high. [8 CAC 2480.8(a)]

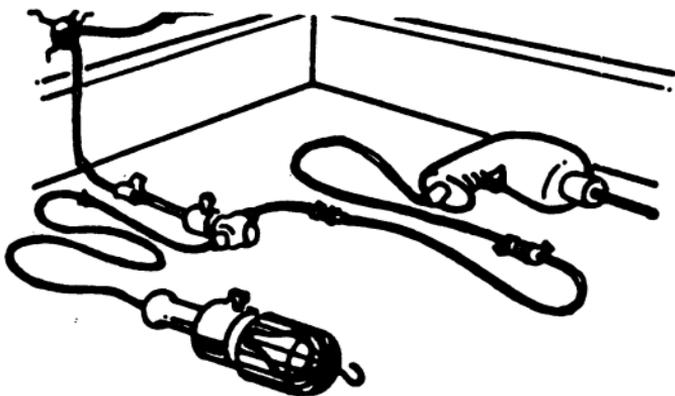


Figure 27:
Misuse of flexible cords. (NIOSH Health and Safety
Guide for Manufacturers of Toys and Games. June, 1976.)

B. Grounding

1. Powered tools and electrical equipment with exposed non-current carrying metal parts must be grounded. Double insulated power tools need not be grounded. [8 CAC 4395.45]
2. The path to ground from circuits, equipment, and conductor enclosures must be permanent and continuous. [8 CAC 2395.51(a)(1)]

C. Flexible Cords

1. Flexible cords must not be [8 CAC 2500.8(a)]:
 - used as a substitute for fixed wiring;
 - run through holes in walls, ceilings, or floors;
 - run through doors or windows; or
 - attached to or hidden behind walls or building surfaces.
2. Flexible cords must be
 - continuous lengths without splices or taps. (Splicing is allowed on cords that are No. 12 or larger (Type S)). [8 CAC 2500.9]
 - fastened so that there is no pull on joints or terminal screws. [8 CAC 2500.10]

D. High Voltage Equipment (more than 600 volts)

1. High voltage metal-enclosed switchgear and control assemblies must only be accessible to qualified people. [8 CAC 2863]
2. High voltage equipment must be enclosed or locked up, and live parts must be fenced or guarded. [8 CAC 2930]

3. High voltage parts which are used during operation or maintenance must be readily and safely accessible. [8 CAC 2930(a)]

APPENDIX:

FURTHER READING AND REFERRALS

A. Cal/OSHA and California Health and Safety Laws.

1. California Administrative Code--Title 8, Industrial Relations.

All, or sections, of Title 8 available from:

Documents and Publications Ordering Dept.
P.O. Box 1015
North Highlands, CA 95660.

2. State of California Labor Code--Division 1, Chapters 6 and 6.5; Division 5.

Describes Cal/OSHA functions and structure.

Available from same address as (1), above, or at public and law libraries.

3. California Division of Occupational Safety and Health, Cal/OSHA Communications Unit.

Booklets available on Cal/OSHA laws and services.

Available from:

Communications Unit
P.O. Box 603
San Francisco, CA 94101
(415) 557-2237.

4. California Division of Occupational Safety and Health, Cal/OSHA Consultation Service.

Offers information and assistance to employers and worker groups.

Toll-free telephone: (800) 652-1476.

5. California Division of Occupational Safety and Health, District Offices.

Provide information and accept complaints. Twenty locations in California.

B. Foundry Health and Safety.

1. Labor Occupational Health Program publications:

-Occupational Health and Safety: A Manual for Foundry Workers. 105 pp. Contains detailed descriptions of health and safety hazards.

-Foundry Workers Instructor's Guide. 59 pp. For use by health and safety instructors in conjunction with the foundry manual, above.

-Getting the Facts. 100 pp. Contains a large annotated bibliography and complete resource list for occupational safety and health.

All available from:

Labor Occupational Health Program
Institute of Industrial Relations
University of California
2521 Channing Way
Berkeley, CA 94720
(415) 642-5507.

2. National Institute for Occupational Safety and Health (NIOSH) publications:

-Health and Safety Guide for Foundries, USDHEW, NIOSH, 1976. 88 pp. (GPO No.: 017-033-00123-5.)

-Health Hazards in a Foundry, USDHEW, NIOSH, 1976. A series of three pamphlets. (GPO Nos.: 017-033-00243-6; 017-033-00181-2; 017-033-0183-9.)

All available from:

U.S. Government Printing Office
Superintendent of Documents
Washington, D.C. 20402.

3. California Department of Health, Hazard Evaluation System and Information Service (HESIS).

Individuals may phone in requests for health information about particular workplace substances or chemicals:

HESIS
2151 Berkeley Way, Room 504
Berkeley, CA 94704
(415) 540-3014.

4. Working Steel, Ken Light and Charles West. 20-minute black-and-white 16 mm. film on foundry hazards. For purchase, contact LOHP (see (1), above); for rental, contact:

LOHP Films
P.O. Box 315
Franklin Lakes, N.J. 07417
(201) 891-8240.

5. "Disabling Work Injuries and Illnesses in Foundries, California, 1973 and 1974," Work Injuries and Illnesses in California Quarterly, May, 1978. 50 pp.

Available from:

Division of Labor Statistics and Research
P.O. Box 603
San Francisco, CA 94101.

